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2018-19 CATALOG

The statements set forth in the Catalog are for informational purposes only and should not be construed as the basis of a contract between a student and the Institute.

While the provisions of the Catalog will ordinarily be applied as stated, Georgia Tech reserves the right to change any provision listed in the Catalog, including but not limited to academic requirements for graduation, without actual notice to individual students. Every effort will be made to keep students advised of any such changes. Information regarding any changes will be available through the Office of the Registrar, the Office of the Vice President for Student Life and Dean of Students, and the Schools and Colleges. It is especially important for each student to note that it is her or his own responsibility to be aware of current requirements for a chosen degree program.

This edition of the Catalog takes effect in Summer Session 2018 and shall remain in effect through Spring Semester 2019.
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- University System of Georgia (USG) Member Institutions (p. 13)
- Office of the President (p. 13)
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Member Institutions

Research Universities
- Augusta University
- Georgia Institute of Technology
- Georgia State University
- University of Georgia

Comprehensive Universities
- Georgia Southern University
- Kennesaw State University
- University of West Georgia
- Valdosta State University

State Universities
- Albany State University
- Armstrong State University
- Clayton State University
- Columbus State University
- Fort Valley State University
- Georgia College and State University
- Georgia Southwestern State University
- Middle Georgia State University
- Savannah State University
- University of North Georgia

State Colleges
- Abraham Baldwin Agricultural College
- Atlanta Metropolitan State College
- Bainbridge State College
- College of Coastal Georgia
- Dalton State College
- Darton State College
- East Georgia State College
- Georgia Gwinnett College
- Georgia Highlands College
- Gordon State College
- South Georgia State College

Office of the President

G. P. "Bud" Peterson
President

Executive Vice Presidents
Rafael L. Bras

Provost and Executive Vice President for Academic Affairs
Stephen E. Cross
Executive Vice President for Research

Cabinet
Barrett H. Carson
Vice President for Development

Lynn M. Durham
Associate Vice President and Chief of Staff

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Vice President for Institute Diversity

Bonnie Ferri
Vice Provost for Graduate Education and Faculty Development

Patrick J. McKenna
Vice President, Legal Affairs and Risk Management

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Vice Provost for Undergraduate Education

Dene H. Sheheane
Vice President for Government and Community Relations

John M. Stein
Vice President of Student Life, Dean of Students

Deans
Maryam Alavi
Scheller College of Business

Nelson C. Baker
Georgia Tech Professional Education

Steven P. French
College of Design

Zvi Galil
College of Computing

Paul Goldbart
College of Sciences

Steven W. McLaughlin
College of Engineering

Catherine Murray-Rust
Libraries

Jacqueline Royster
Ivan Allen College of Liberal Arts

Accreditation

The Georgia Institute of Technology is accredited by the Southern Association of Colleges and Schools Commission on Colleges to award bachelor’s, master’s, and doctoral degrees. Contact the Southern Association of Colleges and Schools Commission on Colleges for answers to questions about Georgia Tech’s accreditation.

Southern Association of Colleges and Schools, Commission on Colleges (http://www.sacscoc.org)
Additionally, many Colleges, units, and programs are individually accredited by the appropriate agencies specific to them.

College of Architecture
In the United States, most state registration boards require a degree from an accredited professional degree program as a prerequisite for licensure. The National Architectural Accrediting Board (http://www.naab.org/home) (NAAB), which is the sole agency authorized to accredit U.S. professional degree programs in architecture, recognizes three types of degrees: the Bachelor of Architecture, the Master of Architecture, and the Doctor of Architecture.

A program may be granted a 6-year, 3-year, or 2-year term of accreditation, depending on the extent of its conformance with established educational standards.

The Doctor of Architecture and Master of Architecture degree programs may consist of a pre-professional undergraduate degree and a professional graduate degree that, when earned sequentially, constitute an accredited professional education. However, the pre-professional degree is not, by itself, recognized as an accredited degree.

The School of Architecture at Georgia Tech offers the following NAAB-accredited degree programs:

- Master of Architecture, 2-year track (pre-professional degree in Architecture + 60 credits required)
- Master of Architecture, 3-year track (non-pre-professional degree + 108 credits required)

The Bachelor of Science in Building Construction is accredited by the American Council for Construction Education (http://www.acce-hq.org) (ACCE). The Master of Science in Building Construction and Facility Management is accredited by the International Facility Management Association (https://www.ifma.org) (IFMA). The School of Building Construction has also received international recognition by the Royal Institute of Chartered Surveyors (http://www.rics.org/us) (RICS).

The Master of City and Regional Planning program is fully accredited by the Planning Accreditation Board (http://www.planningaccreditationboard.org) (PAB).

The Bachelor of Science in Industrial Design and the Master of Industrial Design degree programs have been accredited by the National Association of Schools in Art and Design (http://nasad.arts-accredit.org) (NASAD) and are recognized by the Industrial Designers Society of America.

College of Computing
The following undergraduate computing programs are accredited by the Computing Accreditation Commission of the Accreditation Board for Engineering and Technology (http://www.abet.org) (ABET).

- Bachelor of Science in Computer Science
- Bachelor of Science in Computational Media

College of Engineering
The following undergraduate engineering programs are accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (http://www.abet.org) (ABET).

- Bachelor of Science in Aerospace Engineering
- Bachelor of Science in Biomedical Engineering
- Bachelor of Science in Chemical and Biomolecular Engineering
- Bachelor of Science in Civil Engineering
- Bachelor of Science in Computer Engineering
- Bachelor of Science in Electrical Engineering
- Bachelor of Science in Environmental Engineering
- Bachelor of Science in Industrial Engineering
- Bachelor of Science in Materials Science and Engineering
- Bachelor of Science in Mechanical Engineering
- Bachelor of Science in Nuclear and Radiological Engineering

The Bachelor of Science in Nuclear Engineering and the PhD with a major in Nuclear Engineering - Medical Physics Option programs are accredited by the Commission on Accreditation of Medical Physics Educational Programs (http://www.campep.org/campeplstgrad.asp) (CAMPEP).

College of Sciences
The American Chemical Society (http://www.acs.org/content/acs/en.html) has certified the curriculum leading to the Bachelor of Science in Chemistry.

The Human Factors and Ergonomics Society (https://hfes.org/web/Default.aspx) has accredited the curriculum leading to the Doctor of Philosophy with a major in Psychology, concentration in Engineering Psychology.

Scheller College of Business
The Scheller College of Business and all of its degrees are accredited by the Association to Advance Collegiate Schools of Business (http://www.aacsb.edu) (AACSB International).

Division of Student Affairs
The Counseling Center is accredited by the International Association of Counseling Services (http://www.iacscinc.org/home.html) (IACS), which is the accrediting body for counseling services provided by college and university counseling centers. The Counseling Center sponsors pre-doctoral internship training program in psychology for doctoral students in counseling and clinical psychology programs. The internship training program is accredited by the American Psychological Association (http://www.apa.org) (APA).

Georgia Tech Language Institute
The Language Institute's Intensive English Program is accredited by the Commission on English Language Program Accreditation (http://www.cea-accredit.org) (CEA) and thus meets the CEA Standards for English Programs and Institutions.

Accreditation Board for Engineering and Technology (ABET) (http://www.abet.org)
- Bachelor of Science in Computer Science
- Bachelor of Science in Computational Media
- Bachelor of Science in Aerospace Engineering
• Bachelor of Science in Biomedical Engineering
• Bachelor of Science in Chemical and Biomolecular Engineering
• Bachelor of Science in Civil Engineering
• Bachelor of Science in Computer Engineering
• Bachelor of Science in Electrical Engineering
• Bachelor of Science in Environmental Engineering
• Bachelor of Science in Industrial Engineering
• Bachelor of Science in Materials Science and Engineering
• Bachelor of Science in Mechanical Engineering
• Bachelor of Science in Nuclear and Radiological Engineering

American Psychological Association (APA) (http://www.apa.org/ed/accreditation)
  • Internship training program in the Counseling Center

Association to Advance Collegiate Schools of Business (AACSB International) (http://www.aacsb.edu)
  • The Scheller College of Business and all of its degree programs

American Council for Construction Education (ACCE) (http://www.acce-hq.org)
  • Bachelor of Science in Building Construction

Commission on Accreditation of Allied Health Education Programs (CAAHEP) (http://www.caahep.org)
  • Master of Science in Prosthetics and Orthotics

Commission on Accreditation of Medical Physics Educational Programs (CAMPEP) (http://www.campep.org/campeplstgrad.asp)
  • Master of Science in Medical Physics
  • Doctor of Philosophy with a Major in Nuclear Engineering – Medical Physics Option

Commission on English Language Program Accreditation (CEA) (http://www.cea-accredit.org/accredited-sites/accredited-site-search)
  • Intensive English Program, Georgia Tech Language Institute

  • Doctor of Philosophy with a major in Psychology, concentration in Engineering Psychology.

International Association of Counseling Services (IACS) (http://www.iacsinc.org/home.html)
  • Counseling Center

International Facility Management Association (IFMA) (https://www.ifma.org)
  • Master of Science in Building Construction and Facility Management

National Architectural Accrediting Board (NAAB) (http://www.naab.org/home)
  • Master of Architecture

National Association of Schools in Art and Design (NASAD) (http://nasad.arts-accredit.org)
  • Bachelor of Science in Industrial Design
  • Master of Science in Industrial Design

Planning Accreditation Board (PAB) (http://www.planningaccreditationboard.org)
  • Master of City and Regional Planning

Southern Association of Colleges and Schools, Commission on Colleges (http://www.sacscoc.org)
  • Georgia Tech, as an institution
COLLEGES AND SCHOOLS

- College of Computing (p. 16)
- College of Design (http://www.catalog.gatech.edu/colleges/coa)
- College of Engineering (http://www.catalog.gatech.edu/colleges/coe)
- College of Sciences (p. 44)
- Ivan Allen College of Liberal Arts (p. 53)
- Scheller College of Business (p. 70)

College of Computing

The founding of the College of Computing in 1990 as a focal point for the interdisciplinary advancement of computing caps a history that began in 1963 with the establishment of the School of Information Science. In 1972, this school was succeeded by the School of Information and Computer Science, the immediate predecessor of the current College of Computing. The College of Computing at Georgia Tech is one of the first college-level units devoted to the study of computing in the country.

Computer science is an important basis for many activities and is a natural and powerful partner with a variety of other disciplines. The College offers instructional and research programs in many areas, including algorithms and data structures, intelligent systems and robotics, computer architecture, cognitive science, databases, distributed and parallel systems, educational technology, graphics and visualization, human-computer interaction, information security, information systems, networking and telecommunications, operating systems, parallel architectures, programming languages, software engineering, and theories of automata and computation.

Beginning in fall 2006, the undergraduate program was organized around the Threads™ program developed by College of Computing faculty. A Thread™ is an intuitive, flexible, and mutually strengthening set of courses that allows students to craft a distinctive future in any computing-related field. Based on their particular interests, students will choose two Threads™ consisting of computing combined with modeling and simulation, devices, theory, information internetworks, intelligence, media, people, or platforms in order to weave a technical degree with a broad collection of skills and learning experiences they need to thrive in a globally competitive world. This approach allows the computing program to retain its strong computer science foundations yet encourages partnerships with the multitude of disciplines affected by computing and technology.

The College conducts an increasing number of interdisciplinary research and instructional programs jointly with other campus units and operates three centers of interdisciplinary research for the campus:

- The Center for Experimental Research in Computer Systems (CERCS);
- The Graphics, Visualization, and Usability (GVU) Center; and
- The Georgia Tech Information Security Center (GTISC).

The College's operations are housed in parts of five separate buildings on campus, including the College of Computing building.

The College awards:

- bachelor's degrees in computer science (CS),
- bachelor's degrees in computational media (jointly with the School of Literature, Media, and Communication),
- master's degrees in computer science,
- master's degrees in information security, and
- doctoral degrees in computer science and human-centered computing.

The College offers an undergraduate CS minor. The College also offers the Master's degree in human-computer interaction in collaboration with the School of Literature, Media, and Communication and the School of Psychology. The College is a sponsor of a multidisciplinary program in Algorithms, Combinatorics, and Optimization, an approved doctoral degree program at Georgia Tech. Master's and doctoral degrees in bioengineering can be pursued through the College as one of the units participating in the Institute-wide interdisciplinary Bioengineering Program. A doctoral degree in bioinformatics can also be pursued through the College in conjunction with the School of Biology.

The following undergraduate computing programs are accredited by the Computing Accreditation Commission of ABET, www.abet.org (http://www.abet.org):

- Bachelor of Science in Computer Science (p. 272)
- Bachelor of Science in Computational Media (p. 247)
- Algorithms, Combinatorics, and Optimization. PhD (p. 480)
- Analytics. MS (p. 509)
- Bioengineering. MS (p. 512), PhD (p. 482)
- Bioinformatics. MS (p. 512), PhD (p. 482)
- Computational Media. BS (p. 247)
- Computational Science and Engineering. MS (p. 516), PhD (p. 485)
- Computer Science. BS (p. 272), MS (p. 516), PhD (p. 486)
- Computing and Business. Minor (p. 544)
- Computing and Devices. Minor (p. 545)
- Computing and Information Internetworks. Minor (p. 544)
- Computing and Intelligence. Minor (p. 545)
- Computing and People. Minor (p. 546)
- Computing & Systems and Architecture. Minor (p. 547)
- Computing and Theory. Minor (p. 548)
- Cybersecurity. MS (p. 521)
- Human-Computer Interaction. MS (p. 526)
- Human-Centered Computing. PhD (p. 489)
- Machine Learning. PhD (p. 491)
- Robotics. PhD (p. 499)

Research Centers

Georgia Tech Information Security Center (GTISC)

The Georgia Tech Information Security Center, a National Center of Academic Excellence in Information Assurance Education, is an interdisciplinary center involving faculty from the College of Computing, School of Electrical and Computer Engineering, Georgia Tech Research Institute (GTRI), the Sam Nunn School of International Affairs, and the School of Public Policy. www.gtisc.gatech.edu (http://www.gtisc.gatech.edu)
Robotic Systems at Georgia Tech (RIM@GT)

The Center for Robotics and Intelligent Machines (RIM@Georgia Tech) leverages the strengths and resources of Georgia Tech in robotics education, research, and leadership by reaching across traditional boundaries to embrace a multidisciplinary approach. The College of Computing, College of Engineering, and the Georgia Tech Research Institute play key complementary roles through Tech’s traditional expertise in interactive and intelligent computing, control, and mechanical engineering. Emphasizing personal and everyday robotics as well as the future of automation, faculty involved with RIM@Georgia Tech help students understand and define the future role of robotics in society. www.robotics.gatech.edu (http://www.robotics.gatech.edu)

Algorithms and Randomness Center and ThinkTank (ARC ThinkTank)

The ARC ThinkTank brings together faculty from the College of Computing, the School of Mathematics, and the School of Industrial Systems Engineering at Georgia Tech to find algorithms and algorithmic models for real-world problems across the sciences and, in the process, seeking new directions and techniques for the emerging theory of algorithms. www.arc.gatech.edu/ (http://www.arc.gatech.edu)

GVU Center at Georgia Tech

The GVU Center at Georgia Tech is an interdisciplinary research center encompassing a number of individual colleges at Georgia Tech as well as external collaborators. GVU focuses on unlocking and amplifying human potential through technical innovation in computing technologies. The faculty and students associated with GVU bring expertise ranging from computer science and engineering to the humanities and design. It is through deep collaboration between these diverse domains that the GVU Center is able to engage in research that would otherwise be difficult to tackle in traditional academic and industrial settings. www.gvu.gatech.edu (http://www.gvu.gatech.edu)

Center for Experimental Research in Computer Systems (CERCS)

CERCS is one of the largest experimental systems programs in the U.S. focusing on complex hardware, communications, and system-level software, and applications that lead the innovation of new information and computing technologies. www.cercs.gatech.edu/ (http://www.cercs.gatech.edu)

School of Computational Science and Engineering

The School of Computational Science and Engineering (CSE) was established in 2005 to strengthen and better reflect the critical role that computation plays in the science and engineering disciplines at Georgia Tech and the broader technology community. At Georgia Tech, CSE is the academic discipline devoted to the systematic study and application of computer-based models of natural and engineered systems. This definition contains two significant elements. First, it acknowledges the essential role that computing and data play in scientific discovery and design and innovation in engineering. Secondly, by referring to CSE as a discipline, it recognizes that CSE has its own distinct body of knowledge.

As a school in the College of Computing, CSE supports interdisciplinary research and education in computer science, data science, and applied mathematics. CSE is designed to innovate and create new expertise, technologies, and practitioners.

CSE bridges the gap between traditional computer science (CS) and computational research. The division is currently developing programs that immerse students in computing with real-world computational problems and applications. Developing solutions to difficult computational problems that allow all the richness, subtleties, and requirements of the domain to be adequately considered or addressed is crucial.

CSE is concerned with those technologies that lie at the boundary between computer science, data science, and science and engineering. Some of these areas include:

- combinatorial optimization
- cybersecurity
- data analysis
- high performance computing
- large-scale analytics
- machine learning
- modeling and simulation
- numeric and geometric methods
- visualization

CSE involves deep collaboration with scientists and engineers, as well as traditional computer scientists. Therefore, school faculty team up with researchers and educators working in high impact areas both at Georgia Tech and at peer research organizations, such as national laboratories and industry research labs. Current projects span the following areas:

- aerospace engineering
- chemistry
- computational biology and genomics
- civil and environmental engineering
- data science
- healthcare informatics
- industrial and systems engineering
- materials science
- mechanical engineering
- national security and homeland defense

Master’s Degrees

- Master of Science in Analytics (p. 509)
- Master of Science in Bioengineering (p. 512)
- Master of Science in Computational Science and Engineering (p. 516)
- Master of Science in Computer Science (p. 516)

Doctoral Degrees

- Doctor of Philosophy with a Major in Bioengineering (p. 482)
- Doctor of Philosophy with a Major in Bioinformatics (p. 482)
- Doctor of Philosophy with a Major in Computational Science and Engineering (p. 485)
- Doctor of Philosophy with a Major in Computer Science (p. 486)
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Graduate Study in Computational Science and Engineering

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- Master of Science in Computer Science (p. 516)
- Master of Science in Analytics (p. 509)
- Master of Science in Bioengineering (p. 512)

Doctoral Degrees
- Doctor of Philosophy with a Major in Computational Science and Engineering (p. 485)
- Doctor of Philosophy with a Major in Computer Science (p. 486)
- Doctor of Philosophy with a Major in Machine Learning (p. 491)
- Doctor of Philosophy with a Major in Bioengineering (p. 482)
- Doctor of Philosophy with a Major in Bioinformatics (p. 482)

Bioengineering Programs
In response to the increased need for engineers and medical scientists with advanced training in bioengineering, Georgia Tech now offers master's and PhD degrees in bioengineering. The purpose of bioengineering as a research discipline is

- to develop new and better physical and mathematical concepts and techniques that may be applied to problems in medicine and biology,
- to the development of new medical technologies, and
- to the organization and delivery of cost-effective healthcare.

Interdisciplinary graduate programs in Bioengineering are offered by the College of Computing in conjunction with the Bioengineering Center in the Office of Interdisciplinary Programs, the College of Engineering, and the College of Sciences. The student's home unit will be the College of Computing, which, upon completion of the student's requirements, will recommend the degree. This interdisciplinary approach has been approved by the faculty in the Schools of Aerospace Engineering, Chemical and Biomolecular Engineering, Electrical and Computer Engineering, Materials Science and Engineering, Mechanical Engineering, and Polymer, Textile and Fiber Engineering, and by the deans of the Colleges of Computing, Engineering, and Sciences.

The program is for computer science or engineering graduates who wish to pursue a degree in bioengineering rather than in a traditional field of computing or engineering, or who have done bioengineering research in other disciplines. In addition, those interested students with non-engineering backgrounds (with degrees in such fields as physics, chemistry, biology, or mathematics) who meet the admission requirements will be admitted to the program. Applications from physicians with undergraduate degrees in engineering or the physical sciences will also be considered. All applications will be processed through the Bioengineering Center.

Additional information is available at www.bme.gatech.edu (http://www.bme.gatech.edu).

Master of Science in Bioengineering (p. 512)
Doctor of Philosophy with a Major in Bioengineering (p. 482)

Graduate Cooperative Programs
The Graduate Cooperative Education Program provides master's and doctoral degree students majoring in any discipline at Georgia Tech the opportunity to supplement their graduate studies with specialized work experience. Graduate co-op students gain experience with top employers, earn competitive salaries to help defray educational expenses, and expand post-graduation career options while on semester-long work assignments.

The Graduate Co-op Program is available to enrolled Georgia Tech students and is based upon academic achievement. Internships related to a student's field of study can receive academic approval as a graduate cooperative work assignment allowing students to work summer, fall, or spring semesters, full-time or part-time.

There are no fees associated with the Graduate Co-op Program and students are provided full-time enrollment status through their registration in a Graduate Co-op course. This permits students to retain all privileges of full-time enrolled students while on work assignments.

To participate in the Graduate Co-op Program, a student must

- have a 3.0 or better GPA,
- complete an online orientation session, and
- obtain a program participation letter from his or her major school.

Students normally identify their own job opportunities, but the Graduate Co-op Office provides access to a job posting database and can assist with career guidance, job searches, resumes, and cover letters. Graduate students accepting a graduate co-op/internship opportunity should see a Graduate Co-op Program advisor regarding offer letters, required academic approvals, registration permits, and any necessary work authorizations. Enrollment in a 6000-level co-op course, a noncredit/no-cost audit course with no student or Institute fees attached, is also required.

International students are eligible to participate, but F-1 visa holders must be enrolled for a minimum of nine months before being able to work off campus. All international students on F-1, J-1, and other appropriate visas must work with the Office of International Education (http://www.oie.gatech.edu) to secure work authorization documentation.

For more information on the Georgia Tech Graduate Co-op and Internship Program, visit: www.gradcoop.gatech.edu (http://www.gradcoop.gatech.edu).

School of Computer Science
Georgia Tech's School of Computer Science is home to a group of faculty and researchers with breadth and strength in all aspects of the computational process—from the algorithms to the architecture, from security to networking, from system design to the programming environments to databases.

Mission
The SCS mission is produce the people, tools, and ideas to power computation into the future: "We turn imagination into reality."

Bachelor's Degrees
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Doctor of Philosophy with a Major in Bioengineering (p. 482)

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The Graduate Cooperative Education Program provides master’s and doctoral degree students majoring in any discipline at Georgia Tech the opportunity to supplement their graduate studies with specialized work experience. Graduate co-op students gain experience with top employers, earn competitive salaries to help defray educational expenses, and expand post-graduation career options while on semester-long work assignments.

The Graduate Co-op Program is available to enrolled Georgia Tech students and is based upon academic achievement. Internships related to a student’s field of study can receive academic approval as a graduate cooperative work assignment allowing students to work summer, fall, or spring semesters, full-time or part-time.

There are no fees associated with the Graduate Co-op Program and students are provided full-time enrollment status through their registration in a Graduate Co-op course. This permits students to retain all privileges of full-time enrolled students while on work assignments.

To participate in the Graduate Co-op Program, a student must
- have a 3.0 or better GPA,
- complete an online orientation session, and
- obtain a program participation letter from his or her major school.

Students normally identify their own job opportunities, but the Graduate Co-op Office provides access to a job posting database and can assist with career guidance, job searches, resumes, and cover letters. Graduate students accepting a graduate co-op/internship opportunity should see a Graduate Co-op Program advisor regarding offer letters, required academic approvals, registration permits, and any necessary work authorizations. Enrollment in a 6000-level co-op course, a noncredit/no-cost audit course with no student or Institute fees attached, is also required.

International students are eligible to participate, but F-1 visa holders must be enrolled for a minimum of nine months before being able to work off campus. All international students on F-1, J-1, and other appropriate visas must work with the Office of International Education (http://www.oie.gatech.edu) to secure work authorization documentation.

For more information on the Georgia Tech Graduate Co-op and Internship Program, visit: www.gradcoop.gatech.edu (http://www.gradcoop.gatech.edu).

School of Interactive Computing
Interactive and intelligent computing is an emerging discipline on the frontier of ways computation impacts the external world. The School of Interactive Computing advances computing-mediated interactions by encompassing fields ranging from artificial intelligence and machine learning to graphics and computer vision to interface design and...
empirical methods. We don’t just evaluate technology, we create technology that makes interactions better. Much of the research within the School of Interactive Computing produces new artifacts that embody new capabilities or methods. Examples include:

- Individuals working with traditional computers
- Groups of people using ubiquitous computing capabilities throughout various environments
- Researchers visualizing scientific data
- Students developing and altering middle school physics simulations
- Automated intelligent surveillance systems monitoring airport tarmacs
- Robots delivering pharmaceuticals to patients in hospitals

Whether an advance is in robotics, augmented reality, or ubiquitous computing, it is developed in the context of a prototype. School of Interactive Computing students become proficient in many areas such as mechanical or electrical engineering, and industrial design. The School of Interactive Computing develops practitioners, future innovators and researchers by offering numerous degree programs.

At the undergraduate-level, the School of Interactive Computing is an integral part of the College’s BS in Computer Science, and oversees aspects of Computational Media’s Bachelor’s degree-offered jointly with the School of Literature, Communication and Culture (LMC). The School of Interactive Computing also administers the interdisciplinary Master’s in Human Computer Interaction (HCI) program in which students from the School of Interactive Computing, LMC, and Psychology participate. At the graduate-level the School of Interactive Computing students can pursue Master’s and PhD degrees in Computer Science, or a PhD in Human-Centric Computing—the first of its kind in the nation. The School of Interactive Computing is also developing a Robotics PhD to be offered in conjunction with schools from the College of Engineering.

Bachelor’s Degrees
- Bachelor of Science in Computational Media (p. 247)

Master’s Degrees
- Master of Science in Computer Science (p. 516)
- Master of Science in Human-Computer Interaction (p. 526)

Doctoral Degrees
- Doctor of Philosophy with a Major in Computer Science (p. 486)
- Doctor of Philosophy with a Major in Human-Computer Interaction (p. 489)
- Doctor of Philosophy with a Major in Machine Learning (p. 491)
- Doctor of Philosophy with a Major in Robotics (p. 499)

Graduate Study in Interactive Computing

Master’s Degrees
- Master of Science in Computer Science (p. 516)
- Master of Science in Human-Computer Interaction (p. 526)

Doctoral Degrees
- Doctor of Philosophy with a Major in Computer Science (p. 486)

Graduate Cooperative Programs

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There are no fees associated with the Graduate Co-op Program and students are provided full-time enrollment status through their registration in a Graduate Co-op course. This permits students to retain all privileges of full-time enrolled students while on work assignments.

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- obtain a program participation letter from his or her major school.

Students normally identify their own job opportunities, but the Graduate Co-op Office provides access to a job posting database and can assist with career guidance, job searches, resumes, and cover letters. Graduate students accepting a graduate co-op/internship opportunity should see a Graduate Co-op Program advisor regarding offer letters, required academic approvals, registration permits, and any necessary work authorizations. Enrollment in a 6000-level co-op course, a noncredit/no-cost audit course with no student or Institute fees attached, is also required.

International students are eligible to participate, but F-1 visa holders must be enrolled for a minimum of nine months before being able to work off campus. All international students on F-1, J-1, and other appropriate visas must work with the Office of International Education (http://www.oie.gatech.edu) to secure work authorization documentation.

For more information on the Georgia Tech Graduate Co-op and Internship Program, visit: www.gradcoop.gatech.edu (http://www.gradcoop.gatech.edu).

Undergraduate Study in Interactive Computing

Bachelor’s Degrees
- Bachelor of Science in Computational Media (p. 247)

School of Architecture

Location:
East Architecture Building
Architecture was established as a discipline at Georgia Tech in 1908, and the graduates of the program have helped shape the growth and physical climate of Atlanta, the region and the world. As the largest of the five units in the College of Design, the School of Architecture has several distinct degree programs, a reflection of its multiple missions. The undergraduate program, the Bachelor of Science in Architecture, advances Georgia Tech’s general education mission through a studio-based design curriculum providing a thorough grounding in liberal and technological knowledge.

At the core of the School is the professional program in architecture, the Master of Architecture, one requirement leading to licensure as a practicing architect. In addition, advanced study and research programs, including the Master of Science with a major in Architecture, the Master of Science in Urban Design, and the Doctor of Philosophy with a major in Architecture, build linkages with practice and industry and exploit the creative tensions between research and design that drives innovation in the field.

Resources such as the Digital Building Laboratory, the Digital Fabrication Laboratory, and the SimTigrate Lab for health and design, support a culture of research focused on building performance and innovation in the field.

All work produced in the College of Design as part of a degree program becomes the property of the College; it may be retained or returned at the discretion of the faculty. The faculty also reserves the right to refuse for credit any project executed outside the precincts of the College or otherwise produced without proper coordination with the faculty.

In the United States, most registration boards require a degree from an accredited professional degree program as a prerequisite for licensure. The National Architectural Accrediting Board (NAAB), which is the sole agency authorized to accredit professional degree programs in architecture offered by institutions with U.S. regional accreditation, recognizes three types of degrees: the Bachelor of Architecture, the Master of Architecture, and the Doctor of Architecture. A program may be granted an eight-year, three-year, or two-year term of accreditation, depending on the extent of its conformance with established educational standards.

Doctor of Architecture and Master of Architecture degree programs may require a preprofessional undergraduate degree in architecture for admission. However, the preprofessional degree is not, by itself, recognized as an accredited degree.

The Georgia Institute of Technology, School of Architecture, offers the following NAAB-accredited degree programs:

- M.Arch. (preprofessional degree in Architecture + 60 graduate credits)
- M.Arch. (non-preprofessional degree + 102 credits)

Next accreditation visit for all programs: 2022
courses that engage particular aspects of architectural knowledge and practice.

Within the School of Architecture, the PhD with a major in Architecture develops knowledge and technologies that

- enhances design imagination, design evaluation, and the design process;
- articulates design choices and predicts the consequences of design decisions;
- helps to learn from precedents;
- supports better building performance; and
- situates the practice of architecture within a critical understanding of culture, history, and the profession.

Our program includes research emphases in

- Design Computation;
- Evidence-Based Design;
- Building Technology;
- History and Culture; and
- Organizational and Cognitive Performance.

In each of these research areas, we intersect the perspectives of architectural design, science, technology, and the humanities even as we expect individual research projects to rigorously pursue specific disciplinary agendas.

For more information about graduate programs in the School of Architecture, please contact

Academic Advisor
School of Architecture
Georgia Institute of Technology
Atlanta, Georgia 30332-0155
phone: 404.894.3476
website: www.arch.gatech.edu (http://www.arch.gatech.edu)

The School of Architecture encourages foreign study for all students to prepare them professionally and personally for successful lives in the global environment of the twenty-first century. Students may participate in an immersive experience at another institution or participate in a Georgia Tech faculty-led program.

The School of Architecture sponsors several international programs organized and led by its own faculty:

- Modern Architecture and the Modern City
- Greece-Italy Study Abroad Program
- Tongji University-Georgia Tech Exchange Program
- Design Develop Build Program in Africa
- International Urban Design Studio

For current offerings, visit https://arch.gatech.edu/international-education

Undergraduate Study in Architecture

Minors
- Minor in Architectural History (p. 539)
- Minor in Architecture (p. 540)

Bachelor’s Degrees
- Bachelor of Science in Architecture (p. 206)

The School of Architecture offers three certificate programs for which undergraduate students may apply:

1. Architecture and Society – provides an opportunity to explore the technological and formal innovations of architecture and infrastructure within their socio-political and cultural contexts. Students will learn not only about buildings' technical systems — and their material, structural and climatic performance — but also about their formal order, siting, use, funding/patronage, relation to nature or the city, decoration, and multiple interpretive contexts.

2. Sustainable Architecture – provides undergraduate students the opportunity to specialize in design and technical innovations that will increase building energy performance, reduce emissions, use eco-friendly materials, and thereby increase the durable societal value of the built environment.

3. Computational Design – prepares students to develop a skill set in computer-aided design and fabrication built upon an integrated application of design research, architectural geometry, digital theory and digital design technologies in contemporary architectural practice and research.

Certificates will be granted only to students who, in addition to the certificate program requirements, have satisfied requirements for a Georgia Tech degree. Each certificate requires a minimum of twelve credit hours, at least nine of which are at the 3000 level or higher in the designated area. Courses required by a student’s program of study may not be credited by that student toward a certificate. Courses counting toward a certificate must be taken on a letter-grade basis, and a "C" or better must be received in each course.

Interested students should consult http://www.arch.gatech.edu/architecture-minor-certificates and consult with an academic advisor for more details.

The School of Architecture encourages foreign study for all students to prepare them professionally and personally for successful lives in the global environment of the twenty-first century. Students may participate in an immersive experience at another institution or participate in a Georgia Tech faculty-led program.

The School of Architecture currently runs the following faculty-led programs:

- Summer Study in Greece and Italy (open to students of all majors)
- Undergraduate International Studio (restricted to students in the B.S in Architecture program)
- Design Develop Build Program in Africa (restricted to students majoring in Architecture)
- International Urban Design Studio (restricted to students majoring in Architecture)
- Barcelona Study Abroad Program in Spain (open to students of all majors)

School of Building Construction

The construction industry is among the largest in the United States, employing nearly seven million people and contributing 5 percent...
of the United States gross national product. The School of Building Construction (BC) at Georgia Tech offers one of the nation’s leading academic programs in building construction and is at the forefront of research in the built environment. The School’s mission is to be the hub of excellence for construction teaching, research, and service by promoting the development of an adaptive knowledge-based, sustainability-conscious industry framework. Supported by the pillars of project delivery, construction management, and facility management, the aim is to advance emerging construction practices, technology innovation, and integrated delivery systems. The School’s vision is to be a global leader in innovation and delivery of technological and methodological sustainability-focused advances for the construction and facility management industry through relevant, applied, and fundamental research. With a problem-focused approach to global outreach, the School will lead an expansion of our global footprint and influence to ensure that we are graduating good global citizens, and to ensure that our fundamental and applied construction research remains relevant at the local, regional, national, and international levels.

Employment prospects for BC students are excellent. Students are recruited by general contractors, residential home builders, project management firms, cost value and consulting firms, real estate and property development companies, building material suppliers, and local, state, and federal government agencies. The School offers a certificate in Construction Management for undergraduate students. The average starting salary for the BC graduate is among the highest for Georgia Tech alumni and ranks at the top of the industry. The School offers master’s degrees in Building Construction and Facility Management, Occupational Safety and Health, and Real Estate Development.

Students in the School of Building Construction learn the basic principles and practices of construction management, real estate development, science, and technology. BC students are educated on how to manage the functions and processes of every aspect of the construction industry. The business climate in Atlanta is vibrant and provides an excellent laboratory opportunity for students to observe various construction sites and activities. The construction companies in the Atlanta area also provide many internships and part-time jobs for students during their study in the BC program.

The Master of Science in Building Construction and Facility Management is accredited by the International Facility Management Association (IFMA) Foundation. The accreditation ensures the School continues to meet the standards set by the IFMA Foundation for quality facility management education.

Master’s Degree

- Master of Science in Building Construction and Facility Management (p. 513)
- Master of Real Estate Development (p. 507)
- Professional Master's in Occupational Safety and Health (p. 592)

Doctoral Degree

- Doctor of Philosophy with a Major in Building Construction (p. 483)

Certificate Programs

The School of Building Construction offers a certificate in Construction Management, which is available to students in all majors at Georgia Tech. The certificate is designed to provide a specialized education in evolving integrated management approaches to the delivery of built environment, from concept to implementation. The certificate exposes students to the multi-disciplinary nature of construction project development and management and introduces them to the latest technologies and processes developed to enhance interdisciplinary collaboration and integration.

Certificates will be granted only to students who, in addition to the certificate program requirements, have satisfied requirements for a Georgia Tech degree. Each certificate requires a minimum of twelve credit hours, at least nine of which are at the 3000 level or higher in the designated area. Courses required by a student’s program of study may not be credited by that student toward a certificate. Courses counting toward a certificate must be taken on a letter-grade basis, and a C or better must be received in each course.

Interested students should consult http://www.bc.gatech.edu/content/undergraduate-certificate and consult with an academic advisor for more details.

Graduate Study in Building Construction

Graduate Programs

- Master of Science in Building Construction and Facility Management (p. 513)
- Master of Real Estate Development (p. 507)
- Professional Master’s in Occupational Safety and Health (p. 592)
- Doctor of Philosophy with a Major in Building Construction (p. 483)

Contact Information

School of Building Construction
College of Design
Georgia Institute of Technology
280 Ferst Dr.
Atlanta, GA 30332-0680

Phone: 404.894.4875
Fax: 404.894.1641

Departmental Resources

- Building Construction web site (http://www.bc.gatech.edu)
- Information for master’s degree students (http://www.bc.gatech.edu/content/master-science-building-construction-and-facility-management)
- Information for doctoral degree students (http://www.bc.gatech.edu/phd)

Office of Graduate Studies

- Building Construction and Facility Management (http://www.gradadmiss.gatech.edu/bcfm)

Rules and Regulations

The Catalog is the authoritative source of Rules and Regulations (p. 151) and other Policies (p. 138) for Georgia Tech students.

Approved Electives

Students have several options to customize their graduate study through professional electives. Graduate students may select their approved electives from the core of the other Building Construction concentrations,
from a rotating list of BC electives, and from other academic area including: City Planning, Public Policy, Management, Architecture, and Engineering.

**Undergraduate Study in Building Construction**

**Bachelor’s Degree**
- Bachelor of Science in Building Construction (p. 219)

**School of City and Regional Planning**

Founded in 1952, Georgia Tech's planning school is one of the oldest professional planning programs in the United States, with more than 1,500 alumni. Graduates are employed in public, private, and third sectors, including all levels of government, real estate development firms, planning consultancies, banks, public utilities, community development corporations, universities, research organizations, and public interest groups. The School's Master of City and Regional Planning program is fully accredited by the Planning Accreditation Board.

Our institutional setting within the College of Design and one of the world's premiere technology universities enables students to acquire expertise in every area of the urban development process, including planning, design, construction/engineering, and management. The School of City and Regional Planning is home to four research centers:

- Georgia Center for Quality Growth and Regional Development (https://cqgrd.gatech.edu)
- Center for Spatial Planning Analytics and Visualization (http://cspav.gatech.edu)
- Sino-U.S. Eco-urban Lab (http://www.ecourbanlab.org)
- Urban Climate Lab (http://www.urbanclimate.gatech.edu)

These centers plus Georgia Tech's Economic Innovation Institute, Georgia Transportation Institute, Brook Byers Institute for Sustainable Systems, and renowned co-op program, provide hands-on practice and research experience for many of our graduate students.

The Master of City and Regional Planning (MCRP) program offered by the School of City and Regional Planning is fully accredited by the Planning Accreditation Board, a joint accrediting body of the American Institute of Certified Planners, the American Planning Association, and the Association of Collegiate Schools of Planning.

The MCRP degree is the recognized basis for a career as a professional planner.

**Minors**
- Minor in Sustainable Cities (p. 589)

**Master's Degrees**
- Master of City and Regional Planning (p. 506)
- Master of Science in Geographic Information Science and Technology (p. 524)

**Doctoral Degree**
- Doctor of Philosophy with a Major in City and Regional Planning (p. 484)

**Dual Degrees**
- Master of City and Regional Planning & Master of Architecture (p. 502)
- Master of City and Regional Planning & Master of Science in Civil Engineering (p. 501)
- Master of City and Regional Planning & Master of Science in Public Policy (p. 501)

**Certificate in Real Estate Development**

Georgia Tech undergraduates in good standing may complete a Certificate in Real Estate Development offered by the School of City and Regional Planning in collaboration with the School of Building Construction and the Scheller College of Business. The certificate is designed to provide specialized education in land real estate development making our students more competitive in securing employment and in advancing to graduate education. Students must complete twelve credit hours in required and restricted elective courses, and maintain a minimum grade point average of 2.7. The certificate is awarded upon graduation or the next semester after graduation.

Certificate in Real Estate Development (http://www.planning.gatech.edu/undergraduate-certificate-and-courses)

**Certificate in Geographic Information Systems**

The Certificate in Geographic Information Systems is open to both MCRP students and students from other programs. The certificate is structured around three sets of courses, including a foundational course in GIS, two skills related courses, and one policy context course. For City and Regional Planning graduate students, coursework for this certificate can be counted toward the MCRP or PhD degree. Students must complete twelve credit hours in required and restricted elective courses taken on letter-grade basis, and completed with a minimum grade point average of 3.0 or higher. The certificate is awarded upon graduation or the next semester after graduation.

Certificate in Geographic Information Systems (https://planning.gatech.edu/graduate-certificates)

**Graduate Study in City and Regional Planning**

**Graduate Programs**
- Master of City and Regional Planning (MCRP) (p. 506)
- Master of Science in Geographic Information Science and Technology (p. 524)
- Doctor of Philosophy with a Major in City and Regional Planning (p. 484)

**Dual Degree Programs**
- Master of City and Regional Planning & Master of Architecture (p. 502)
- Master of City and Regional Planning & Master of Science in Civil Engineering (p. 501)
- Master of City and Regional Planning & Master of Science in Public Policy (p. 501)
Contact Information
School of City and Regional Planning
College of Design
Georgia Institute of Technology
245 Fourth St. NW, Suite 204
Atlanta, GA 30332-0155

Phone: 404.894.2350
Fax: 404.894.1628
Email: crp@design.gatech.edu

Departmental Resources
- City and Regional Planning web site (http://www.planning.gatech.edu)
- Information for MCRP students (http://www.planning.gatech.edu/masters-programs)
- Information for MS in Geographic Information Science and Technology students (http://www.planning.gatech.edu/master-science-geographic-information-science-and-technology)
- Information for PhD in City and Regional Planning students (http://www.planning.gatech.edu/phd)

Office of Graduate Studies
- City and Regional Planning (http://www.gradadmiss.gatech.edu/crp)
- City and Regional Planning program spotlight (http://www.gradadmiss.gatech.edu/crp-spotlight)
- Geographic Information Science and Technology (http://www.gradadmiss.gatech.edu/ms-gist)
- Geographic Information Science and Technology program spotlight (http://www.gradadmiss.gatech.edu/gist-spotlight)

Rules and Regulations
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Dual Degrees
The School of City and Regional Planning offers several dual degree programs pairing the Master of City and Regional Planning with allied professional studies. By enrolling in a dual degree program, students are able to obtain two degrees in less time than it would take if the degrees were being pursued separately. Both degrees are awarded simultaneously upon completion of the program of study. Dual degrees position graduates to tackle urban and regional policy problems that would benefit from a multidisciplinary perspective. Dual degrees also position graduates to be competitive for work settings that traditionally involve professionals from multiple fields.

Candidates seeking dual degree program admission should apply to each of the two degree programs separately, indicating in their statements that they are seeking dual degree admission. The two schools involved will each make their decisions independently so that the applicant will have the option to pursue only one degree if not admitted to both degree programs. Please refer to the catalog listings of both degree programs involved, as admissions requirements and deadlines may differ.

- Dual Degree Information (http://www.planning.gatech.edu/academics/dualdegrees/overview)

Graduate Certificate Program in Historic Preservation
MCRP students in good standing may cross-enroll at Georgia State University to earn a certificate in heritage preservation with an emphasis on historic preservation. Coursework may be counted toward the MCRP degree.

- Graduate Certificate in Historic Preservation (http://www.planning.gatech.edu/undergraduate-certificate-and-courses)

Graduate Certificate in Geographic Information Systems
The certificate in Geographic Information Systems is open to both MCRP students and students from other graduate programs on campus. The certificate is structured around three sets of courses, including a foundation course in GIS, two skills related courses, and one policy context course. For City and Regional Planning graduate students, coursework for this certificate can be counted toward the MCRP or PhD degree.

- Graduate Certificate in Geographic Information Systems (http://www.planning.gatech.edu/graduate-certificates)

Graduate Certificate in Remote Sensing
Students completing the master's or doctoral degree requirements of the School may earn a Remote Sensing Certificate through the School of Earth and Atmospheric Sciences.

- Graduate Certificate in Remote Sensing (p. 502)
- Information about Graduate Certificates (http://www.planning.gatech.edu/graduate-certificates)

Undergraduate Study in City and Regional Planning
Minors
- Minor in Sustainable Cities (p. 589)

Certificate in Real Estate Development
- Certificate in Real Estate Development (http://www.planning.gatech.edu/undergraduate-certificate-and-courses)

School of Industrial Design
Industrial design is the professional service of creating and developing concepts and specifications that optimize the function, value, and appearance of products and systems for the mutual benefit of both user and manufacturer. An industrial designer's work touches all of our lives in the form of home products and furnishings, communication devices, healthcare equipment, rehabilitation technologies, and a myriad of other
consumer and industrial products and services. While giving form to the
efforts of industry, an industrial designer is at the same time a consumer
advocate, providing the humanizing link between technology and people.
As such, an industrial designer’s central responsibilities include fitting the
artifact, system, or service to the person through considering appropriate
aesthetics and ergonomics, technical processes, requirements for
manufacture, marketing opportunities, and economic constraints.
The Georgia Tech School of Industrial Design offers a well-rounded
course of study with early emphasis on basic design and design
skills. Design projects stress realistic design situations. The program
efforts of industry, an industrial designer is at the same time a consumer
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As such, an industrial designer’s central responsibilities include fitting the
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manufacture, marketing opportunities, and economic constraints.

Resources such as the Interactive Product Design Lab, the Body Scan
Lab, the Human Machine Interaction Transportation Lab and the Digital
Fabrication Lab support a culture of research-focused teaching and
learning.

All work executed in the College of Design becomes the property of
the College and will be retained or returned at the discretion of the
faculty. The faculty also reserves the right to refuse credit for any project
executed outside the precincts of the College or otherwise executed
without proper coordination with the instructor.

The Bachelor of Science in Industrial Design and the Master of Industrial
Design degree programs offered by the School of Industrial Design are
accredited by the National Association of Schools in Art and Design
(NASAD). Georgia Tech is recognized by the Industrial Designers Society
of America (IDSA) as a NASAD-accredited institution.

Minors
• Minor in Industrial Design (p. 564)

Bachelor’s Degrees
• Bachelor of Science in Industrial Design (p. 359)

Master’s Degrees
• Master of Industrial Design (p. 507)
• Master of Science in Human-Computer Interaction (p. 526)

Graduate Study in Industrial Design
Master’s Degrees
The School of Industrial Design at Georgia Tech offers two graduate
degree programs.
• Master of Industrial Design (p. 507)
• Master of Science in Human-Computer Interaction (p. 526)

Georgia Tech’s Master’s of Industrial Design (MID) focuses on an
inclusive design approach that is dedicated to the creation and
development of products, systems, services and environments that are
usable by all segments of the population. With the growing diversity
of the population, inclusive design is becoming increasingly important
to designers of tomorrow to ensure that design is responsive to the
individual and collective needs of all people.

The interdisciplinary Master of Science in Human-Computer Interaction
(HCI) degree program is a cooperative effort of the School of Interactive
Computing, the School of Literature, Media and Communication; the
School of Industrial Design, and the School of Psychology. The program
provides students with the practical and interdisciplinary skills and
theoretical understanding they will need to become leaders in the design,
implementation, and evaluation of the computer interfaces of the future.

For more information about graduate programs in the School of Industrial
Design, please contact

Academic Advisor
School of Industrial Design
Georgia Institute of Technology
Atlanta, Georgia 30332-0155
phone: 404.894.4874
website: http://www.id.gatech.edu/

Undergraduate Study in Industrial
Design

Minors
• Minor in Industrial Design (p. 564)

Bachelor’s Degrees
• Bachelor of Science in Industrial Design (p. 359)

School of Music
As champions of one of the oldest traditions of the Institute, the School
of Music provides a creative cultural outlet for Georgia Tech’s many
musically minded students. The School has evolved to include premier
academic programs in Music Technology. The School of Music offers a
Bachelor of Science, Master of Science, and Ph.D. in Music Technology,
where students can combine musical expertise with the scientific,
engineering, and technical training that Georgia Tech is known for. In
these academic programs, students gain proficiency in music theory,
performance, composition, and/or analysis; music information retrieval;
digital signal processing and synthesis; interactive music systems
design; and music cognition.

Students across campus can participate in the School of Music’s vocal
and instrumental ensembles, including the Marching Band or Orchestra.
Also, they can pursue a minor within the School of Music, and earn
free elective credit for all ensembles and classroom courses, and/or
Humanities credit for ensemble courses carrying the Humanities
attribute.

Research in the School of Music is focused in the Center for Music
Technology. This research center pairs faculty and students to conduct
creative and technological research in a range of areas, including acoustics, music informatics, sonification, and robotic musicianship.

**Minors**
- Minor in Music (General) (http://catalog.gatech.edu/programs/minor-music)
- Minor in Music Technology (p. 576)
- Minor in Music Performance (http://catalog.gatech.edu/programs/minor-music-performance)

**Bachelor's Degree**
- Bachelor of Science in Music Technology (p. 459)

**Master's Degree**
- Master of Science in Music Technology (p. 533)

**Doctoral Degree**
- Doctor of Philosophy with a Major in Music Technology (p. 494)

A Certificate in Fine Arts-Music can be earned by Georgia Tech students upon completion of thirteen hours of coursework in music as approved by the Chair of the School of Music. Students following certificate guidelines will be exposed to an introduction to fine arts, including the development of personal aesthetic and critical skills, and will go on to more in-depth study in music analysis and history. A core component of this program involves sustained performance in one of Georgia Tech's instrumental or vocal ensembles.

At least nine hours must be at the 3000 level or higher. All other Undergraduate Certificate Academic Requirements, as they appear in the Undergraduate Certificate Program Guidelines, must be met. Courses must be taken on a letter-grade basis, and a C or better must be received in order to obtain course credit toward the Certificate. This Certificate Program is designed mainly for students with an interest in gaining an in-depth knowledge of music within the context of a technical undergraduate education. Required and elective courses are as follows:

### Required Courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MUSI 3450</td>
<td>Survey-Music Technology</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Composers and Their Music</td>
<td>2</td>
</tr>
<tr>
<td>MUSI 2600</td>
<td>Music Theory I</td>
<td>2</td>
</tr>
<tr>
<td>or MUSI 360</td>
<td>Music Theory II</td>
<td></td>
</tr>
</tbody>
</table>

### Core Areas

Select four credit hours from one of the following areas:

- Band and/or Woodwind Ensemble
  - MUSI 1102 Concert Band
  - MUSI 1103 Concert Band
  - MUSI 2102 Concert Band
  - MUSI 2103 Concert Band
  - MUSI 3102 Concert Band
  - MUSI 3103 Concert Band
  - MUSI 4102 Concert Band
  - MUSI 4103 Concert Band
  - MUSI 1112 Symphonic Band
  - MUSI 1113 Symphonic Band
  - MUSI 1114 Symphonic Band
  - MUSI 2112 Symphonic Band

- Chamber Ensemble
  - MUSI 1401 Chamber Ensemble
  - MUSI 1402 Chamber Ensemble
  - MUSI 1403 Chamber Ensemble
  - MUSI 2401 Chamber Ensemble
  - MUSI 2402 Chamber Ensemble
  - MUSI 2403 Chamber Ensemble
  - MUSI 3401 Chamber Ensemble
  - MUSI 3402 Chamber Ensemble
  - MUSI 3403 Chamber Ensemble
  - MUSI 4401 Chamber Ensemble
  - MUSI 4402 Chamber Ensemble
  - MUSI 4403 Chamber Ensemble

- Chorale
  - MUSI 1201 Chorale
  - MUSI 1202 Chorale
  - MUSI 1203 Chorale
  - MUSI 2201 Chorale
  - MUSI 2202 Chorale
  - MUSI 2203 Chorale
  - MUSI 3201 Chorale
  - MUSI 3202 Chorale
  - MUSI 3203 Chorale
  - MUSI 4201 Chorale
  - MUSI 4202 Chorale
  - MUSI 4203 Chorale

- Jazz
  - MUSI 1301 Jazz Ensemble
  - MUSI 1302 Jazz Ensemble
  - MUSI 1303 Jazz Ensemble
  - MUSI 2301 Jazz Ensemble
  - MUSI 2302 Jazz Ensemble
  - MUSI 2303 Jazz Ensemble
  - MUSI 3301 Jazz Ensemble
  - MUSI 3302 Jazz Ensemble
  - MUSI 3303 Jazz Ensemble
  - MUSI 4301 Jazz Ensemble
  - MUSI 4302 Jazz Ensemble
  - MUSI 4303 Jazz Ensemble

- Orchestra
  - MUSI 1601 University Orchestra
  - MUSI 1602 University Orchestra
  - MUSI 1603 University Orchestra
  - MUSI 2601 University Orchestra
  - MUSI 2602 University Orchestra
  - MUSI 2603 University Orchestra
  - MUSI 3601 University Orchestra
Undergraduate Study in Music Technology

Bachelor's Degree

- Bachelor of Science in Music Technology (http://catalog.gatech.edu/programs/music-technology-bs)

Minors

- Minor in Music (General) (http://catalog.gatech.edu/programs/minor-music)
- Minor in Music Technology (p. 576)
- Minor in Music Performance (http://catalog.gatech.edu/programs/minor-music-performance)

Graduate Study in Music Technology

Master's Degree

- Master of Science in Music Technology (p. 533)

Doctoral Degree

- Doctor of Philosophy with a Major in Music Technology (p. 494)

School of Music Humanities Credit Information

Core Area C

For more information, see "Core Curriculum, Core C, General Education" (p. 93) in this Catalog.

Humanities Credit for Ensemble Participation

Students can earn Humanities credit for participation in one or more specified School of Music ensembles. Each ensemble course is repeatable for credit and the following ensembles carry the humanities attribute:

- MUSI 3121 Concert Band 1
- MUSI 3131 Symphonic Band 1
- MUSI 3231 Chamber Choir 1
- MUSI 3241 Chorale 1
- MUSI 3251 Glee Club 1
- MUSI 3261 Women's Choir 1
- MUSI 3311 Jazz Ensemble 1
- MUSI 3511 Percussion Ensemble 1
- MUSI 3531 New Music Ensemble 1
- MUSI 3551 Rock and Pop Ensemble 1
- MUSI 3611 Symphony Orchestra 1

Vocal and Instrumental Ensembles

The Chamber Choir

The Chamber Choir is an elite vocal ensemble chosen by audition and performs on campus and community concerts throughout the academic year. The choir rehearse and performs challenging choral music literature written especially for smaller choirs.

The Chorale

A mixed ensemble focused upon the rehearsal, study and performance of choral music. Repertoire may include accompanied and unaccompanied works from all style eras and genres, modern music, world music, and performances of multiple mediums. Choral music experience is recommended. No audition is required.

Men's Glee Club

The Men's Glee Club was organized in 1906 and is the oldest student organization on campus. The Glee Club performs frequently on and off campus. Repertoire includes traditional men's chorus music, contemporary vocal percussion, and original compositions.

Electronic Percussion Ensemble

This ensemble performs a variety of student-designed and arranged music. All pieces are performed on student-designed and built instruments, as well as the latest in commercial controllers and interfaces. The use of multimedia is also encouraged in each arrangement.

Jazz Program

The Georgia Tech Jazz Program provides a great opportunity to study one of America's greatest and most unique art forms. The Jazz Ensembles explore music from the late 1920's through the present day, including works by composers such as Duke Ellington, Bill Holman, Sammy Nestico, Charles Mingus and Pat Metheny. Emphasis in these groups is focused on ensemble playing and the art of improvisation, an essential element in jazz tradition. Typically, two large jazz ensembles are offered each semester, as well as the opportunity to perform in small jazz
combos. Each ensemble presents several concerts during an academic
semester, in addition to numerous on and off-campus events throughout
the year. The Jazz Program also strives to bring professional artists to
campus on a regular basis, and students will often have the opportunity
to perform with these musicians and clinicians in concert during the year.

Percussion Ensemble
The percussion ensembles meet in the Fall and Spring and focus
on traditional and contemporary ensemble literature as well as
transcriptions of popular music. These ensembles are offered to students
with prior percussion background. Interested students should contact
Chris Moore (chris.moore@music.gatech.edu) for permission.

Athletic Bands
The Yellow Jacket Marching Band and Basketball Pep Bands are
elements of the Georgia Tech Band Program. The Marching Band and
Pep Bands perform at all home games and travel to several out-of-state
events, including the ACC Tournament, NCAA Tournament, football
games, and bowl appearances. These trips are financed by the Georgia
Tech Athletic Association. Tryouts for the auxiliary units are held each
spring. Wind and percussion auditions occur at the mandatory band
camp held the week before the start of fall classes.

Symphonic Band and Concert Band
The Symphonic Band and Concert Band perform masterworks as well
as contemporary wind literature designed for the rich sonorities of
an expanded instrumentation. The Concert Band provides ensemble
performance experiences in a wide range of musical styles and periods
for all students at GT. Symphonic Band performs the latest contemporary
music as well as standards of the repertoire. Symphonic Band has been
involved in commissions of new music from many composers, including
Andy Akiho, James David, Steven Bryant, and Julie Giroux. The music
performed in these organizations varies from semester to semester and
is selected to provide a challenging opportunity for musical growth. By
rehearsing and performing at the highest possible level of artistry, each
student will be challenged to improve his/her individual musicianship and
ensemble skills. The highest quality repertoire for wind instruments will
be the core of the curriculum, allowing for a wide variety in the musical,
educational, and philosophical foundations of the course. Auditions are
required and take place on the first Tuesday of each semester.

More information:
- Georgia Tech Bands and Orchestra (http://gtband.net)

Orchestra
The Georgia Tech Orchestra was founded in 1993 and has grown to full
orchestration including brass, woodwinds, and percussion. The group
performs a balance of classical, romantic, contemporary, and popular
literature. The Orchestra performs during Parent’s Weekend, the Music of
the Season concert, and many other community appearances. Auditions
are scheduled by appointment during the first two days of class.

Guggenheim School of Aerospace
Engineering
The Guggenheim School of Aerospace Engineering prepares students
at the bachelor’s, master’s, and doctoral levels for a career in vehicle
engineering with primary emphasis on flight vehicles. A combined BS/
MS honors program is also offered, preparing students for graduate
studies and research (www.ae.gatech.edu (http://www.ae.gatech.edu)).

In addition, the School offers a minor in aerospace engineering, and
interdisciplinary minors in the fields of energy systems and scientific
and engineering computing. The School is housed in five buildings with
a total of approximately 122,000 square feet, most of which is devoted
to instructional and research laboratories. Additional information may be
found at http://www.ae.gatech.edu/academics/undergraduate

Minor
- Minor in Aerospace Engineering (p. 539)

In partnership with other units on campus, the School also offers
interdisciplinary minors in the areas of energy systems, and scientific and
engineering computing.

Bachelor’s Degree
- Bachelor of Science in Aerospace Engineering (p. 191)

Master’s Degrees
- Master of Science in Aerospace Engineering (p. 508)
- Master of Science in Computational Science and Engineering
  (p. 516)

Doctoral Degrees
- Doctor of Philosophy with a Major in Aerospace Engineering
  (p. 479)
- Doctor of Philosophy with a Major in Computational Science and
  Engineering (p. 485)
- Doctor of Philosophy with a Major in Robotics (p. 499)

Graduate Study in Aerospace
Engineering
Graduate Programs
- Master of Science in Aerospace Engineering (p. 508)
- Master of Science in Computational Science and Engineering
  (p. 516)
- Doctor of Philosophy with a Major in Aerospace Engineering
  (p. 479)
- Doctor of Philosophy with a Major in Computational Science and
  Engineering (p. 485)
- Doctor of Philosophy with a Major in Robotics (p. 499)

Contact Information
Graduate Coordinator
School of Aerospace Engineering
Georgia Institute of Technology
270 Ferst Dr.
Atlanta, GA 30332-0150

Phone: 404.894.3000
Fax: 404.894.2760

Departmental Resources
- Aerospace Engineering web site (http://www.ae.gatech.edu/
  academics/graduate)
The methodologies involved in industrial engineering are probability, technical, economic, and social factors for all types of organizations. It involves designing and analyzing complex systems that integrate, including human beings, around the world. Industrial engineering uses technology to manage resources of all kinds, improves systems and processes to enhance efficiency and productivity.

Industrial engineering is a branch of engineering that designs and optimizes, capital investment analysis, statistics, and computer science. The important application domains are supply-chain systems, manufacturing, planning, quality control, economics, and financial systems, among others. Graduates can be found in a host of settings including transportation, telecommunications, hospitals, banking, environmental systems, retailing, government, and consulting.

Bachelor’s Degree
- Bachelor of Science in Industrial Engineering (p. 360)

Master’s Degrees
- Master of Science in Analytics (p. 509)
- Master of Science in Computational Science and Engineering (p. 516)
- Master of Science in Health Systems (p. 525)
- Master of Science in Industrial Engineering (p. 529)
- Master of Science in International Logistics (p. 530)
- Master of Science in Operations Research (p. 534)
- Master of Science in Quantitative and Computational Finance (p. 536)
- Master of Science in Statistics (p. 536)
- Master of Science in Supply Chain Engineering (p. 537)

Doctoral Degrees
- Doctor of Philosophy with a Major in Algorithms, Combinatorics, and Optimization (p. 480)
- Doctor of Philosophy with a Major in Bioinformatics (p. 482)
- Doctor of Philosophy with a Major in Computational Science and Engineering (p. 485)
- Doctor of Philosophy with a Major in Industrial Engineering (p. 499)
- Doctor of Philosophy with a Major in Machine Learning (p. 491)
- Doctor of Philosophy with a Major in Operations Research (p. 496)

Undergraduate Study in Aerospace Engineering

Undergraduate Programs
- Minor in Aerospace Engineering (p. 539)
- Bachelor of Science in Aerospace Engineering (p. 191)

Accreditation
The BS in Aerospace Engineering program is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (http://www.abet.com) (ABET).

Admission
- Undergraduate Admission (http://admission.gatech.edu)

Advising
- Undergraduate Advising (https://advising.gatech.edu)

Departmental Resources
- Information for Currently Enrolled Undergraduate Aerospace Engineering Students (http://www.ae.gatech.edu/academics/undergraduate)
- Aerospace Engineering Combined BS/MS Honors Program (http://www.ae.gatech.edu/academics/undergraduate/semester/honors/index)

Rules and Regulations
The Catalog is the authoritative source of Rules and Regulations (p. 151) and other Policies (p. 138) for Georgia Tech students.

H. Milton Stewart School of Industrial and Systems Engineering
Industrial engineering is a branch of engineering that designs and improves systems and processes to enhance efficiency and productivity. The field uses technology to properly manage resources of all kinds, including human beings, around the world. Industrial engineering involves designing and analyzing complex systems that integrate technical, economic, and social factors for all types of organizations. The methodologies involved in industrial engineering are probability, optimization, capital investment analysis, statistics, and computer science. The important application domains are supply-chain systems, manufacturing, planning, quality control, economics, and financial systems, among others. Graduates can be found in a host of settings including transportation, telecommunications, hospitals, banking, environmental systems, retailing, government, and consulting.
Doctoral Study in Industrial Engineering
The PhD Program in Industrial Engineering is intended for qualified individuals for whom past accomplishments and evaluation indicate a high potential for successful completion of the program requirements and a subsequent creative intellectual contribution to the field. Admitted students may pursue their work in various concentrations related to common themes associated with industrial engineering:

- supply chain logistics and manufacturing,
- economic decision analysis,
- applied statistics, and
- human-integrated systems.

Admission is dependent upon student qualification rather than educational background in any specified discipline. Consideration for admission is based largely upon performance in prior academic work, the Graduate Record Examination (GRE), and credible letters of reference.

Distance Learning
The School of Industrial and Systems Engineering offers off-campus working professionals the opportunity to enroll in many of its graduate courses through video technologies. Qualified individuals can complete the requirements for the MS IE or MS OR utilizing the video-based delivery system. Admission as a degree-seeking student in the video program is based upon the same criteria as for regular students. See Distance Learning and Professional Education (http://www.cdl.gatech.edu/dl/servlet/DLHome) for more information.

Financial Aid
Financial aid for PhD study is available in the form of traineeships, fellowships, sponsored externships, and research and teaching assistantships.

Undergraduate Study in Industrial & Systems Engineering
Bachelor's Degree
- Bachelor of Science in Industrial Engineering (p. 360)

Exceptional Students Options
Program activities and options are available to encourage and reward students with superior records and abilities. Participation in these programs requires demonstrated scholastic excellence and prior arrangement with the student's advisor and/or the Associate Chair for Undergraduate Studies.

Graduate-Level Courses
With approval, students with a cumulative grade-point average of 3.0 or above may take up to 9 credit hours of graduate-level courses. Students who would get both BS and MS in ISYE may use up to 6 credit hours of graduate-level course for both degrees. To take a graduate-level course for both degrees, the grade-point average must be 3.5 or higher.

Honors Courses
When faculty resources permit, the School offers honors versions of some of the required courses for the BS IE Students with a cumulative grade-point average of at least 3.3 are allowed to enroll in these courses and use them as replacements for the analogous course requirements in the curriculum.

Visiting Scholar/Practitioner Offerings
Occasionally, the School brings to campus selected individuals of unique accomplishment for course offerings built around their special areas of activity, thus making available a broader range of course materials than regularly provided. Prominent in this regard is the James C. Edenfield Executive-in-Residence program, which brings highly successful executives to the School. Participating much like visiting faculty, these executives bring to a classroom setting, both graduate and undergraduate, the benefit of their work experiences as they support the ISYE curriculum.

The Bachelor of Science in Industrial Engineering is accredited by the Engineering Accreditation Commission of ABET, www.abet.org (http://www.abet.org).

Multidisciplinary Activities and Programs
The College of Engineering encourages cross-unit collaboration within the College and supports the interdisciplinary culture of Georgia Tech and the merging of disciplines that is the trait of modern technology development. Engineering faculty provide leadership for such activities through their involvement in more than thirty research centers and institutes on campus.

The College also provides opportunities for engineering students to participate in interdisciplinary activities by working with faculty in the centers as research assistants, by taking part in interdisciplinary design projects and competitions, and by completing one or more of the College's multidisciplinary certificate programs.

Any student in good academic standing who is pursuing a degree in one of the participating schools of the College of Engineering or a participating school in any of the other colleges may select elective courses and the subjects of special problems to satisfy simultaneously both the requirements of his or her major degree program and those of a specialized multidisciplinary program. Upon graduation, the student receives both the degree in the major field of study and a certificate attesting to successful completion of the particular related multidisciplinary program.

The following table shows available program offerings and the degree levels of the programs:

<table>
<thead>
<tr>
<th>Program</th>
<th>Degree Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biomaterials</td>
<td>BS</td>
</tr>
<tr>
<td>Composites Engineering</td>
<td>BS, MS, PhD</td>
</tr>
<tr>
<td>Geohydrology</td>
<td>MS, PhD</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>MS, PhD</td>
</tr>
<tr>
<td>Mechanical Properties of Materials</td>
<td>MS, PhD</td>
</tr>
</tbody>
</table>
Nanomaterials  BS  
Pulp and Paper Engineering  BS  
Technology & Management  BS  

General Requirements of Undergraduate Multidisciplinary Programs

The specific design of the multidisciplinary program of any participating undergraduate student, while individualized, must meet certain general requirements as well as requirements that are specific to that multidisciplinary area. The general (minimum) undergraduate multidisciplinary requirements are as follows:

1. The program must relate the student’s major area to the given multidisciplinary area.
2. Courses must be taken under more than one academic unit.
3. At least twelve credit hours (not required by name and number in the student’s major) must be taken in a coherent program.
4. At least nine credit hours must be at the 3000 level or higher.
5. At least three credit hours must be outside the major field. (Cross-listed courses may be counted outside the student’s major)
6. Courses must be taken on a letter-grade basis, and a C or better must be earned in each course counting toward a multidisciplinary certificate.

General Requirements of Graduate Multidisciplinary Programs

The specific design of the multidisciplinary program of any participating graduate student, while individualized, must meet certain general requirements as well as requirements that are specific to that multidisciplinary area. The general (minimum) graduate multidisciplinary requirements are the same as those listed previously for the undergraduate programs, with the following exceptions:

1. At least three of the coherent multidisciplinary program courses as well as nine credit hours must be at the 6000 level or higher
2. Students at the doctoral level must, on an individual basis, meet additional requirements specified by the student’s doctoral committee, consistent with a program beyond the master’s level that has as it’s objective the development of a doctoral-level multidisciplinary program.

Interested students may obtain detailed information on the various undergraduate-level and graduate-level multidisciplinary programs from the main office of their academic advisors and from the links below.

Certificate Procedures

Petitions for multidisciplinary program certificates are processed as follows:

1. During the semester in which the student expects to graduate, the student completes a Petition for Multidisciplinary Certificate form and obtains the signature of the chair of the certificate program.
2. When complete, the petition is forwarded to the Office of the Dean of Engineering.
3. At the end of the semester in which all graduation requirements have been met, the certificate will be signed by the dean of the College of Engineering and mailed to the student.

Biomaterials Certificate (http://www.mse.gatech.edu/undergraduate-program/bio-cert)
Composites Engineering Certificate (http://www.mse.gatech.edu/undergraduate-program/comp-cert)
Geohydrology Certificate Program (http://mesl.ce.gatech.edu/EDUCATION/GEO)
Mechanical Properties of Materials Certificate (http://mprl.me.gatech.edu/education/certificate)
Nanomaterials Certificate (http://www.mse.gatech.edu/undergraduate-program/nano-cert)
Pulp and Paper Engineering Certificate (http://www.chbe.gatech.edu/node/7625)
Technology & Management Program (http://mgt.gatech.edu/programs/under/tm)

School of Chemical and Biomolecular Engineering

Chemical and Biomolecular Engineering is a branch of engineering that prepares students for an enormously varied set of career paths. Graduates have become corporate executives, plant engineers, professors, inventors, lawyers, researchers, physicians, consultants, and financial officers. They have found employment with oil, chemical, biomedical, pharmaceutical, microelectronics, environmental, pulp and paper, food, textile, fertilizer, fragrance, and automobile companies, and with academia, government, banks, and brokerages. Chemical and biomolecular engineers have led the development of biomedicine and biotechnology, and they have been crucial to the materials revolution, especially in computer chip manufacturing, nanotechnology, and plastics and fibers. Additionally, they are essential in addressing the energy needs of the nation. Chemical and biomolecular engineering emphasizes environmentally benign manufacturing and sustainable development. (www.chemicalengineering.org (http://www.chemicalengineering.org))

The Chemical Engineers in Action (http://www.chemicalengineering.org) site celebrates the many significant advancements that chemical engineers have made to our world. Explore the site to learn more about chemical engineering’s great achievements, bold innovators, and new frontiers in the fields of energy (http://www.chemicalengineering.org/energy), the environment (http://www.chemicalengineering.org/enviro), biomedicine (http://www.chemicalengineering.org/biomed), electronics (http://www.chemicalengineering.org/electronics), food production (http://www.chemicalengineering.org/food), and materials (http://www.chemicalengineering.org/materials).

The undergraduate curriculum leads to a Bachelor of Science in Chemical and Biomolecular Engineering. Chemical and biomolecular engineering principles are taught as the foundation of that degree, but students are also expected to develop an ability to solve all kinds of problems, to view systems in their entirety, and to formulate and test solutions irrespective of the framework of the problem. Completion of the BS degree prepares students for entry into the workforce, for advanced study in chemical and biomolecular engineering, and for countless other graduate programs.

The curriculum has two options.

1. The Standard Option provides the basics of chemical and biomolecular engineering but allows flexibility for the student
to complete additional study in a variety of areas, including microelectronics, materials, and the environment.

2. The Biotechnology Option is for students who wish to focus their education on the biomolecular aspects of chemical and biomolecular engineering. This option includes the core chemical engineering courses, specialized biomolecular engineering courses, biochemistry, and technical electives focused in the biotechnology area.

Both curriculum tracks offer special opportunities for students wishing to pursue minors or certificates in fields of particular interest, and students are encouraged to explore the frontiers of knowledge through involvement in faculty-directed research.

In addition to the BS, the School of Chemical and Biomolecular Engineering offers programs leading to the MS and the PhD. Students should check the School website for detailed curriculum information and recent updates.

The Georgia Institute of Technology is accredited by the Southern Association of Colleges and Schools Commission on Colleges to award baccalaureate, masters, and doctoral degrees.

Southern Association of Colleges and Schools Commission on Colleges
1866 Southern Lane
Decatur, Georgia 30033-4097
telephone 404.679.4500

Contact http://www.sacscoc.org for questions about the accreditation of the Georgia Institute of Technology.

Georgia Tech’s Cooperative Program is accredited by the Accreditation Council for Cooperative Education.

Minors

Special opportunities exist for students wishing to pursue minors or certificates in fields of particular interest, and students are encouraged to explore the frontiers of knowledge through involvement in faculty-directed research.

Visit our website at www.chbe.gatech.edu (http://www.chbe.gatech.edu) for more information.

Minor Program of Study & Guidelines (p. 107)

Bachelor's Degrees

• Bachelor of Science in Chemical and Biomolecular Engineering (p. 232)

Master's Degrees

• Bachelor of Science/Master of Science in Chemical and Biomolecular Engineering (p. 186)
• Master of Science in Bioengineering (p. 512)
• Master of Science in Chemical Engineering (p. 515)
• Master of Science in Paper Engineering (p. 534)

Doctoral Degrees

• Doctor of Philosophy with a Major in Bioengineering (p. 482)
• Doctor of Philosophy with a Major in Chemical Engineering (p. 484)
• Doctor of Philosophy with a Major in Paper Science and Engineering (p. 496)

Graduate Study in Chemical and Biomolecular Engineering

Graduate Programs

• Bachelor of Science/Master of Science in Chemical and Biomolecular Engineering (p. 186)
• Master of Science in Bioengineering (p. 512)
• Master of Science in Chemical Engineering (p. 515)
• Master of Science in Paper Engineering (p. 534)
• Doctor of Philosophy with a Major in Bioengineering (p. 482)
• Doctor of Philosophy with a Major in Chemical Engineering (p. 484)
• Doctor of Philosophy with a Major in Paper Science and Engineering (p. 496)

Contact Information

Graduate Coordinator
School of Chemical and Biomolecular Engineering
Georgia Institute of Technology
311 Ferst Dr. NW
Atlanta, GA 30332-0100

Phone: 404.894.2877
Fax: 404.894.2866

Departmental Resources

• Chemical and Biomolecular Engineering web site (http://www.chbe.gatech.edu)
• Information for graduate students (http://www.chbe.gatech.edu/programs/graduate)

Office of Graduate Studies

• Chemical and Biomolecular Engineering (http://www.gradadmiss.gatech.edu/che)
• Chemical and Biomolecular Engineering program spotlight (http://www.gradadmiss.gatech.edu/che-spotlight)

Rules and Regulations

The Catalog is the authoritative source of Rules and Regulations (p. 151) and other Policies (p. 138) for Georgia Tech students.

Undergraduate Study in Chemical and Biomolecular Engineering

Chemical engineering is a discipline that traditionally has been based in the application of chemistry as an enabling science. The strength of that foundation has resulted in enormous advances in the chemical, petroleum, and related industries that have relied on chemical engineering to provide much of the intellectual capital on which they depend. Over time, and with increasing speed, the discipline has expanded so that biological sciences and chemistry now fill the position once uniquely held by chemistry. Georgia Tech’s School of Chemical & Biomolecular Engineering is a national leader in restructuring its curriculum and research initiatives to reflect that evolution.

The chemical and biomolecular engineering undergraduate curriculum leads to a Bachelor of Science in Chemical and Biomolecular Engineering.
Chemical and biomolecular engineering principles are taught as the foundation of that degree but students also are expected to develop an ability to solve all kinds of problems, to view systems in their entirety, and to formulate and test solutions irrespective of the framework of the problem. Completion of the BS degree prepares students for entry into the workforce, for advanced study in chemical and biomolecular engineering, or for countless other graduate programs.

Mission

The mission of the School of Chemical & Biomolecular Engineering is to provide students with the intellectual basis to be educated citizens, to prepare them for successful professional careers, and to advance the science and technology that form the basis of chemical and biomolecular engineering. In pursuit of this mission, the School has adopted the following:

Program Educational Objectives

- Graduates will demonstrate proficiency in the principles and methods essential to modern chemical and biomolecular engineering.
- Graduates will demonstrate broadened perspectives regarding social issues and responsibilities, ethics, and professionalism.
- Graduates will be recognized for excellence and leadership and selected for high-quality industrial, academic, government, and other professional positions.
- Graduates will demonstrate an understanding of the global nature of engineering practice and business activities.
- Graduates will understand the importance of further professional growth through continuing education and research.

Program Outcomes

In pursuit of its educational objectives, the School has adopted the following program outcomes:

- Students will demonstrate the ability to apply knowledge of mathematics, science, and engineering.
- Students will demonstrate the ability to design and conduct experiments, as well as to analyze and interpret data.
- Students will demonstrate the ability to design a system, component, product, and/or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
- Students will demonstrate an ability to lead and function on multidisciplinary teams.
- Students will demonstrate an ability to identify, formulate, and solve engineering problems.
- Students will demonstrate an understanding of professional and ethical responsibility.
- Students will demonstrate the ability to communicate effectively.
- Students will demonstrate a breadth in education that facilitates understanding the impact of engineering solutions in a global, economic, environmental, and societal context.
- Students will demonstrate recognition of the need for and an ability to engage in lifelong learning.
- Students will demonstrate knowledge of contemporary issues, especially as related to chemical engineering practice.
- Students will demonstrate the ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.
- Students will have an understanding of the chemical engineering profession as obtained through professional organizations, cooperative education, internships, undergraduate research, and/or required laboratory courses.
- Students will have a thorough grounding in the basic sciences including chemistry, physics, and biology appropriate to the program objectives.
- Students will demonstrate knowledge in the applications of these basic sciences to enable graduates to design, analyze, and control physical, chemical, and biological processes consistent with the program’s educational objectives.

In pursuit of these objectives, the following curriculum is designed to provide coverage of core areas of chemical and biomolecular engineering, and to allow students opportunities to explore the breadth of the discipline. The curriculum requires a total of 132 credit hours for the BS degree. The biotechnology option allows the student to focus intensely in this rapidly emerging area of chemical engineering. The standard option provides the flexibility to explore other areas of chemical engineering practice while providing an understanding of the biomolecular aspects of modern chemical engineering. The standard program will also allow chemical and biomolecular engineering students to tailor their educations to their particular interests and plans for their professional careers. Students are encouraged to use the required elective hours to earn a minor or certificate, or at least to focus their electives in an area of particular interest.

Many graduates have found international experience obtained as a student to be valuable later in their careers. The School is developing special initiatives to facilitate such experiences, and it has a longstanding six-week summer program at University College London in which students receive six credit hours of elective credit and credit for CHBE 4200.

Finally, although the focus of the curriculum is development of technical skills, it has elements geared to enhance communication, teamwork, and business skills.

Minors

Special opportunities exist for students wishing to pursue minors or certificates in fields of particular interest, and students are encouraged to explore the frontiers of knowledge through involvement in faculty-directed research.

Visit our website at www.chbe.gatech.edu (http://www.chbe.gatech.edu) for more information.

Minor Program of Study & Guidelines (p. 107)

Bachelor’s Degrees

- Bachelor of Science in Chemical and Biomolecular Engineering (p. 232)

  Bachelor of Science in Chemical and Biomolecular Engineering - Biotechnology Option (p. 234)

Transfer Students

Due to the sequence of courses and the order in which they must be taken, students who transfer into the school of Chemical and Biomolecular Engineering (ChBE) from another university should expect to be enrolled for a minimum of six terms (a term is a semester or a
summer session). If, for financial aid purposes, insurance, etc., students are required to be full-time, they should transfer to Georgia Tech having sufficient non-chemical and biomolecular engineering courses remaining to enroll full-time for six terms. All prerequisites and co-requisites must be followed.

The BS in Chemical and Biomolecular Engineering program is accredited by the Engineering Accreditation Commission of ABET, www.abet.org (http://www.abet.org).

**School of Civil and Environmental Engineering**

The School of Civil and Environmental Engineering offers courses in civil engineering, environmental engineering, and engineering science and mechanics, as well as programs leading to the following degrees:

- Bachelor of Science in Civil Engineering,
- Bachelor of Science in Environmental Engineering,
- Master of Science in Civil Engineering,
- Master of Science in Environmental Engineering, and
- Master of Science in Engineering Science and Mechanics,
- Master of Science in Engineering Science and Mechanics,
- Doctor of Philosophy.

The School participates in the interdisciplinary graduate programs in Bioengineering, Computational Science & Engineering, and Ocean Science and Engineering. The School also offers a dual program leading to the following degrees:

- Master of Science in Civil Engineering, with a concentration in transportation systems engineering, and
- Master of City Planning.

**Minor**

- Minor in Leadership Studies (p. 569)

**Bachelor's Degrees**

- Bachelor of Science in Civil Engineering (p. 244)
- Bachelor of Science in Environmental Engineering (p. 343)

**Master's Degrees**

- Master of Science in Bioengineering (p. 512)
- Master of Science in Civil Engineering (p. 515)
- Master of Science in Computational Science and Engineering (p. 516)
- Master of Science in Environmental Engineering (p. 523)
- Master of Science in Engineering Science and Mechanics (p. 523)
- Dual Degree - Master of City and Regional Planning/Master of Science in Civil Engineering (p. 501)

**Doctoral Degrees**

- Doctor of Philosophy with a Major in Bioengineering (p. 482)
- Doctor of Philosophy with a Major in Civil Engineering (p. 485)
- Doctor of Philosophy with a Major in Computational Science and Engineering (p. 485)
- Doctor of Philosophy with a Major in Engineering Science and Mechanics (p. 488)
- Doctor of Philosophy with a Major in Environmental Engineering (p. 488)
- Doctor of Philosophy with a Major in Ocean Science & Engineering (http://www.catalog.gatech.edu/programs/ocean-science-engineering-phd)

**Graduate Study in Civil and Environmental Engineering**

**Graduate Programs**

- Master of Science in Bioengineering (p. 512)
- Master of Science in Civil Engineering (p. 515)
- Master of Science in Computational Science and Engineering (p. 516)
- Master of Science in Engineering Science and Mechanics (p. 523)
- Master of Science in Environmental Engineering (p. 523)
- Dual Degree - Master of City and Regional Planning/Master of Science in Civil Engineering (p. 501)
- Doctor of Philosophy with a Major in Bioengineering (p. 482)
- Doctor of Philosophy with a Major in Civil Engineering (p. 485)
- Doctor of Philosophy with a Major in Computational Science and Engineering (p. 485)
- Doctor of Philosophy with a Major in Engineering Science and Mechanics (p. 488)
- Doctor of Philosophy with a Major in Environmental Engineering (p. 488)
- Doctor of Philosophy with a Major in Ocean Science & Engineering

**Graduate Certificate in Remote Sensing**

Students completing the master's or doctoral degree requirements of the School may earn a Graduate Certificate in Remote Sensing.

- Graduate Certificate in Remote Sensing (http://www.gatech.edu)

**Undergraduate Study in Civil and Environmental Engineering**

**Minor**

- Minor in Leadership Studies (p. 569)

**Bachelor's Degrees**

- Bachelor of Science in Civil Engineering (p. 244)
- Bachelor of Science in Environmental Engineering (p. 343)

The following undergraduate engineering programs are accredited by the Engineering Accreditation Commission of ABET, www.abet.org (http://www.abet.org).
• Bachelor of Science in Civil Engineering
• Bachelor of Science in Environmental Engineering

School of Electrical and Computer Engineering

Electrical engineers have defined, shaped, and driven the information technology revolution that we are experiencing today. Building on the fundamental cornerstones of electrical engineering—the control of information and electric power—electrical engineers have been responsible for innovations and technological breakthroughs that have altered the fabric and face of modern life. Cell phones, tablets, modern hearing aids, the Internet, digital cameras, global positioning systems, and hybrid cars all are based on electrical engineering. Georgia Tech’s School of Electrical and Computer Engineering (ECE) is consistently ranked nationally among the top ten of all electrical engineering programs, and its graduates are pioneering such life-altering innovations as biomedical devices that save lives, and improve everyday living for disabled people, as well as environmentally friendly technologies such as solar energy and wind power. The electrical engineering program encompasses all major areas of this dynamic field, including analog electronics, bioengineering, digital signal processing, electric power, electromagnetics, microelectronics and microsystems, nanosystems, optics and photonics, systems and controls, and telecommunications.

Combining the study of computer systems with traditional aspects of electrical engineering, computer engineering is one of the fastest growing fields in the country, with projected demand over the next decade expected to grow by as much as 150 percent. The computer engineering program in ECE is at the forefront of this new and dynamic field, with national rankings consistently in the top ten. Rapid advances in underlying technologies have resulted in ever smaller, less costly, and higher-performance computer systems, making computers omnipresent in our everyday lives and fueling exciting developments in areas like robotics, wired and wireless networking, embedded processing, network security, and data storage. It is this ever-expanding capacity of computers that empowers us to communicate, learn, transact business, receive medical treatment, and explore space in new ways.

The School of Electrical and Computer Engineering (ECE) provides undergraduate and graduate programs that prepare students to participate in a broad range of career opportunities. Modern facilities and laboratories support experimental and theoretical programs of instruction and research. Additional information about the School is available at www.ece.gatech.edu (http://www.ece.gatech.edu) or upon request by calling 404.894.2901.

Bachelor’s Degrees
• Bachelor of Science in Computer Engineering (p. 270)
• Bachelor of Science in Electrical Engineering (p. 341)

Master’s Degrees
• Bachelor of Science/Master of Science in Electrical and Computer Engineering (p. 186)
• Dual MS Program in ECE GT Lorraine and European Partner Universities (p. 501)
• Dual MS Program in ECE GT and Korean Advanced Institute of Science and Technology (p. 501)
• Dual MS Program in ECE with the Politecnico di Torino (Italy) (p. 502)
• Master of Science in Bioengineering (p. 512)
• Master of Science in Electrical and Computer Engineering (p. 523)
• Professional Master’s in Sustainable Electrical Energy (PMSEE) (p. 593)

Doctoral Degrees
• Doctor of Philosophy with a Major in Bioengineering (p. 482)
• Doctor of Philosophy with a Major in Electrical and Computer Engineering (p. 488)
• Doctor of Philosophy with a Major in Machine Learning (p. 491)
• Doctor of Philosophy with a Major in Robotics (p. 499)
• Joint Doctor of Philosophy with a Major in Electrical and Computer Engineering with the Politecnico di Milano (p. 502)
• Joint Doctor of Philosophy with a Major in Electrical and Computer Engineering with the Politecnico di Torino (Italy) (p. 502)

Graduate Study in Electrical and Computer Engineering

Master’s Degrees
• Bachelor of Science/Master of Science in Electrical and Computer Engineering (p. 186)
• Dual MS Program in ECE GT Lorraine and European Partner Universities (p. 501)
• Dual MS Program in ECE GT and Korean Advanced Institute of Science and Technology (p. 501)
• Dual MS Program in ECE with the Politecnico di Torino (Italy) (p. 502)
• Master of Science in Bioengineering (p. 512)
• Master of Science in Electrical and Computer Engineering (p. 523)
• Professional Master’s in Sustainable Electrical Energy (PMSEE) (p. 593)

Doctoral Degrees
• Doctor of Philosophy with a Major in Bioengineering (p. 482)
• Doctor of Philosophy with a Major in Electrical and Computer Engineering (p. 488)
• Doctor of Philosophy with a Major in Machine Learning (p. 491)
• Doctor of Philosophy with a Major in Robotics (p. 499)
• Joint Doctor of Philosophy with a Major in Electrical and Computer Engineering with the Politecnico di Milano (p. 502)
• Joint Doctor of Philosophy with a Major in Electrical and Computer Engineering with the Politecnico di Torino (Italy) (p. 502)

Certificate Program in Remote Sensing

Remote sensing refers to a means of investigating the properties of a target using measurements made at some distance from the target. Applications range from astronomy and environmental applications to medical radiography and automotive collision avoidance radars, as well as security-enhancing sensors. In the last three decades, sensing of the Earth and its atmosphere has increased very substantially because of climate change and global pollution concerns and because of the need
for measurements to support the increasingly sophisticated weather and earthquake forecasting and oil and gas surveying capabilities.

Students completing the master’s or doctoral degree requirements of the Schools listed below may be awarded a Remote Sensing Certificate. The primary administration of the certificate is through Dr. Irina Sokolik of the School of Earth and Atmospheric Sciences. Departmental contacts are listed below:

Aerospace Engineering: Dr. Robert Braun
Electrical and Computer Engineering: Dr. Manos Tentzeris
Earth and Atmospheric Sciences: Dr. Irina Sokolik
Civil and Environmental Engineering: Dr. Michael Bergin
Chemistry and Biochemistry: Dr. Thomas Orlando
City Planning: Dr. Steven French

The courses that would be used to satisfy the requirements of this certificate have been divided into two areas:

1. First, a group of core courses that cover both fundamentals and applications of remote sensing;
2. Second, elective courses that cover a range of courses that cover fundamental physics, data analysis methods, and application areas.

A total of twelve credit hours are required to obtain the certificate, including at least two core courses. Nine of the credit hours must be at the 6000 level or above.

### Area 1: Core Courses

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CP 6531</td>
<td>Intro to Remote Sensing</td>
<td>3</td>
</tr>
<tr>
<td>EAS 4430</td>
<td>Remote Sensing &amp; Data Anly</td>
<td>3</td>
</tr>
<tr>
<td>EAS 4460</td>
<td>Satellite &amp; Radar Met</td>
<td>3</td>
</tr>
<tr>
<td>EAS 6145</td>
<td>Remote Sens Atmos &amp; Oceans</td>
<td>3</td>
</tr>
</tbody>
</table>

### Area 2: Electives

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>AE 6353</td>
<td>Orbital Mechanics (AE 6353 is a pre-requisite for AE 6354)</td>
<td>3</td>
</tr>
<tr>
<td>AE 6354</td>
<td>Adv Orbital Mechanics</td>
<td>3</td>
</tr>
<tr>
<td>CEE 6222</td>
<td>Hydrometeorology</td>
<td>3</td>
</tr>
<tr>
<td>CEE 6462</td>
<td>Signals &amp; Inverse Problems</td>
<td>3</td>
</tr>
<tr>
<td>CEE 6483</td>
<td>Geo Spatial Image Analy</td>
<td>3</td>
</tr>
<tr>
<td>CP 6521</td>
<td>Advanced GIS</td>
<td>3</td>
</tr>
<tr>
<td>EAS 4510</td>
<td>Exploration Geophysics</td>
<td>3</td>
</tr>
<tr>
<td>EAS 4520</td>
<td>Exploration Seismology</td>
<td>3</td>
</tr>
<tr>
<td>EAS 6134</td>
<td>Inverse Methods in EAS</td>
<td>3</td>
</tr>
<tr>
<td>EAS 8803</td>
<td>Special Topics (may be taught as Atmospheric Radiative Transfer)</td>
<td>3</td>
</tr>
<tr>
<td>EAS 8803</td>
<td>Special Topics (may be taught as Optical Techniques in Atmospheric Sensing)</td>
<td>3</td>
</tr>
<tr>
<td>ECE 6272</td>
<td>Fund-Radar Signal Process</td>
<td>3</td>
</tr>
<tr>
<td>ECE 6780</td>
<td>Medical Image Processing</td>
<td>3</td>
</tr>
<tr>
<td>ECE 7370</td>
<td>Antennas/Waves in Matter</td>
<td>3</td>
</tr>
</tbody>
</table>

### Courses in Development

- **AE/EAS 4XXX:** Designing a UAV for Remote Sensing Applications - This course is currently being planned and EAS recently received a NASA grant to provide education in this subject area.
- **EAS 6XXX:** Earth Science/Geological Applications of Remote Sensing - A new faculty member in EAS geodetic remote sensing will be creating this course. It probably will include Global Positioning System (GPS) applications

Other new courses on remote sensing may qualify as electives for this certificate with approval by the Remote Sensing Certificate, Dr. Irina Sokolik.

### GT-Lorraine

Students may choose to pursue graduate degrees in Electrical and Computer Engineering at Georgia Tech-Lorraine, the European campus of the Georgia Institute of Technology, located in Metz, France. Undergraduate programs are also offered in the fall, spring, and summer terms at Georgia Tech-Lorraine. In addition to courses taught in English by regular Georgia Tech faculty, students also may participate in courses and academic programs offered by partner French universities.


ECE Website ([http://www.ece.gatech.edu](http://www.ece.gatech.edu))

### GT-Shenzhen

Students may choose to pursue a Master's degree in Electrical and Computer Engineering at Georgia Tech-Shenzhen, an instructional site of the Georgia Institute of Technology, located in Shenzhen, China. Courses are taught in English by regular Georgia Tech faculty during the fall, spring, and summer terms at Georgia Tech-Shenzhen.

gtshenzhen@ece.gatech.edu

Georgia Tech-Shenzhen: [www.shenzhen.gatech.edu](http://www.shenzhen.gatech.edu)

ECE Website: [www.ece.gatech.edu](http://www.ece.gatech.edu)

### Undergraduate Study in Electrical and Computer Engineering

#### Bachelor's Degrees

- Bachelor of Science in Computer Engineering (p. 270)
- Bachelor of Science in Electrical Engineering (p. 341)

The following undergraduate engineering programs are accredited by the Engineering Accreditation Commission of ABET, [www.abet.org](http://www.abet.org).

- Bachelor of Science in Computer Engineering
- Bachelor of Science in Electrical Engineering

### School of Materials Science and Engineering

Established in 1985
(School of Textile Engineering established in 1897)
(School of Ceramic Engineering established in 1924)
General Information

The School of Materials Science and Engineering provides high-quality academic programs focused on developing a fundamental understanding of all forms of materials and the creation of new materials for the next generation of engineering applications. A discipline on the forefront of innovations in both science and engineering, the BSMSE degree offers students three separate concentrations:

- Polymer and Fiber materials;
- Structural and Functional materials, and
- Biomaterials.

These concentrations view engineering materials, such as metals, ceramics, polymers, fibers, textiles, composites, biomaterials, nanomaterials and electronic materials, from a fundamental point of view, emphasizing the relationships between the atomic- and micro-scale structure, with the processing, properties, and performance of the materials.

Completion of the BS degree prepares students for entry into the workforce, or for advanced study in materials science and engineering, or for other graduate programs. Materials scientists and engineers have many career options available, such as aerospace, automotive, biomedical, chemical, defense, electronics, materials processing, textiles, consumer products, and recreational equipment industries, as well as in universities, government, and industrial laboratories, and even legal, business, and medical disciplines.

Research and instruction in the School of Materials Science and Engineering at Georgia Tech spans the following areas:

1. Synthesis and processing focusing on development of advanced and traditional materials with novel compositions and tailored microstructures;
2. Characterization and evaluation of structure and properties using advanced techniques and state-of-the-art instrumentation; and
3. Computational modeling of processing-structure-property-performance relationships emphasizing correlation of properties with the structure across nano-, micro-, meso-, and macro-length scales.
4. Design of materials through fundamental theoretical and experimental understanding of materials behavior.

MSE faculty participate in collaborative research projects with faculty from other schools in the Colleges of Engineering and Sciences, and the Georgia Tech Research Institute. Several interdisciplinary centers are led by MSE faculty. The external sponsored research funding brought in by the FTE faculty in the School of Materials Science and Engineering exceeds $11 million per year and comes from a wide variety of sources including industry, private foundations, and federal agencies including AFOSR, ARO, DARPA, DoE, DTRA, NSF, NIH, and ONR. A significant number of materials specialists are required to meet the present and future opportunities and challenges of this field, which makes MSE graduates sought after in practically every aspect of technological advancement.

The school offers a Bachelor of Science in Materials Science and Engineering degree. An undergraduate minor in materials science and engineering is available for non-MSE majors. Graduate degrees (MS and PhD) are offered in materials science and engineering, paper science and engineering, and in the interdisciplinary bioengineering program.

Minor

- Minor in Material Science and Engineering (p. 571)

Bachelor's Degree

- Bachelor of Science in Materials Science and Engineering (p. 424)

Master's Degrees

- Bachelor of Science/Master of Science in Materials Science and Engineering (p. 188)
- Master of Science in Bioengineering (p. 512)
- Master of Science in Materials Science and Engineering (p. 531)
- Master of Science in Paper Science and Engineering (p. 534)

Doctoral Degrees

- Doctor of Philosophy with a Major in Bioengineering (p. 482)
- Doctor of Philosophy with a Major in Materials Science and Engineering (p. 494)
- Doctor of Philosophy with a Major in Materials Science and Engineering (Joint Degree with Peking University) (http://www.catalog.gatech.edu/programs/materials-science-phd-joint-peking)
- Doctor of Philosophy with a Major in Paper Science and Engineering (p. 496)

Graduate Study in Materials Science and Engineering

Materials graduates are essential to the economic growth of the country. They contribute to the development, selection, and use of materials in all engineering and scientific applications. Master's and doctoral degrees in materials science and engineering are offered. An excellent selection of undergraduate courses is also offered in preparation and support of graduate studies. Course offerings and research activities cover a diversity of subjects in the broad field of materials. Subjects include biomaterials, nanotechnology, computational materials science, physical metallurgy, mechanical properties, fracture mechanics, corrosion phenomena, processing, thermodynamics and phase equilibria, non-destructive testing, X-ray analysis, phase transformations, glass science, electronic/technical ceramics, thin-film semiconductors, electronic and optical microscopy, dispersions and rheology, refractories, surface analysis, fiber science, polymerization reaction engineering, polymer process simulation, mechanical properties of polymers, and process-structure-property characterization of polymers. State-of-the-art research facilities in the School of Materials Science and Engineering contribute to the strength of both the academic and research programs.

MSE graduates find employment with manufacturing firms in light and heavy industry, in research laboratories of private firms and federal agencies, and in academic institutions. Several recent graduates have filled positions of high responsibility in these areas and have been instrumental in advancing the level of materials engineering practice in the United States. The MSE faculty participate in numerous multidisciplinary programs including manufacturing engineering, surface science technology, microelectronics, electronic packaging, and composites.
The Master's Degree

MSE offers graduate work leading to the degrees of Master of Science in Materials Science and Engineering, Master of Science in Paper Science and Engineering, and Master of Science with a major in Materials Science and Engineering. The student admitted for graduate work will normally have completed an undergraduate program in materials, ceramics, metallurgy, or polymers. However, students with undergraduate degrees or backgrounds in other fields (e.g., physics, chemistry, geology, and chemical, mechanical, nuclear, or geological engineering) may qualify by taking certain minimum prerequisites during the early part of their graduate studies. To assure a smooth transition into the graduate program, the student should select appropriate electives during his or her undergraduate studies.

Students in the MS program must complete a core of graduate materials courses and prepare an individualized program of study for this degree in consultation with their graduate advisors. The proposed program must receive the approval of the graduate coordinator and the School chair. Thesis, non-thesis, and industrial internship options are available. The minimum credit hour requirements for the MS degree with include eighteen credit hours of courses and a minimum of twelve credit hours of thesis research, with a total minimum of 30 credit hours, or 30 credit hours of courses, or twenty-five hours of courses and six hours of project work conducted as part of an industrial internship. A total of twelve course hours must be in the major, and twelve course hours must be at the 6000 level or higher. A minimum GPA of 2.7 is required for graduation.

The Doctoral Degree

The Doctor of Philosophy degree is directed to attain proficiency in the pursuit of independent scholarly work. The degree comprises coursework in the general principles of materials, with emphasis on metallurgy, polymers, ceramics, paper science and engineering, or electronic materials. Additional requirements include specialized core courses and elective courses both in the area of the doctoral thesis and in one or two other areas, passing comprehensive examinations, and an independent research investigation.

Candidates for the doctoral degree are required to complete at least sixteen credit hours of graduate-level coursework beyond the MS degree, with a minimum GPA of 3.0, and pass the PhD qualification examination. Each student must also earn 9 credit hours in a coherent minor field, chosen in consultation with the advisor, to satisfy the School of Material Science and Engineering's core course requirements. Students should commence participation in the School's research programs early in their graduate careers.

Financial Aid

A number of fellowships and research assistantships from outside sources and industry are available to provide financial assistance for qualified graduate students. In addition, a limited number of presidential fellowships, as well as research assistantships, are available from the Institute. Further information can be obtained by contacting the director of graduate programs in the School of Materials Science and Engineering.

Mechanical Properties Research Laboratory

The Mechanical Properties Research Laboratory (MPRL) is an interdisciplinary College of Engineering laboratory that supports education and research with emphasis on structural materials. Its principal activities are directed toward the measurement and modeling of the mechanical properties of engineering materials, primarily related to deformation, fatigue, and fracture. The MPRL has an international reputation for excellence in areas of:

- fatigue and fracture studies of structural materials, structures and joints
- development of constitutive equations for deformation and damage, incorporating these advances into life prediction methodologies
- characterization and quantitative analysis of microstructure and damage in engineering materials such as structural alloys, composites, metal foams, biomaterials and nanostructured materials and alloys
- development of improved constitutive models for material deformation, fatigue and fracture behaviors
- multiscale simulation of materials and microstructure-sensitive fatigue and fracture approaches
- durability and degradation of aging materials and structures

Master's Degrees

- Bachelor of Science/Master of Science in Materials Science and Engineering (p. 188)
- Bachelor of Science in Bioengineering (p. 512)
- Master of Science in Materials Science and Engineering (p. 531)
- Master of Science in Paper Science and Engineering (p. 534)

Doctoral Degrees

- Doctor of Philosophy with a Major in Bioengineering (p. 482)
- Doctor of Philosophy with a Major in Materials Science and Engineering (p. 494)
- Doctor of Philosophy with a Major in Materials Science and Engineering (Joint Degree with Peking University) (http://www.catalog.gatech.edu/programs/materials-science-phd-joint-pekling)
- Doctor of Philosophy with a Major in Paper Science and Engineering (p. 496)

Undergraduate Study in Materials Science and Engineering

Minor

- Minor in Material Science and Engineering (p. 571)

Bachelor's Degree

- Bachelor of Science in Materials Science and Engineering (p. 424)

The BS in Materials Science and Engineering program is accredited by the Engineering Accreditation Commission of ABET, www.abet.org (http://www.abet.org).

Certificate in Biomaterials

The School of Materials Science and Engineering offers certificates in biomaterials (jointly with BME), polymers, composites, and nanomaterials. Students may fulfill the certificate requirements by taking twelve credit hours of approved courses. By appropriate choice of technical and free electives, only one course outside of those required for the BS MSE degree is required for any certificate and up to 3 hours
of related undergraduate research credit may be applied towards a
certificate. Contact the Associate Chair for Undergraduate Programs
or visit www.mse.gatech.edu/Academics/Certificate_Programs/
certificate_programs.html for eligibility
requirements and a updated list of approved courses.

1 BIOL 1510 is required for the Biomaterials certificate. Since this is
a four-credit hour course, thirteen hours are often taken by MSE
students who obtain this certificate.

Transfer Programs in the College of Engineering

To encourage and accommodate students who desire to study
engineering but may prefer to attend a community college, a Historically
Black College and University (HBCU), or a gender specific college, the
College of Engineering offers the opportunity to transfer to Georgia
Tech via the Dual Degree Engineering Program (DDEP) or the Regents’
Engineering Pathway Program (REPP).

For further information concerning these programs, please access the
following sections of the College of Engineering website:

Dual Degree Engineering Program (http://ceed.gatech.edu/ddep) (DDEP)
Regents’ Engineering Pathway Program (http://ceed.gatech.edu/REPP)
(REPP)

Wallace H. Coulter Department of
Biomedical Engineering at Georgia
Tech and Emory University

Established in 1997

Biomedical engineering is a highly interdisciplinary field integrating
engineering and the life sciences to support the prevention, diagnosis,
and treatment of disease. The role of the biomedical engineer is to
provide answers to problems arising from the study of living systems by
employing the methodology and principles of engineering. Biomedical
engineers often serve as integrators in multidisciplinary teams of
engineers, scientists, and healthcare professionals in the medical device
and biotechnology industries as well as government regulatory agencies.
Our program challenges students with practical, hands-on problem-
solving and design experiences throughout the curriculum. Graduates of
our program have obtained the strong foundation necessary to address
the complex healthcare challenges of the twenty-first century.

The Wallace H. Coulter Department of Biomedical Engineering at
Georgia Tech and Emory University (the Coulter Department) is a unique
partnership between a public institution and a private university—Georgia
Tech’s College of Engineering and Emory’s School of Medicine. The
formation of the Department in 1997 was the culmination of collaborative
efforts in the field of biomedical engineering that dates back to the
1980s. In 2000, the Department assumed the name of Wallace H. Couler,
who was recognized as one of the most influential engineers in the
twentieth century through his entrepreneurial efforts in shaping the fields
of automated cell analysis and hematology.

Research in the Coulter Department encompasses long-range
fundamental research and direct clinical applications through
translational research. The department has identified six thrust areas in
which to focus research and educational programs:

• biomaterials and regenerative medicine,
• cardiovascular biology and biomechanics,
• cellular and biomolecular engineering,
• integrative biosystems,
• medical imaging, and
• neuroengineering.

Research initiatives in these areas are resulting in major breakthroughs in
medicine, basic science, and applied technology.

The Coulter Department offers both undergraduate and graduate
degree programs that attract outstanding students who wish to have
an education that prepares them to be the leaders in this field in the
twenty-first century. Additionally, to meet the needs of a rapidly changing
society and global economy, the Coulter Department has forged a new
partnership with Peking University to offer a joint doctoral degree in
biomedical engineering. The program offers a unique means for U.S. and
Chinese students who want to learn and work in a global economy and in
global health settings.

Minor
• Minor in Biomedical Engineering (p. 541)

Bachelor’s Degree
• Bachelor of Science in Biomedical Engineering (p. 217)

Master’s Degree
• Master of Biomedical Innovation and Development (p. 503)

Doctoral Degree
• Doctor of Philosophy with a Major in Bioengineering (p. 482)
• Doctor of Philosophy with a Major in Bioinformatics (p. 482)
• Doctor of Philosophy with a Major in Biomedical Engineering
  (p. 483)
• Doctor of Philosophy with a Major in Computational Science and
  Engineering (p. 485)
• Doctor of Philosophy with a Major in Machine Learning (p. 491)
• Doctor of Philosophy with a Major in Robotics (p. 499)
• M.D./Ph.D. Program (p. 502)

Graduate Study in Biomedical
Engineering

Graduate Programs
• Master of Science in Biomedical Innovation and Development
  (p. 503)
• Doctor of Philosophy with a Major in Bioengineering (p. 482)
• Doctor of Philosophy with a Major in Bioinformatics (p. 482)
• Doctor of Philosophy with a Major in Biomedical Engineering
  (p. 483)
• Doctor of Philosophy with a Major in Computational Science and
  Engineering (p. 485)
• Doctor of Philosophy with a Major in Machine Learning (p. 491)
Contact Information
Department of Biomedical Engineering
Graduate Admissions Committee
Georgia Institute of Technology
313 Ferst Dr.
Atlanta, GA 30332-0535

Phone: 404.385.2557
Fax: 404.894.4243

Departmental Resources
- Biomedical Engineering web site (http://www.bme.gatech.edu)

Office of Graduate Studies
- Biomedical Innovation and Development (http://www.gradadmin.gatech.edu/mbid)
- Bioengineering (http://www.gradadmin.gatech.edu/bioe)
- Bioinformatics (http://www.gradadmin.gatech.edu/bioinformatics)
- Biomedical Engineering (http://www.gradadmin.gatech.edu/bmed)
- Computational Science and Engineering (http://www.gradadmin.gatech.edu/cse)
- Robotics (http://www.gradadmin.gatech.edu/robo)

Rules and Regulations
The Catalog is the authoritative source of Rules and Regulations (p. 151) and other Policies (p. 138) for Georgia Tech students.

Undergraduate Study in Biomedical Engineering
The BS in Biomedical Engineering program is accredited by the Engineering Accreditation Commission of ABET, www.abet.org (http://www.abet.org).

The Department of Biomedical Engineering participates in an undergraduate Multidisciplinary Certificate in "Biomaterials".

See http://www.mse.gatech.edu/undergraduate-program/bio-cert for more details.

Woodruff School of Mechanical Engineering
Established in 1885

Mechanical Engineering (ME) was the first academic program established at Georgia Tech. On September 20, 1985, the School of Mechanical Engineering celebrated its centennial by assuming the name of one of its most distinguished alumni, Atlanta businessman and philanthropist George W. Woodruff (Class of 1917).

Today, the Woodruff School offers undergraduate degrees in mechanical engineering and nuclear and radiological engineering, and graduate degrees in mechanical engineering, nuclear and radiological engineering, medical physics, bioengineering, robotics, paper science and engineering.

Mechanical engineering embraces the generation, conversion, transmission, and utilization of thermal and mechanical energy; the design and production of tools and machines and their products; the consideration of fundamental characteristics of materials as applied to design; and the synthesis and analysis of mechanical, thermal, and fluid systems, including the automation of such systems.

Design, production, manufacture, operation, administration, economics, and research are functional aspects of mechanical engineering.

The undergraduate program in ME allows 15 credit hours of free electives, thereby allowing students to elect one of six concentration areas within in ME or any of the Institute's approved minors.

ME concentrations include:
- Automation and Robotics
- Thermal, Fluid, and Energy Systems
- Micro and Nano Engineering
- Mechanics of Materials
- Manufacturing
- Nuclear Energy

The Nuclear & Radiological Engineering (NRE) and Medical Physics (MP) programs are within the George W. Woodruff School of Mechanical Engineering. NRE and MP are based on a symbiotic group of related areas of knowledge of a common set of science, engineering, and mathematical disciplines and their applications to the development of nuclear power and the utilization of radiation in industry and medicine.

Nuclear engineering field is broad with a unique nuclear core that includes physics of neutron chain (fission) and fusion reactors, radiation production, transport, and interaction with matter; radiation damage of materials, nuclear fuel and structural materials, large-scale numerical modeling, and simulation of nuclear systems. Radiological engineering is the application of the radiation related disciplines to radiation safety (protection), medical application (medical physics), security and detection of nuclear material. The multidisciplinary aspects of nuclear engineering includes topics in
- ChBE (separation/processing),
- ECE (electronics, instrumentation, electromagnetics),
- ME (heat transfer, fluids, thermodynamics),
- MSE (mechanics and properties of material), and
- physics (nuclear, atomic, and radiation).

Medical physics encompasses the therapeutic and diagnostic applications of radiation in medicine. It involves the application of physical principles to medicine, particularly in the diagnosis and treatment of human diseases. Medical physics includes diagnostic radiology, the diagnosis of disease with X-rays, ultrasound, and magnetic resonance imaging; health physics, the study of radiation hazards and radiation protection; nuclear medicine, the diagnosis and treatment of diseases with injected radio-pharmaceuticals; and radiation oncology, the treatment of cancer by ionizing radiation.

School Facilities
The Woodruff School is housed in a multi-building classroom/research complex. Included in this complex are modern classrooms and seminar conference rooms that serve the entire Institute.
The School has many types of specialized instruments and other equipment associated with its laboratories in mechanical engineering for the study of acoustics and dynamics; automation and mechatronics; bioengineering; computer-aided engineering and design; fluid mechanics; heat transfer, combustion, and energy systems; manufacturing; mechanics of materials; micro and nano engineering; and tribology. The Nuclear and Radiological Engineering Program has special facilities for the study of computational reactor physics; fast reactors; fusion; medical physics; and radiation detection.

Modern facilities and laboratories support experimental and theoretical programs of instruction and research. Special facilities in the Woodruff School include:

- Automation and Robotics
- Thermal, Fluid, and Energy Systems
- Micro and Nano Engineering
- Mechanics of Materials
- Manufacturing
- Nuclear Energy

The Georgia Tech Invention Studio is also housed in the Woodruff School. It is a design-build-play space open to all Georgia Tech students, faculty, and staff, regardless of year, major, or prior experience. It is staffed by the University Lab Instructors, student volunteers who are always on hand to provide machine training and help with projects.

The facilities available for the nuclear and radiological engineering and medical physics programs include the

- Radiological Science and Engineering Laboratory (RSEL),
- AREVAL Radiation Detection Laboratory,
- Varian Computational Treatment Planning Laboratory,
- Microchannel Test Facility, and
- Plasma-facing Components Thermal-hydraulic Test Facility.

The RSEL houses the Variant Clinical Accelerator (VCLA) Laboratory, Southern Nuclear Radiation Physics Laboratory which houses a graphite subcritical assembly, a neutron reference field laboratory, a thermoluminescent detector laboratory, a radiation sources laboratory housing various radioisotopes generating neutrons and photons, a nuclear materials laboratory, and a vault which houses a neutron generator.

Minors

- Minor in Energy Systems (p. 552)
- Minor in Engineering and Business (p. 559)
- Minor in Global Development (p. 562)
- Minor in Nuclear and Radiological Engineering (p. 577)

Bachelor’s Degrees

- Bachelor of Science in Mechanical Engineering (p. 439)
- Bachelor of Science in Nuclear and Radiological Engineering (p. 464)

Master’s Degrees

- Master of Science in Bioengineering (p. 512)
- Master of Science in Mechanical Engineering (p. 532)
- Master of Science in Medical Physics (p. 533)
- Master of Science in Nuclear Engineering (p. 533)
- Master of Science in Paper Science and Engineering (p. 534)
- Master of Science - Undesignated (p. 508)

Doctoral Degrees

- Doctor of Philosophy with a Major in Bioengineering (p. 482)
- Doctor of Philosophy with a Major in Mechanical Engineering (p. 494)
- Doctor of Philosophy with a Major in Nuclear Engineering (p. 495)
- Doctor of Philosophy with a Major in Paper Science and Engineering (p. 496)
- Doctor of Philosophy with a Major in Robotics (p. 499)

Graduate Study in Mechanical Engineering

The graduate program in mechanical engineering offers advanced study and research in the areas of acoustics and dynamics; automation and mechatronics; bioengineering; computer-aided engineering and design; fluid mechanics; heat transfer, combustion, and energy systems; manufacturing; mechanics of materials; microelectromechanical systems; and tribology. The graduate programs lead to the degrees of

- Master of Science in Mechanical Engineering,
- Master of Science,
- Master of Science in Bioengineering,
- Master of Science in Paper Science and Engineering, and
- Doctor of Philosophy for qualified graduates having backgrounds in engineering, mechanics, mathematics, the physical sciences, or the biological sciences.

The master’s degree requires a minimum of thirty approved credit hours. Students may elect to earn nine of these hours by writing a thesis, or they may earn all credit toward the degree through coursework. Six hours of credit for graduate courses taken as an undergraduate at Georgia Tech and used for credit toward the BS ME may be included in the MS program of study if the student graduated with an undergraduate grade-point average of at least 3.5. Students must earn a graduate grade-point average of at least 3.0 and satisfy all remaining requirements to be certified for the master’s degree.

Candidates for the Doctor of Philosophy degree must earn a graduate grade-point average of at least 3.3. Students may obtain additional information about the programs by viewing the Woodruff School Handbook for Graduate Students. Every student enrolled must consult this source of information with respect to special rules and degree requirements.

The graduate program in nuclear and radiological engineering/medical physics leads to the degrees of

- Master of Science in Nuclear Engineering,
- Master of Science in Medical Physics,
- Master of Science, and
- Doctor of Philosophy.

In nuclear and radiological engineering, students with a bachelor’s degree in engineering pursue the Master of Science in Nuclear Engineering degree, while students with a Bachelor of Science degree in other fields enroll for the Master of Science degree. Depending on the career objectives of the student, the Woodruff School may encourage a thesis
as part of the Master of Science program. Nuclear and radiological engineering students must earn a graduate grade-point average of at least 3.0 and satisfy all remaining requirements to be certified for the master’s degree.

The doctoral program is designed with great latitude to capitalize on variations in experience and interests of individual students. Candidates for the Doctor of Philosophy degree must earn a graduate grade-point average of at least 3.3.

**Master's Degrees**
- Master of Science in Bioengineering (p. 512)
- Master of Science in Mechanical Engineering (p. 532)
- Master of Science in Medical Physics (p. 533)
- Master of Science in Nuclear Engineering (p. 533)
- Master of Science in Paper Science and Engineering (p. 534)
- Master of Science - Undesignated (p. 508)

**Doctoral Degrees**
- Doctor of Philosophy with a Major in Bioengineering (p. 482)
- Doctor of Philosophy with a Major in Mechanical Engineering (p. 494)
- Doctor of Philosophy with a Major in Nuclear Engineering (p. 495)
- Doctor of Philosophy with a Major in Nuclear Engineering - Medical Physics Option (p. 495)
- Doctor of Philosophy with a Major in Nuclear Engineering - Nuclear Enterprise Management Option (p. 495)
- Doctor of Philosophy with a Major in Paper Science and Engineering (p. 496)
- Doctor of Philosophy with a Major in Robotics (p. 499)

**Educational Objectives**
The educational objectives of the doctoral programs in the Woodruff School are:
- to prepare students for successful careers in industry and/or academia and to promote and instill an ethic for lifelong learning;
- to educate students in methods of advanced analysis, including the mathematical, computational, and experimental skills appropriate for professionals to use when solving problems;
- to provide a substantial depth of knowledge in a particular field or subfield of study that allows the student to be recognized as an expert;
- to provide a breadth of knowledge in a minor field of study that fosters an awareness of and skill in interdisciplinary approaches to problem solving;
- to develop the skills pertinent to the research process, including the students’ ability to formulate problems, to synthesize and integrate information, to work collaboratively, to communicate effectively, and to publish the results of their research; and
- to promote a sense of scholarship, leadership, and service among our graduates.

The educational objectives of the master’s degree programs in the Woodruff School are:
- to prepare students for successful careers in industry and to promote and instill an ethic for lifelong learning;
- to educate students in methods of advanced analysis appropriate for professionals to use when solving problems;
- to provide a depth of knowledge in a particular field of study that allows the student to apply innovative techniques to solve problems;
- to provide a breadth of knowledge that fosters an awareness of and skill in interdisciplinary approaches to problem solving; and
- to develop the skills pertinent to the research process, including the students’ ability to formulate problems, to synthesize and integrate information, to work collaboratively, to communicate effectively, and to publish the results of their research (MS thesis students).

The M.S. in Medical Physics and the Ph.D. in Nuclear and Radiological Engineering-Medical Physics Option programs are accredited by the Commission on Accreditation of Medical Physics Educational Programs, CAMPEP, www.campep.org/campeplstgrad.asp (http://www.campep.org/campeplstgrad.asp).

**Distance Learning Programs**
The Woodruff School offers working professionals the opportunity to enroll in many of its graduate courses through video, CD-ROM, or Internet technologies. The distance-learning program has the same admission, course, and degree requirements as those for graduate students attending classes at the Atlanta campus or at Georgia Tech-Lorraine. Qualified individuals may complete the requirements for the master’s degrees in mechanical engineering (MS ME) and medical physics (MS MP) by utilizing the distance-learning mode.

Distance Learning & Professional Education (https://pe.gatech.edu/degrees/online-masters-degrees/mechanical-engineering)

**Georgia Tech-Lorraine**
The Woodruff School’s program at Georgia Tech-Lorraine in Metz, France has a number of components. In addition to the master’s of science degree in mechanical engineering (MS ME) there is also a doctoral program, which has grown as a result of major funding from CNRS and Georgia Tech; a new fall/spring semester undergraduate program; and the undergraduate summer program. Most graduate students focus on the MS ME French students from partner institutions, such as ENSAM and the Ecole des Mines, take courses at Georgia Tech-Lorraine, typically for two semesters, before coming to the Atlanta campus to finish their master’s degree. U.S. students take classes at GTL as well as at ENSAM for three semesters and receive both the MS ME and the Master Professionel of ENSAM. Students must also complete an internship in France during the summer. The mechanical engineering programs offered at GTL have the same admission, course, and degree requirements as those for graduate students in mechanical engineering attending classes on the Atlanta campus or through the distance-learning program. ENSAM is a leading institution for the study of mechanical and industrial engineering with eight campuses across France, including one in Metz. For more information on the Georgia Tech-Lorraine program, view www.georgiatech-metz.fr (http://www.georgiatech-metz.fr).

**Multidisciplinary Programs**
Mechanical engineering students may plan electives that satisfy simultaneously the requirements of the degree program and a designated multidisciplinary field within the College of Engineering, thus earning both a graduate degree and a certificate indicating expertise in a related...
specialty. For a complete description of these and other multidisciplinary programs, contact the School.

**Undergraduate Study in Mechanical Engineering**

**Minors**
- Minor in Energy Systems (p. 552)
- Minor in Engineering and Business (p. 559)
- Minor in Global Development (p. 562)
- Minor in Nuclear and Radiological Engineering (p. 577)

**Bachelor’s Degrees**
- Bachelor of Science in Mechanical Engineering (p. 439)
- Bachelor of Science in Nuclear and Radiological Engineering (p. 464)

**Undergraduate Research**

Georgia Tech encourages undergraduate students to participate in quality and substantive research. There are several options in the Woodruff School for both mechanical engineering and nuclear and radiological engineering majors to do special problem courses or undergraduate research courses. Students can do a non-research special problem course. This is usually a design course and it might be combined with the capstone design class for a two-semester design problem. There are two types of undergraduate research courses; an ME or NRE class; and research internships, where students are paid for working on a project either part time or full time. For both options, the course appears on the transcript. In all cases, the student must find a faculty member to work with. Each special problem and research course requires a written final report, which is to be submitted to the faculty advisor for grading. All special problems courses taken for credit receive a letter grade and appear on the transcript. Funding opportunities are available through the President’s Undergraduate Research Awards.

For more information on undergraduate research at Georgia Tech, visit [www.undergradresearch.gatech.edu](http://www.undergradresearch.gatech.edu) and for specific ME/NRE program information, visit [www.me.gatech.edu](http://www.me.gatech.edu).

The following undergraduate engineering programs are accredited by the Engineering Accreditation Commission of ABET, [www.abet.org](http://www.abet.org):
- Bachelor of Science in Mechanical Engineering
- Bachelor of Science in Nuclear and Radiological Engineering

**College of Sciences**

College established in 1990
First Science Program in 1888

The College of Sciences comprises six schools
- Biological Sciences,
- Chemistry and Biochemistry,
- Earth and Atmospheric Sciences,
- Mathematics,
- Physics, and
- Psychology.

All schools offer BS, MS, and PhD degree programs.

In addition, the College of Sciences offers a BS program in Neuroscience.

The Center for Education Integrating Science, Mathematics, and Computing (CEISMC), which works with K-12 schools and teachers in the state of Georgia to improve science and mathematics education, is also a unit of the College of Sciences.

The College of Sciences provides the courses in mathematics and the natural sciences that are necessary for all Tech undergraduates to acquire skills and basic principles for their majors. A detailed description of each degree program in the College of Sciences is located under the appropriate school heading, as are descriptions of the courses offered. The College of Sciences’ courses required or recommended by degree programs in the other five colleges at Georgia Tech are listed under the curricula for those degrees.

The American Chemical Society has certified the curriculum leading to the Bachelor of Science in Chemistry.

The Human Factors and Ergonomics Society has accredited the curriculum leading to the PhD in Engineering Psychology.

The Master of Science in Prosthetics and Orthotics (MSPO) program is accredited by the Commission on Accreditation of Allied Health Education Programs (CAAAHEP) upon the recommendation of the National Commission on Orthotic and Prosthetic Education (NCOPE). Accreditation for the MSPO program is effective 2010 to 2015.

- Algorithms, Combinatorics, and Optimization. PhD (p. 480)
- Applied Physics. BS (p. 204)
- Applied Physiology. PhD (p. 480)
- Biochemistry. Minor (p. 540), BS (p. 208)
- Bioinformatics. MS (p. 512), PhD (p. 482)
- Biology. Minor (p. 541), BS (p. 214), MS (p. 513), PhD (p. 482)
- Chemistry. Minor (p. 542), BS (p. 234), MS (p. 515), PhD (p. 484)
- Computational Science and Engineering. MS (p. 516), PhD (p. 485)
- Discrete Mathematics. BS (p. 331)
- Earth and Atmospheric Sciences. Minor (p. 548), BS (p. 335), MS (p. 522), PhD (p. 487)
- Health and Medical Sciences. Minor (p. 562)
- Human-Computer Interaction. MS (p. 526)
- Machine Learning. PhD (p. 491)
- Mathematics. Minor (p. 572), BS (p. 432), MS (p. 531), PhD (p. 494)
- Neuroscience. BS (p. 463)
- Ocean Science and Engineering. PhD (p. 495)
- Paper Science and Engineering. MS (p. 534), PhD (p. 496)
- Physics. Minor (p. 579), BS (p. 471), MS (p. 534), PhD (p. 496)
- Physiology. Minor (p. 579)
- Psychology. Minor (p. 581), BS (p. 474), MS, (p. 535) PhD (p. 500)
- Quantitative Biosciences. PhD (p. 498)
- Quantitative and Computational Finance. MS (p. 536)
The College of Sciences currently offers minors in biology, earth and atmospheric sciences, and mathematics, along with a number of certificate programs that provide similar opportunities for students to develop their expertise or acquire skills or information in specific areas in addition to their major area. Students who satisfactorily complete a certificate program will receive a certificate of recognition from the department that offers the program. Certificate programs available in the College of Sciences are as follows: (Certificate programs offered by the other colleges at Georgia Tech are also available to students in the College of Sciences.)

**Certificate Programs in the College of Sciences**

**Biological Science**
- Applied Physiology
- Biologically Inspired Design
- Biomedical Science
- Biomolecular Technology
- Computational & Quantitative Biology
- Environmental Science
- Integrative Biology
- Marine Science

**Physics**
- Astrophysics

**Psychology**
- Biopsychology
- Cognitive Psychology
- Engineering Psychology
- Experimental Psychology
- Industrial/Organizational Psychology
- Social/Personality Psychology

**School of Biological Sciences**

Programs of study offered by the School of Biological Sciences allow students to gain competence in several different areas of modern biological sciences. The curricula in all degree programs in the School encourage breadth by incorporating course selections from other schools and departments. The Institute, with its strengths in science, computing, mathematics, and engineering, provides unique opportunities for careers in the biological sciences and related areas.

The Bachelor of Science degree program consists of a combination of requirements and electives that ensure a balanced background in the fundamental areas of biology, while providing an opportunity to emphasize an area of interest in the junior and senior years. The School also offers graduate programs leading to MS and PhD degrees. The degree programs include coursework, faculty and student seminars, and independent research. Faculty members are actively engaged in research fields such as bioinformatics, biophysics, ecology, evolutionary biology, genetics, mathematical biology, marine science, microbiology, and molecular cell biology.

The Master of Science Degree Program in Prosthetics and Orthotics is accredited by the Commission on Accreditation of Allied Health Education Programs (www.caahep.org) upon the recommendation of the National Commission of Orthotic and Prosthetic Education (NCOPE).

Commission on Accreditation of Allied Health Education Programs
35 East Wicker Drive, Suite 1970
Chicago, IL 60601-2208
312.553.9355

**Minor**
- Minor in Biology (p. 541)
- Minor in Physiology (p. 579)

**Bachelor's Degrees**
- Bachelor of Science in Biology (p. 214)
- Bachelor of Science in Neuroscience (p. 463)

**Master's Degrees**
- Master of Science in Biology (p. 513)
- Master of Science in Bioinformatics (p. 512)
- Master of Science in Computational Science and Engineering (p. 516)

**Doctoral Degrees**
- Doctor of Philosophy with a Major in Applied Physiology (p. 480)
- Doctor of Philosophy with a Major in Biology (p. 482)
- Doctor of Philosophy with a Major in Bioinformatics (p. 482)
- Doctor of Philosophy with a Major in Computational Science and Engineering (p. 485)
- Doctor of Philosophy with a Major in Ocean Science and Engineering (p. 495)
- Doctor of Philosophy with a Major in Quantitative BioSciences (p. 498)

**Graduate Study in Biological Sciences**

The School of Biological Sciences provides advanced training and research opportunities in various aspects of systems biology, ranging from molecular biology to ecology. Some current research areas include genomic sequence analysis, mechanisms of gene expression and DNA replication, evolutionary mechanisms, sphingolipids and metabolomics, signal transduction in plant and animal cells, environmental microbiology, bioremediation, sensory mechanisms in small animals, biological oceanography, ecosystem toxicology, and theoretical ecology.

**Master's Degrees**
- Master of Science in Biology (p. 513)
- Master of Science in Bioinformatics (p. 512)
- Master of Science in Computational Science and Engineering (p. 516)
Doctoral Degrees

- Doctor of Philosophy with a Major in Applied Physiology (p. 480)
- Doctor of Philosophy with a Major in Biology (p. 482)
- Doctor of Philosophy with a Major in Bioinformatics (p. 482)
- Doctor of Philosophy with a Major in Computational Science and Engineering (p. 485)
- Doctor of Philosophy with a Major in Ocean Science and Engineering (p. 495)
- Doctor of Philosophy with a Major in Quantitative BioSciences (p. 498)

Undergraduate Study in Biological Sciences

Admission

- Undergraduate Admission (http://admission.gatech.edu)

Advising

- Undergraduate Advising (https://advising.gatech.edu)

Rules and Regulations

The Catalog is the authoritative source of Rules and Regulations (p. 151) and other Policies (p. 138) for Georgia Tech students.

Health Sciences Requirement

All Georgia Tech students must satisfactorily complete the health and wellness requirement for graduation.

The requirement can be satisfied by completing one of two course options in Applied Physiology: APPH 1040 or APPH 1050. APPH 1040 is a two-credit-hour lecture-based course. APPH 1050 is a lecture and physical activity course that meets once per week for 1.5 credit hours of lecture and once per week at the Campus Recreations Center for 1.5 credit hours of structured physical activity. A $35 course fee is required to take APPH 1050. The School may grant credit to transfer students for comparable courses completed at other institutions. For more information, contact Applied Physiology's administrative office.

Students who have completed their health and wellness requirement are also encouraged to consider additional elective courses in Applied Physiology's Health Sciences Certificate program. In addition, other Applied Physiology (APPH) courses may be used as free electives or technical electives, if approved by the major school. Individual schools may allow up to 3 credit hours of courses to be counted toward the degree requirements. Students should check the curricula of their individual schools to determine the number of hours they may apply toward the degree.

Requesting an Overload for HPS 1040

Overload requests for APPH 1040 or APPH 1050 should be made via the online registration system. Students should contact the Office of the Registrar (http://www.registrar.gatech.edu/registration) for information about how to request a permit/overload. Please note, no overloads are given during early registration. Overload requests will be reviewed the week before classes begin. Permits will be given at that time based upon classroom space and class status, with juniors and seniors having priority.

Certificates

Each certificate requires twelve credit hours of coursework, including at least nine credit hours at the 3000+ level. Courses required by name and number for a student’s major program of study may not count towards a certificate. Students may not double-count courses towards more than one certificate or minor. Non-Biology majors will be required to include at least nine credit hours of BIOL coursework within their certificate. Students should choose twelve credit hours from the lists below for each of the six new certificates:

### Biomedical Science

Select 12 credit hours from the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>APPH/BIOL 3751</td>
<td>Anatomy &amp; Physiology</td>
</tr>
<tr>
<td>BIOL 4015</td>
<td>Cancer Bio/Tech</td>
</tr>
<tr>
<td>BIOL 4150</td>
<td>Genomics&amp;Appl Bioinfor</td>
</tr>
<tr>
<td>BIOL 4340</td>
<td>Medical Microbiology</td>
</tr>
<tr>
<td>BIOL 4401</td>
<td>Exper Dgn&amp;Statis Methods</td>
</tr>
<tr>
<td>BIOL 4464</td>
<td>Developmental Biology</td>
</tr>
<tr>
<td>BIOL 4570</td>
<td>Immunology &amp; Immunochem</td>
</tr>
<tr>
<td>BIOL 4650</td>
<td>Bioethics</td>
</tr>
<tr>
<td>BIOL 4668</td>
<td>Eukaryotic Mol Genetics</td>
</tr>
<tr>
<td>BIOL 4752</td>
<td>Intro Neuroscience</td>
</tr>
<tr>
<td>BIOL 4802</td>
<td>Special Topics (Current Trends in Biomedical Entrepreneurship/Entrepreneurship in the Life Sciences)</td>
</tr>
<tr>
<td>BIOL 4802</td>
<td>Special Topics (Evolutionary Developmental Biology)</td>
</tr>
<tr>
<td>BIOL 4802</td>
<td>Special Topics (Drug Discovery)</td>
</tr>
<tr>
<td>BIOL 4803</td>
<td>Special Topics (Human Genetics)</td>
</tr>
<tr>
<td>BIOL 4803</td>
<td>Special Topics (Virology)</td>
</tr>
<tr>
<td>BIOL 4803</td>
<td>Special Topics (Endocrinology)</td>
</tr>
<tr>
<td>BMED 3100</td>
<td>Systems Physiology</td>
</tr>
<tr>
<td>BMED 4400</td>
<td>Neuroengineering Fund</td>
</tr>
<tr>
<td>BMED 4500</td>
<td>Cell &amp; Tissue Engr Lab</td>
</tr>
<tr>
<td>BMED/CHEM/CHBE 4765</td>
<td>Drug Design,Devlpmnt&amp;Delivery</td>
</tr>
<tr>
<td>LMC 2300</td>
<td>Intro Biomedicine &amp; Cult</td>
</tr>
<tr>
<td>PSYC 3020</td>
<td>Biopsychology</td>
</tr>
</tbody>
</table>

**Total Credit Hours**: 12

### Biomolecular Technology

Select 12 credit hours from the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 3380</td>
<td>Intro Microbiology</td>
</tr>
<tr>
<td>BIOL 3381</td>
<td>Intro Microbiology Lab</td>
</tr>
<tr>
<td>BIOL 4105</td>
<td>Macromolecular Modeling</td>
</tr>
<tr>
<td>BIOL 4150</td>
<td>Genomics&amp;Appl Bioinfor</td>
</tr>
<tr>
<td>BIOL 4225</td>
<td>Molecular Evolution</td>
</tr>
<tr>
<td>BIOL 4440</td>
<td>Plant Physiology</td>
</tr>
<tr>
<td>BIOL 4746</td>
<td>Signaling Molecules</td>
</tr>
</tbody>
</table>

**Total Credit Hours**: 12
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 4478</td>
<td>Biophysics</td>
</tr>
<tr>
<td>BIOL 4608</td>
<td>Prokaryotic Mole Genetics</td>
</tr>
<tr>
<td>BIOL 4668</td>
<td>Eukaryotic Mole Genetics</td>
</tr>
<tr>
<td>BIOL 4802</td>
<td>Special Topics (Drug Discovery)</td>
</tr>
<tr>
<td>BIOL 4803</td>
<td>Special Topics (Protein Biology)</td>
</tr>
<tr>
<td>BIOL 4803</td>
<td>Special Topics (Regulatory RNAs)</td>
</tr>
<tr>
<td>BIOL 4803</td>
<td>Special Topics (Environmental Microbial Genomics)</td>
</tr>
<tr>
<td>BMED/CHM/CHBE 4765</td>
<td>Drug Design, Development &amp; Delivery</td>
</tr>
<tr>
<td>CHEM 4511</td>
<td>Biochemistry I</td>
</tr>
<tr>
<td>CHEM 4512</td>
<td>Biochemistry II</td>
</tr>
<tr>
<td>CHEM 4521</td>
<td>Biophysical Chemistry</td>
</tr>
<tr>
<td>CHEM 4803</td>
<td>Special Topics</td>
</tr>
<tr>
<td>CHBE 4760</td>
<td>Biocatalysis</td>
</tr>
<tr>
<td><strong>Total Credit Hours</strong></td>
<td><strong>12</strong></td>
</tr>
</tbody>
</table>

### Computational & Quantitative Biology

Select 12 credit hours from the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 2400</td>
<td>Math Models in Biol</td>
</tr>
<tr>
<td>BIOL 4105</td>
<td>Macromolecular Modeling</td>
</tr>
<tr>
<td>BIOL 4150</td>
<td>Genomics &amp; Appl Bioinfor</td>
</tr>
<tr>
<td>BIOL 4225</td>
<td>Molecular Evolution</td>
</tr>
<tr>
<td>BIOL 4401</td>
<td>Exper Dgn &amp; Stat Methods</td>
</tr>
<tr>
<td>BIOL 4422</td>
<td>Theoretical Ecology</td>
</tr>
<tr>
<td>BIOL/MATH 4755</td>
<td>Mathematical Biology</td>
</tr>
<tr>
<td>BIOL 4803</td>
<td>Special Topics (Computational Systems Biology)</td>
</tr>
<tr>
<td>BMED 4477</td>
<td>Bio Networks &amp; Genomics</td>
</tr>
<tr>
<td>CS 4400</td>
<td>Intr to Database Systems</td>
</tr>
<tr>
<td>CS 4710</td>
<td>CS for Bioinformatics</td>
</tr>
<tr>
<td>MATH 3012</td>
<td>Applied Combinatorics</td>
</tr>
<tr>
<td>MATH 3215</td>
<td>Probability &amp; Statistics</td>
</tr>
<tr>
<td>MATH 4022</td>
<td>Intro to Graph Theory</td>
</tr>
<tr>
<td>CEE/ISYE 3770</td>
<td>Statistics &amp; Applications</td>
</tr>
<tr>
<td><strong>Total Credit Hours</strong></td>
<td><strong>12</strong></td>
</tr>
</tbody>
</table>

### Environmental Science

Select 12 credit hours from the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 2100</td>
<td>Biogeography-New Zealand</td>
</tr>
<tr>
<td>BIOL 3100</td>
<td>Ecology &amp; Evol-Australia</td>
</tr>
<tr>
<td>BIOL 3300</td>
<td>Tropical Ecology</td>
</tr>
<tr>
<td>BIOL 3380</td>
<td>Intro Microbiology</td>
</tr>
<tr>
<td>BIOL 3381</td>
<td>Intro Microbiology Lab</td>
</tr>
<tr>
<td>BIOL 4101</td>
<td>Sensory Ecology</td>
</tr>
<tr>
<td>BIOL 4221</td>
<td>Biological Oceanography</td>
</tr>
<tr>
<td>BIOL 4410</td>
<td>Microbial Ecology</td>
</tr>
<tr>
<td>BIOL 4417</td>
<td>Marine Ecology</td>
</tr>
<tr>
<td>BIOL 4418</td>
<td>Microbial Physiology</td>
</tr>
<tr>
<td>BIOL 4422</td>
<td>Theoretical Ecology</td>
</tr>
<tr>
<td>BIOL 4440</td>
<td>Plant Physiology</td>
</tr>
<tr>
<td>BIOL 4446</td>
<td>Animal Physiology</td>
</tr>
<tr>
<td>BIOL 4471</td>
<td>Behavior Biology</td>
</tr>
<tr>
<td>BIOL 4620</td>
<td>Aquatic Chemical Ecology</td>
</tr>
<tr>
<td>BIOL 4802</td>
<td>Special Topics (Community Ecology)</td>
</tr>
<tr>
<td>BIOL 4803</td>
<td>Special Topics (Population Biology)</td>
</tr>
<tr>
<td>BIOL 4803</td>
<td>Special Topics (Urban Ecology)</td>
</tr>
<tr>
<td>BIOL 4803</td>
<td>Special Topics (Population &amp; Evolutionary Ecology)</td>
</tr>
<tr>
<td>CEE 2300</td>
<td>Environmental Engr Prin</td>
</tr>
<tr>
<td>CEE 3340</td>
<td>Environ Engr Laboratory</td>
</tr>
<tr>
<td>CEE 4300</td>
<td>Environmental Engr Sys</td>
</tr>
<tr>
<td>CEE 4620</td>
<td>Environ Impact Assess</td>
</tr>
<tr>
<td>CHEM/EAS 4740</td>
<td>Atmospheric Chemistry</td>
</tr>
<tr>
<td>EAS 1600</td>
<td>Intro-Environmental Sci</td>
</tr>
<tr>
<td>EAS 1601</td>
<td>Habitable Planet</td>
</tr>
<tr>
<td>EAS 2420</td>
<td>Environmental Measures</td>
</tr>
<tr>
<td>EAS 2600</td>
<td>Earth Processes</td>
</tr>
<tr>
<td>EAS 2602</td>
<td>Earth Through Time</td>
</tr>
<tr>
<td>EAS 4110</td>
<td>Resources, Energy &amp; Environ</td>
</tr>
<tr>
<td>EAS 4300</td>
<td>Oceanography</td>
</tr>
<tr>
<td>EAS 4350</td>
<td>Paleoclimate &amp; Paleocean</td>
</tr>
<tr>
<td>EAS 4410</td>
<td>Climate &amp; Global Change</td>
</tr>
<tr>
<td>EAS 4602</td>
<td>Biogeochemical Cycles</td>
</tr>
<tr>
<td><strong>Total Credit Hours</strong></td>
<td><strong>12</strong></td>
</tr>
</tbody>
</table>

### Marine Science

Select 12 credit hours from the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 4221</td>
<td>Biological Oceanography</td>
</tr>
<tr>
<td>BIOL 4410</td>
<td>Microbial Ecology</td>
</tr>
<tr>
<td>BIOL 4417</td>
<td>Marine Ecology</td>
</tr>
<tr>
<td>BIOL 4446</td>
<td>Animal Physiology</td>
</tr>
<tr>
<td>BIOL 4620</td>
<td>Aquatic Chemical Ecology</td>
</tr>
<tr>
<td>CEE 3040</td>
<td>Fluid Mechanics</td>
</tr>
<tr>
<td>CEE 4225</td>
<td>Coastal Engineering</td>
</tr>
<tr>
<td>EAS 3620</td>
<td>Geochemistry</td>
</tr>
<tr>
<td>EAS 4300</td>
<td>Oceanography</td>
</tr>
<tr>
<td>EAS 4350</td>
<td>Paleoclimate &amp; Paleocean</td>
</tr>
<tr>
<td>EAS 4602</td>
<td>Biogeochemical Cycles</td>
</tr>
<tr>
<td>NS 2323</td>
<td>Navigation</td>
</tr>
<tr>
<td><strong>Total Credit Hours</strong></td>
<td><strong>12</strong></td>
</tr>
</tbody>
</table>

### Biologically Inspired Design

**Required**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL/ISYE/MSE/ME 4740</td>
<td>Bio-Inspired Design</td>
</tr>
<tr>
<td><strong>Electives</strong></td>
<td><strong>Select 9 credit hours from the following:</strong></td>
</tr>
<tr>
<td><strong>Total Credit Hours</strong></td>
<td><strong>9</strong></td>
</tr>
</tbody>
</table>
Integrative Biology

Select twelve credit hours from courses represented in four of the other certificates listed above (e.g., three credit hours from each of four other certificates = 12 credit hours total).

For Non-Biology Majors

Additional courses that can count towards any of the above certificates are 1:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 1510</td>
<td>Biological Principles</td>
<td>8</td>
</tr>
<tr>
<td>&amp; BIOL 1511</td>
<td>and Honors Biological Prin</td>
<td></td>
</tr>
<tr>
<td>BIOL 1520</td>
<td>Intro to Organismal Biol</td>
<td>8</td>
</tr>
<tr>
<td>&amp; BIOL 1521</td>
<td>and Honors Organismal Biol</td>
<td></td>
</tr>
<tr>
<td>BIOL 2335</td>
<td>General Ecology</td>
<td>6</td>
</tr>
<tr>
<td>&amp; BIOL 2337</td>
<td>and Honors Ecology</td>
<td></td>
</tr>
<tr>
<td>BIOL 2344</td>
<td>Genetics</td>
<td>4</td>
</tr>
<tr>
<td>&amp; BIOL 2345</td>
<td>and Genetics Laboratory</td>
<td></td>
</tr>
</tbody>
</table>

1 As long as these courses are not required for the major program of study, and only up to three credit hours of courses at the 1xxx-2xxx level can count.

At least nine credits of BIOL coursework are required for each certificate.
The School of Earth and Atmospheric Sciences (EAS) is an interdisciplinary program that studies Earth’s physical and chemical environment. EAS takes an integrated Earth system science approach in which all components of Earth’s system are studied and analyzed as parts of the larger coupled system. The curriculum is designed to provide its graduates with the intellectual insights needed to understand the evolution of Earth’s environment and its possible future changes. This integrated approach provides the context for professional training in environmental science and meteorology, as well as specialization for research careers in atmospheric chemistry, aerosols, and clouds; dynamics of weather and climate; geochemistry; geophysics; oceanography; paleoclimate; planetary science; and remote sensing.

Financial Aid
Financial support is available for graduate study in the School of Chemistry and Biochemistry. The usual form of financial aid for first-year students is the teaching assistantship. Most students beyond the first year are appointed as research assistants. Both teaching and research assistants receive full tuition waivers. Additional information on the graduate program is available by writing:

Graduate Coordinator
School of Chemistry and Biochemistry
Georgia Institute of Technology
Atlanta, Georgia 30332-0400
or by visiting www.chemistry.gatech.edu (http://www.chemistry.gatech.edu).

Graduate Certificate in Remote Sensing (p. 502)
Students completing the master’s or doctoral degree requirements of the School may earn a Graduate Certificate in Remote Sensing.

Undergraduate Study in Chemistry and Biochemistry
Minors
- Minor in Chemistry (p. 542)
- Minor in Biochemistry (p. 540)

Bachelor’s Degrees
- Bachelor of Science in Chemistry (p. 234)
- Bachelor of Science in Biochemistry (p. 208)

School of Earth and Atmospheric Sciences
Established in 1970

Doctoral Degrees
- Doctor of Philosophy with a Major in Bioinformatics (p. 482)
- Doctor of Philosophy with a Major in Chemistry (p. 484)
- Doctor of Philosophy with a Major in Computational Science and Engineering (p. 485)
- Doctor of Philosophy with a Major in Paper Science and Engineering (http://catalog.gatech.edu/programs/paper-science-phd)
- Doctor of Philosophy with a Major in Quantitative Biosciences (p. 498)

Graduate Study in Earth and Atmospheric Sciences
Master’s Degree
- Master of Science in Earth and Atmospheric Sciences (p. 502)

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Minor
- Minor in Earth and Atmospheric Sciences (http://catalog.gatech.edu/programs/minor-earth-atmospheric)

Bachelor’s Degrees
- Bachelor of Science in Earth and Atmospheric Sciences (p. 335)

Master’s Degree
- Master of Science in Earth and Atmospheric Sciences (p. 522)

Doctoral Degrees
- Doctor of Philosophy with a Major in Earth and Atmospheric Sciences (p. 487)
- Doctor of Philosophy with a Major in Ocean Science and Engineering (p. 495)
- Doctor of Philosophy with a Major in Quantitative Biosciences (p. 498)

Graduate Study in Earth and Atmospheric Sciences
Master’s Degree
- Master of Science in Earth and Atmospheric Sciences (p. 502)

Doctoral Degrees
- Doctor of Philosophy with a Major in Earth and Atmospheric Sciences (p. 487)
- Doctor of Philosophy with a Major in Ocean Science and Engineering (p. 495)
- Doctor of Philosophy with a Major in Quantitative Biosciences (p. 498)

Graduate Certificate in Geohydrology
Students completing the master’s or doctoral degree requirements of the School may be awarded a Multidisciplinary Geohydrology Certificate if their program of study satisfies the requirements of the Multidisciplinary Geohydrology program. Additional details can be found in this catalog under Multidisciplinary Certificate Programs in Engineering (p. 31).

Graduate Certificate in Remote Sensing
Remote sensing refers to a means of investigating the properties of a target using measurements made at some distance from the target. Applications range from astronomy and environmental applications to medical radiography and automotive collision avoidance radars, as well as security-enhancing sensors. In the last three decades, sensing of the Earth and its atmosphere has increased very substantially because of climate change and global pollution concerns and because of the need for measurements to support the increasingly sophisticated weather and earthquake forecasting and oil and gas surveying capabilities.

Students completing the master’s or doctoral degree requirements of the Schools listed below may be awarded a Remote Sensing Certificate. The primary administration of the certificate is through Dr. Irina Sokolik of the...
School of Earth and Atmospheric Sciences. Departmental contacts are listed below:

Aerospace Engineering: Dr. Robert Braun
Electrical and Computer Engineering: Dr. Manos Tentzeris
Earth and Atmospheric Sciences: Dr. Irina Sokolik
Civil and Environmental Engineering: Dr. Michael Bergin
Chemistry and Biochemistry: Dr. Thomas Orlando
City Planning: Dr. Steven French

The courses that would be used to satisfy the requirements of this certificate have been divided into two areas:

1. First, a group of core courses that cover both fundamentals and applications of remote sensing;
2. Second, elective courses that cover a range of courses that cover fundamental physics, data analysis methods, and application areas.

A total of twelve credit hours are required to obtain the certificate, including at least two core courses. Nine of the credit hours must be at the 6000 level or above.

### Area 1: Core Courses

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CP 6531</td>
<td>Intro to Remote Sensing</td>
<td>3</td>
</tr>
<tr>
<td>EAS 4430</td>
<td>Remote Sensing &amp; Data Analy</td>
<td>3</td>
</tr>
<tr>
<td>EAS 4460</td>
<td>Satellite &amp; Radar Met</td>
<td>3</td>
</tr>
<tr>
<td>EAS 6145</td>
<td>Remote Sens Atmos &amp; Oceans</td>
<td>3</td>
</tr>
</tbody>
</table>

### Area 2: Electives

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>AE 6353</td>
<td>Orbital Mechanics (AE 6353 is a pre-requisite for AE 6354)</td>
<td>3</td>
</tr>
<tr>
<td>AE 6354</td>
<td>Adv Orbital Mechanics</td>
<td>3</td>
</tr>
<tr>
<td>CEE 6222</td>
<td>Hydrometeorology</td>
<td>3</td>
</tr>
<tr>
<td>CEE 6462</td>
<td>Signals &amp; Inverse Problems</td>
<td>3</td>
</tr>
<tr>
<td>CEE 6483</td>
<td>Geo Spatial Image Analy</td>
<td>3</td>
</tr>
<tr>
<td>CP 6521</td>
<td>Advanced GIS</td>
<td>3</td>
</tr>
<tr>
<td>EAS 4510</td>
<td>Exploration Geophysics</td>
<td>3</td>
</tr>
<tr>
<td>EAS 4520</td>
<td>Exploration Seismology</td>
<td>3</td>
</tr>
<tr>
<td>EAS 6134</td>
<td>Inverse Methods in EAS</td>
<td>3</td>
</tr>
<tr>
<td>EAS 8803</td>
<td>Special Topics (may be taught as Atmospheric Radiative Transfer)</td>
<td>3</td>
</tr>
<tr>
<td>EAS 8803</td>
<td>Special Topics (may be taught as Optical Techniques in Atmospheric Sensing)</td>
<td>3</td>
</tr>
<tr>
<td>ECE 6272</td>
<td>Fund-Radar Signal Proc</td>
<td>3</td>
</tr>
<tr>
<td>ECE 6780</td>
<td>Medical Image Processing</td>
<td>3</td>
</tr>
<tr>
<td>ECE 7370</td>
<td>Antennas/Waves in Matter</td>
<td>3</td>
</tr>
</tbody>
</table>

### Courses in Development

AE/EAS 4XXX: Designing a UAV for Remote Sensing Applications - This course is currently being planned and EAS recently received a NASA grant to provide education in this subject area.

EAS 6XXX: Earth Science/Geological Applications of Remote Sensing - A new faculty member in EAS geodetic remote sensing will be creating this course. It probably will include Global Positioning System (GPS) applications

Other new courses on remote sensing may qualify as electives for this certificate with approval by the Remote Sensing Certificate, Dr. Irina Sokolik.

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**Undergraduate Study in Earth and Atmospheric Sciences**

### Minor

- Minor in Earth and Atmospheric Sciences (http://catalog.gatech.edu/programs/minor-earth-atmospheric)

### Bachelor’s Degrees

- Bachelor of Science in Earth and Atmospheric Sciences (p. 335)

### Certificates

The School of Earth and Atmospheric Sciences offers programs of study for non-School majors leading to certificates in two areas of emphasis: geochemistry and solid earth geophysics. Each course must be completed with a C or better.

Additional information regarding undergraduate programs, the minor, and the certificate programs is available by contacting the EAS Undergraduate Coordinator

Contact the EAS undergraduate coordinator

EAS: Certificate Information (http://www.eas.gatech.edu/academics/degree_req)

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**School of Mathematics**

Established in 1952

Mathematics forms an integral part of the curricula of most students at Georgia Tech. Consequently, the School of Mathematics offers a wide range of courses serving students in the various engineering, science, and management disciplines. The School offers programs of study leading to bachelor’s, master’s, and doctoral degrees in mathematics. Such programs of study serve as preparation for mathematics careers, professional schools, and graduate studies.

In addition to basic courses in mathematics, the School offers a variety of specialized courses at the undergraduate and graduate levels, emphasizing areas related to the research activities of the faculty. These include mathematical analysis, applied mathematics, differential equations and partial differential equations, geometry, scientific computing, probability, statistics, combinatorics, mathematical physics, topology, and algebra.

The School of Mathematics has excellent computer facilities that are used in conjunction with an increasing number of courses and programs of study. A cooperative plan for students who wish to combine practical experience with academic work is available for mathematics majors.

### Minor

- Minor in Mathematics (p. 572)
Bachelor's Degrees
• Bachelor of Science in Mathematics (p. 432)

Master's Degrees
• Master of Science in Computational Science and Engineering (p. 516)
• Master of Science in Mathematics (p. 531)
• Master of Science in Quantitative and Computational Finance (p. 536)
• Master of Science in Statistics (p. 536)

Doctoral Degrees
• Doctor of Philosophy with a Major in Algorithms, Combinatorics, and Optimization (p. 480)
• Doctor of Philosophy with a Major in Bioinformatics (p. 482)
• Doctor of Philosophy with a Major in Computational Science and Engineering (p. 485)
• Doctor of Philosophy with a Major in Machine Learning (p. 491)
• Doctor of Philosophy with a Major in Mathematics (p. 494)
• Doctor of Philosophy with a Major in Quantitative Biosciences (p. 498)

Graduate Study in Mathematics

Master's Degrees
• Master of Science in Computational Science and Engineering (p. 516)
• Master of Science in Mathematics (p. 531)
• Master of Science in Quantitative and Computational Finance (p. 536)
• Master of Science in Statistics (p. 536)

Doctoral Degrees
• Doctor of Philosophy with a Major in Algorithms, Combinatorics, and Optimization (p. 480)
• Doctor of Philosophy with a Major in Bioinformatics (p. 482)
• Doctor of Philosophy with a Major in Computational Science and Engineering (p. 485)
• Doctor of Philosophy with a Major in Machine Learning (p. 491)
• Doctor of Philosophy with a Major in Mathematics (p. 494)
• Doctor of Philosophy with a Major in Quantitative Biosciences (p. 498)

Undergraduate Study in Mathematics

The School of Mathematics offers a Bachelor of Science degree in Mathematics. Students have the option of completing the BS in Mathematics or completing the BS in Mathematics with a concentration in one of four areas:
• Applied Mathematics
• Discrete Mathematics
• Probability and Statistics
• Pure Mathematics.

The BS in Mathematics program emphasizes the study of core mathematics, as well as its application. It provides and excellent preparation for employment, as well as for graduate study in mathematics and related fields.

School of Physics
Established in 1939

Physics involves the study of matter and radiation from the subatomic to the cosmological scale. Revolutionary 20th century advances in quantum physics led to technological breakthroughs including the transistor and laser. Physics has become increasingly important as a fundamental basis for interdisciplinary research in engineering, biophysics, materials science and information. In an increasingly technically oriented society, a physics degree provides an important foundation for a range of careers.

The School of Physics offers basic service courses to freshmen and sophomores, some advanced service courses for students in other units of the Institute, and advanced studies leading to the bachelor’s, master’s, and PhD degrees in physics. The School seeks to provide elective freedom in its degree programs in order to enable students with a wide variety of goals to construct programs of study suitable for them.

In addition to offering courses in the fundamentals of physics, the School provides numerous specialized courses at all levels, particularly in those areas related to the research interests of the faculty. These areas of research currently include:
• astrophysics (including cosmology, and particle and gravitational astrophysics);
• atomic, molecular, and optical physics;
• condensed matter physics (experimental, theoretical, and computational);
• nonlinear physics and chaos;
• soft matter physics;
• physics education;
• and physics of living systems.

Opportunities exist in all these areas and in other areas through collaboration with faculty of other schools and colleges for Special Problems courses, master’s theses, and doctoral dissertations.

Supplementary program planning is available from the School of Physics. Opportunities for graduate study and research are also available at www.physics.gatech.edu (http://www.physics.gatech.edu).

Minor
• Minor in Physics (p. 579)

Bachelor's Degrees
• Bachelor of Science in Applied Physics (p. 204)
• Bachelor of Science in Physics (p. 471)

Master's Degree
• Master of Science in Physics (p. 534)

Doctoral Degrees
• Doctor of Philosophy with a Major in Physics (p. 496)
Graduate Study in Physics

Master's Degree

- Master of Science in Physics (p. 534)

Doctoral Degrees

- Doctor of Philosophy with a Major in Physics (p. 496)
- Doctor of Philosophy with a Major in Quantitative Biosciences (p. 498)

Undergraduate Study in Physics

Minor

- Minor in Physics (p. 579)

Bachelor's Degrees

- Bachelor of Science in Applied Physics (p. 204)
- Bachelor of Science in Physics (p. 471)

Certificate in Astrophysics

For the Astrophysics Certificate, the following lists the required and optional courses.

Required Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS 2021</td>
<td>Solar System</td>
<td>3</td>
</tr>
<tr>
<td>or PHYS 20: Stars, Galaxy &amp; Universe</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>PHYS 3021</td>
<td>Stellar Astrophysics</td>
<td>3</td>
</tr>
</tbody>
</table>

Optional Courses

Select at least two of the following:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS 4261</td>
<td>Atomic Physics</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 4801</td>
<td>Special Topics (if approved by the Chair)</td>
<td>12</td>
</tr>
<tr>
<td>PHYS 4699</td>
<td>Undergraduate Research (if approved by the Chair)</td>
<td>6</td>
</tr>
</tbody>
</table>

Total Credit Hours 12

Courses Offered at Georgia State

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASTR 4000</td>
<td>Fundamentals of Astrophysics</td>
<td>3</td>
</tr>
<tr>
<td>ASTR 3500</td>
<td>Fundamentals of Astronomy and Astrophysics</td>
<td>4</td>
</tr>
</tbody>
</table>

School of Psychology

Established in 1959

The School of Psychology offers programs of study leading to the Bachelor of Science in Psychology, Master of Science in Psychology, and Doctor of Philosophy with a major in Psychology. It also offers training in the basic and applied aspects of the science of behavior for the student majoring in architecture, engineering, management, and natural sciences. The undergraduate curriculum provides a broad-based natural science approach to the study of psychology. Courses in mathematics, biology, and chemistry, for instance, complement the psychology courses. The curriculum also stresses methodological issues so that students learn the fundamentals for carrying out solid research.

Graduate Study in Psychology

Doctoral candidates take a core curriculum in general psychology and quantitative methods. Doctoral candidates will complete all requirements for the master's degree, which includes writing a research thesis.

The doctoral program provides the student with an opportunity for advanced study in cognitive aging, cognition and brain science, engineering, industrial-organizational, or quantitative psychology. Each of these curricula consists of additional courses and programs of individual study and research beyond the core curriculum, which contribute to a strong background in general experimental psychology and the student's area of specialization. The doctoral program will ordinarily require at least four years for students who enter immediately after obtaining a bachelor's degree.

Admission to graduate study in psychology with full graduate standing in the School of Psychology requires the equivalent of an undergraduate major in psychology or a related field with courses in general and experimental psychology, as well as psychological statistics. All applicants should submit scores from the Graduate Record Examination.

The psychology faculty will consider admissions applications from competent students who have majored in subjects other than psychology.

PSYC: Graduate Information (http://psychology.gatech.edu/graduate/graduate-programs)

Master's Degrees

- Master of Science in Human-Computer Interaction (p. 526)
- Master of Science in Psychology (p. 535)

Doctoral Degrees

- Doctor of Philosophy with a Major in Psychology (p. 500)

Undergraduate Study in Psychology

Minor

- Minor in Psychology (p. 581)

Bachelor's Degree

- Bachelor of Science in Psychology (p. 474)
The School of Psychology offers a number of certificate programs that provide similar opportunities for students to develop their expertise or acquire skills or information in specific areas in addition to their major area.

**Certificates in Psychology**

- Certificate in Biopsychology
- Certificate in Cognitive Psychology
- Certificate in Engineering Psychology
- Certificate in Experimental Psychology
- Certificate in Industrial/Organizational Psychology
- Certificate in Social/Personality Psychology

Certificate Information (http://www.psychology.gatech.edu/undergraduate/certificates)

**Ivan Allen College of Liberal Arts**

Established in 1990

The Ivan Allen College (IAC), named after a visionary leader who served as mayor of Atlanta during a time associated with the creation of the "New South," is a unique configuration of six schools as well as Georgia Tech's three ROTC departments. The College was established in 1990 in order to broaden the range of majors available to Tech students. The degree programs are unique in the ways they link the study of the social sciences and humanities to the world of technology and science. IAC majors prepare students for a wide range of professional careers, including leadership in government, business, and technology.

Study in these fields also prepares students for advanced study in professional programs in law, medicine, international affairs, public policy, and new media as well as graduate study in the humanities and social sciences. The success of these new programs has resulted in a realization of the close connections between service and progress expressed in Georgia Tech's motto.

The Ivan Allen College offers nine undergraduate degrees, six master's degrees, and four doctoral degrees. Detailed descriptions of these programs can be found under the appropriate school headings. In addition to its degree programs, the Ivan Allen College provides all Tech students with instruction in the humanities and social sciences. The College's course offerings and its certificate and minor programs enable students, regardless of their major, to broaden their educational experience and to better understand the cultural underpinnings of their professional and personal lives and the international context in which they live and work.

- Applied Language & Intercultural Studies. BS (p. 192)
- Chinese. Minor (p. 543)
- City and Regional Planning & Public Policy. MCRP-MS (p. 501)
- Computational Media. BS (p. 247)
- Cybersecurity. MS (http://catalog.gatech.edu/programs/cybersecurity-ms)
- Digital Media. MS (p. 522), PhD (p. 486)
- East Asian Studies. Minor (p. 550)
- Economics. Minor (p. 551), BS (p. 339), MS (p. 522), PhD (p. 487)
- Economics and International Affairs. BS (p. 340)
- Film and Media Studies. Minor (p. 560)
- French. Minor (p. 561)
- German. Minor (p. 561)
- Global Development. Minor (p. 562)
- Global Economics and Modern Languages. BS (p. 346)
- Health, Medicine, and Society. Minor (p. 563)
- History. Minor (p. 564)
- History, Technology, and Society. BS (p. 356)
- History and Sociology of Technology and Science. MS (p. 525), PhD (p. 488)
- Human-Computer Interaction. MS (p. 526)
- International Affairs. Minor (p. 565), BS (p. 374), MS (p. 530)
- International Affairs and Modern Language. BS (p. 376)
- International Affairs, Science, and Technology. PhD (p. 490)
- Japanese. Minor (p. 568)
- Korean. Minor (p. 568)
- Law, Science, and Technology. Minor (p. 568)
- Leadership Studies. Minor (p. 569)
- Literature, Media, and Communication. BS (p. 389)
- Performance Studies. Minor (p. 578)
- Philosophy. Minor (p. 578)
- Political Science. Minor (p. 580)
- Public Policy. Minor (p. 582), BS (p. 477), MS (p. 535), PhD (p. 497)
- Russian Studies. Minor (p. 583)
- Science, Technology, and Society. Minor (p. 584)
- Social Justice. Minor (p. 586)
- Sociology. Minor (p. 587)
- Spanish. Minor (p. 587)
- Sports, Society, and Technology. Minor (p. 588)
- Technical Communication. Minor (p. 589)
- Women, Science, and Technology. Minor (p. 590)

**Joint Degrees**

Public Policy Joint Degree with Georgia State University. PhD (p. 498)

**Department of Air Force Aerospace Studies**

Established in 1946

The Air Force Reserve Officer Training Corps, Air Force ROTC, is a three- or four-year educational program designed to give men and women the opportunity to become Air Force officers while completing a degree. It involves an elective curriculum taken along with required college classes. Students participating in the program will attend Air Force ROTC classes on Tuesdays and Thursdays. Students earn a college degree and an officer's commission in the U.S. Air Force at the same time.

Air Force ROTC offers competitive four, three and a half, three, two and a half, and two year college scholarships to qualified college students based on merit. Non-competitive scholarships are also available based on major, including certain foreign languages and engineering specialties. Scholarships vary from $3,000, $9,000, $15,000, all the way up to full tuition and required fees. Scholarship winners also receive a stipend of up to $500 for each academic month, in addition to a $900 allowance for books and other educational items. Non-scholarship students also
receive the stipend and book allowance as Professional Officer Course cadets in the program.

The curriculum is divided into two courses:

- a General Military Course open to all freshmen and sophomores, and
- a Professional Officer Course for qualified juniors, seniors, and graduate students.

Students undecided about pursuing a commission can participate in the General Military Course without incurring a military obligation.

Successful completion of the General Military Course, a minimum 2.0 GPA, and the appropriate physical and medical qualifications are prerequisites for enrollment in the Professional Officer Course. Successful completion of both courses with the award of a bachelor’s degree allows students to become commissioned second lieutenants in the United States Air Force.

**Air Force ROTC Cross Registration**

Cross Registration is available to students from ARCHE participating schools. As a cross-town cadets students will participate in Air Force ROTC activities at Georgia Tech every Tuesday and Thursday. Scholarship opportunities are available to students with Air Force Education Service Agreements. Stipends and other incentives are available to all students. Students graduating with a degree from their home institution will receive a commission in the United States Air Force. Contact the Detachment 165 Unit Admissions Officer at 404.894.4175 for more information. For more information on the cross registration process and ARCHE participating schools, visit [www.atlantahighered.org](http://www.atlantahighered.org).

**Air Force ROTC Program Overview**

Students entering the program enroll in Air Force ROTC courses in the same manner in which they register for other undergraduate courses. A formal application is not required. Students enrolled in the General Military Course (GMC) incur no military obligation unless they are on an Air Force ROTC scholarship. Those students desiring to become commissioned officers in the Air Force must complete for entry into the Professional Officer course (POC), which is normally the last two years of college. In the summer between the sophomore and junior years, cadets attend a four- or six-week field training session conducted at an Air Force base.

**Field Training**

Field Training is, in most cases, a cadet’s first exposure to a working Air Force environment. The program is designed to develop military leadership and discipline, and to provide Air Force officer orientation and motivation. At the same time, the Air Force evaluates each cadet’s potential as an officer. Field training includes Air Force professional development orientation, marksmanship training, junior officer training, physical fitness, and survival training.

**General Military Course (GMC)**

Courses are offered during fall and spring semesters with two credit hours awarded for each freshman and sophomore course, and 3 credit hours for each junior and senior course. Four hours of basic ROTC courses may be applied as elective credits toward degree requirements at the school. Classes normally meet two hours a week. A one-hour leadership laboratory and participation in physical conditioning training are also required.

Students in the GMC do not incur military obligation unless they have received an ROTC scholarship.

**AS 1000 Level Class Schedule for Freshman Year**

A survey course designed to introduce students to United States Air Force and Air Force Reserve Officer Training Corps.

<table>
<thead>
<tr>
<th>Fall</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>AS 1110</td>
<td>Foundations of the AF I</td>
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<tr>
<td>AS 1111</td>
<td>Leadership Laboratory</td>
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<table>
<thead>
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<th></th>
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<td></td>
</tr>
<tr>
<td>AS 1121</td>
<td>Leadership Laboratory</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

**AS 2000 Level Class Schedule for Sophomore Year**

This course provides the students with a level of understanding for the general element and employment of air and space power.

<table>
<thead>
<tr>
<th>Fall</th>
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<th></th>
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<tbody>
<tr>
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<td>AS 2211</td>
<td>Leadership Laboratory</td>
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<table>
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</thead>
<tbody>
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<td></td>
</tr>
<tr>
<td>AS 2221</td>
<td>Leadership Laboratory</td>
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</tr>
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</table>

**Leadership Laboratory**

Leadership Laboratory is a separate course requiring two hours per week throughout the cadet’s enrollment in Air Force ROTC. It involves a study of Air Force customs and courtesies, drill and ceremony, professional development opportunities in the Air Force, and the life and work of an Air Force junior officer. Students develop their leadership potential in a practical, supervised laboratory that may include field trips to Air Force installations and presentations by Air Force personnel. Physical Training (PT) is a key part of officer development. Cadets are expected to PT twice per week.

**Professional Officer Course (POC)**

Courses are offered during fall and spring semesters with 3 credit hours for each junior and senior course. Classes normally meet 3 hours a week. A one-hour leadership laboratory and participation in physical conditioning training are also required.
AS 3000 Level Class Schedule for Junior Year
A study of leadership, management fundamentals, professional knowledge, and communication skills required of an Air Force junior officer.

<table>
<thead>
<tr>
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<th>Credits</th>
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<tr>
<td>AS 3311</td>
<td>Leadership Laboratory</td>
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</tr>
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<tr>
<th>Spring</th>
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<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>AS 3320</td>
<td>Leadership Studies II</td>
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</tr>
<tr>
<td>AS 3321</td>
<td>Leadership Laboratory</td>
<td>1</td>
</tr>
</tbody>
</table>

AS 4000 Level Class Schedule for Senior Year
Examines the national security process, Air Force structure, and doctrine with emphasis on developing top-level management skills required of an Air Force junior officer.

<table>
<thead>
<tr>
<th>Fall</th>
<th></th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>AS 4410</td>
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</tr>
<tr>
<td>AS 4411</td>
<td>Leadership Laboratory</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Spring</th>
<th></th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
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<td>Prep for Active Duty</td>
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</tr>
<tr>
<td>AS 4421</td>
<td>Leadership Laboratory</td>
<td>1</td>
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</tbody>
</table>

Air Force ROTC Website (http://www.afrotc.gatech.edu)

Air Force ROTC Scholarship Program
Air Force ROTC can help students with the high cost of getting a degree. As an Air Force ROTC cadet, students are entitled to many benefits.

- Up to $15,000 per academic year to cover tuition, lab, and incidental fees;
- $750 for textbooks; and $250-$400 a month tax-free allowance
- Free Air Force uniforms and textbooks
- Management training and opportunities to apply leadership principles
- At most schools, academic credit for Air Force ROTC classes
- Travel on military aircraft on a space-available basis for students on Air Force ROTC scholarships or in the Professional Officer course

In-College Scholarship Program (ICSP)
The Air Force ROTC In-College Scholarship Program (ICSP) is a highly competitive scholarship program aimed primarily at college freshmen and sophomores in ANY MAJOR. Detachment commanders nominate and rank/order cadets in their program using the ‘whole-person’ concept. All ICSP scholarships activate the following fall term.

Historically Black Colleges and Universities (HBCU)
Scholarships are available for any Clark Atlanta, Morehouse, or Spelman student. The objective of the HBCU scholarship program is to encourage outstanding HBCU students to enroll in the Air Force ROTC program. To compete for the scholarship, students must:

- be full-time,
- be physically and medically qualified,
- have at least a 2.5 GPA, and

- meet all other eligibility criteria.

Depending on the situation, HBCU scholarships can be activated in the same term.

Foreign Language Express Scholarship
Foreign Language Express scholarships provide preapproved scholarships to individuals in certain areas of study for which the United States Air Force projects a critical need in a few years. Scholarships in these areas are guaranteed if students meet all minimum requirements. Air Force ROTC provides an outstanding opportunity for students to receive a three- or two-year scholarship. Depending on the situation, Foreign Language scholarships can be activated in the same term. In order to receive an Express Scholarship students must be in one of the areas of study: Arabic, Chinese, Persian-Iranian/Persian-Afghan, Hindi, Indonesian, Japanese, Pashtu, Russian, Turkish, Urdu/Punjabi, Azerbaijani, Bengali, Cambodian, Hausa, Kazakh, Kurdish, Malay, Serbo-Croatian, Swahili, Thai, Uighur, Uzbek, or Vietnamese.

Nursing Scholarships
Air Force ROTC offers a variety of scholarships for nursing students that cover most tuition, books, and lab fees. The goal of the Nursing scholarships is to allow nursing students to complete their degree debt-free, while acquiring valuable resource knowledge about the Air Force and become part of the Air Force’s medical staff. Air Force nurses may enter in any number of different nursing fields including clinical nurse, operating room nurse, flight nurse, or nurse anesthetist. Depending on the situation, Nursing scholarships can be activated in the same term.

Pre-Health Professions and Armed Forces Health Professions Program
A Pre-Health Professions Program designation is offered to encourage students to earn commissions through Air Force ROTC and continue their education in medical or osteopathic school. You must apply before the end of the sophomore year. The Armed Forces Health Professions Scholarship Program provides up to four years of medical school and it covers tuition and fees, textbooks. It also pays the student a taxable monthly allowance of $938. Students accepted to the graduate-level health professions school, will be granted the scholarship and transferred into the Air Force Medical Corps. Armed Forces Health Professions scholarship participants incur an additional active-duty service commitment.

ROTC Credit (p. 104)
Air Force ROTC Website (http://www.afrotc.gatech.edu)

Department of Military Science/Army ROTC
Established in 1917

The purpose of the Army ROTC is to prepare students for commissioning as officers in the Active Army, Army Reserve, or Army National Guard. The overall program is designed to aid students in developing the abilities and attitudes that will make them academically successful and to develop well-educated junior officers.

The curriculum is divided into two courses:

- a basic course that is open to all freshmen and sophomores and
• an advanced course for qualified juniors, seniors, and graduate students.

Students who are undecided about pursuing a commission have the option of participating in the basic course without incurring a military obligation. Successful completion of the basic course (or commensurate training), a minimum 2.0 cumulative grade-point average, and the appropriate medical and physical qualifications are prerequisites for enrollment in the advanced course. Successful completion of both courses and the award of a bachelor’s degree constitute the normal progression to gaining a commission as a second lieutenant. Courses are available to both men and women.

The overall Army ROTC curriculum prepares students to become effective leaders and managers in a variety of responsible and challenging commissioned officer fields, thus facilitating early middle-management career development and progression.

Army ROTC - Additional Training Offered

Leadership Training Course (LTC)

Those academically qualified students who are unable to fulfill the requirements of the Basic Course during their freshman and sophomore years may qualify for admission to the Advanced Course by successfully completing the Leadership Training Course (LTC). This option is primarily designed to meet the needs of transfer students, those completing the sophomore year, and others, including graduate students, who have four semesters remaining at the Institute. This option provides a two-year program in lieu of the standard four-year curriculum. The LTC option consists of a four-week training period conducted at Fort Knox, Kentucky, during the summer months. During each summer, various cycles will be available to meet student needs. Students choosing this option are required to submit a formal application and pass a physical examination.

Students selected to attend the LTC training program will receive approximately $800 in addition to travel expenses to and from the LTC. Uniforms, housing, medical care, and meals are furnished by the government during the training. Interested students should contact the Military Science Department.

Cadet Professional Development Training (CPDT) Program

The CPDT program supplements campus training with practical leader development experiences and some additional skill identifier awarding courses. Cadets train in Army schools and with Active and Reserve units. CPDT consists of two subprograms, Cadet Troop Leader Training (CTLT) and Cadet Practical Field Training (CPFT).

Basic Airborne School (BAC)

The Basic Airborne Course is a three-week training program conducted by the Airborne Department, USAIC, Fort Benning, Georgia that trains students in the use of the parachute as a means of combat deployment. Successful completion qualifies cadets to wear the Parachutist Badge.

Air Assault School (AAS)

Located at Ft. Campbell, Kentucky, the AAS is a 10 day course of instruction that trains cadets on Combat Assault Operations involving associated equipment and U.S. Army rotary-wing aircraft. Successful completion qualifies cadets to wear the Air Assault Badge. This eleven day course is very demanding both physically and mentally, involving obstacle courses and several long ruck marches. You will learn the basics of aircraft familiarization and recognition, slingload operations, and rappelling.

Mountain Warfare School (MWS)

This is a two-week program conducted at the Ethan Allen Firing Range in Jericho, Vermont. The course teaches cadets the skills needed to operate in a mountainous environment during the summer and fall. Mountain Warfare introduces you to the techniques and tactics required to operate in a mountainous environment under hostile conditions. The emphasis is on field exercises where you learn mountain-related skills.

Cadet Troop Leadership Training (CTLT)

Cadet Troop Leadership Training (CTLT) offers the MS III cadet the opportunity to perform the duties of a Second Lieutenant for up to one month with an active duty unit. MS III graduates of the ROTC Advanced Camp may attend CTLT for 3 to 4 weeks immediately following attendance at the Leadership Development and Assessment Course (LDAC) in the summer following their MS III year. Actual duties performed will vary by branch and unit but will generally be those duties expected of a Second Lieutenant in that unit. Many cadets will serve as either platoon leaders or assistant platoon leaders.

ROTC Credit (p. 104)

Army ROTC Website (http://www.armyrotc.gatech.edu)

Army ROTC - Program Overview

The Basic Course Curriculum

The Basic Course consists of a four-semester block of instruction taken during the freshman and sophomore years. Successful completion of all four semesters satisfies the military science requirements for progression to the Advanced Course. These courses provide a foundation in basic military subjects such as customs and traditions, history, leadership, and map reading. They round out a student’s academic life, provide a challenge, foster confidence, and facilitate personal growth and development.

Courses are offered during fall and spring semesters with 3 credit hours awarded for each freshman and sophomore course and four credit hours for each junior and senior course. Four hours of basic ROTC courses may be applied as elective credits toward degree requirements at the school. Courses normally meet two hours a week. A one-hour leadership laboratory and participation in physical conditioning training are also required for contracted cadets.

Students in the Basic Course do not incur military obligation unless they have received an ROTC scholarship. Scholarship cadets are required to participate in a field training exercise twice per school year. They are issued uniforms and may participate in other ROTC-related events and training, such as Airborne School, Air Assault School, and Northern Warfare Training.

The Basic Course consists of the following:

| First Year | MSL 1001 Leadership&Personal Dev 3 |
| Second Year | MSL 1002 Intr Tactical Leadership 3 |
The Advanced Course Curriculum

The Advanced Course is designed to fully develop a cadet’s leadership and management potential, physical stamina, and self-confidence, as well as those Army values required of an Army officer. The objective is to produce the highest caliber junior officers fully capable of discharging a wide spectrum of command and management responsibilities in the modern Army and in the business world.

The Advanced Course consists of four semesters of instruction normally taken during the junior and senior years. Successful completion of the four courses fulfills the military science academic requirements for award of an officer’s commission. Each student must also participate in a regular physical conditioning program and successfully pass the Army Physical Fitness Test. All Advanced Course students must participate in field training exercises twice a school year. Twelve credit hours are earned, six of which may be applied as elective credits toward any degree at the Institute. Advanced Course students receive a subsistence allowance up to $500 a month. Service veterans and service academy cadets may qualify for direct entry into the Advanced Course. Certain Advanced Course students are eligible to participate in the Simultaneous Membership Program with the Army Reserve or Army National Guard. Students in this program affiliate with an Army unit as officer trainees.

Students enrolled in the Advanced Course are also required to complete a five-week Advanced Camp at Fort Lewis, Washington, to become eligible for commissioning. Attendance at Advanced Camp normally occurs during the summer between the junior and senior years. Students may also participate in additional voluntary training, such as Airborne School or Cadet Troop Leader Training. In addition to completing the military science academic requirements of both the Basic and Advanced Courses, the student must complete at least one undergraduate course from each of five designated fields of study:

- Written Communications: Select any course offered by the Institute in English composition or creative writing.
- Human Behavior: Select any course offered by the Institute in psychology, sociology, anthropology, or ethics.
- Military History/National Security Studies: Select INTA 3520, INTA 3510, or another similar course approved by the Professor of Military Science.
- Computer Literacy: Select any course offered by the College of Computing except CS 1000 (Information and Society).
- Mathematics Reasoning: Select any course offered by the School of Mathematics.

Students who successfully complete the Army ROTC curriculum and earn a bachelor’s degree can be commissioned as second lieutenants. Subsequent military service may be on active duty or with the Army Reserve or Army National Guard. The following courses constitute the Advanced Course:

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<thead>
<tr>
<th>Third Year</th>
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<tbody>
<tr>
<td>MSL 3001</td>
<td>MSL 4901</td>
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<tr>
<td>Adapt Tactical Leadership</td>
<td>Develop Adaptive Leaders</td>
</tr>
<tr>
<td>MSL 3002</td>
<td>MSL 4002</td>
</tr>
<tr>
<td>Leadership-Changing Enviro</td>
<td>Leadership-Complex World</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
</tr>
</tbody>
</table>

ROTC Credit (p. 104)
Army ROTC Website (http://www.armyrotc.gatech.edu)

Army ROTC - Scholarship Programs

Each year, the Army offers a variety of full scholarship programs to those young men and women who have demonstrated outstanding academic scholarship and leadership potential. Four-, three-, and two-year scholarships are available to qualified students. Scholarships are competitive and awarded based on the student’s merit. The Professor of Military Science receives an allocation of scholarships each year.

Scholarships provide full tuition/fees or room/board to both resident and out-of-state students, $1,200 allowance for textbooks and supplies, and a $300 to $500-a-month tax-free stipend. Scholarship students serve either on active duty, in the Army reserves, or Army National Guard.

Options

Students who wish to obtain a commission as an officer but do not want to serve on active duty may request a Guaranteed Reserve Forces Duty (GRFD) scholarship. Reserve Forces Duty scholarships are available, but are limited in number. Affiliation with an Army Reserve or Army National Guard unit is required to participate in either the scholarship or nonscholarship program. In this program, students are guaranteed in writing that they will not be placed on active duty and can fulfill their entire commitment in the Army Reserve or Army National Guard.

ROTC Credit (p. 104)
Army ROTC Website (http://www.armyrotc.gatech.edu)

Army ROTC - Student Advisory Services

Faculty members are available throughout the academic year and during each summer orientation session in the Department of Military Science for academic counseling, schedule planning, and career guidance. Students and their parents are encouraged to seek advice on the overall Army ROTC program, scholarship opportunities, and officer career development. Appointments may be made in person, by calling 404.894.4760/9938, or by e-mail via the ROTC home page, www.armyrotc.gatech.edu (http://www.armyrotc.gatech.edu). Students should also check the homepage for the latest updates on course requirements and other important information.

Academic Mentorship Program

The Academic Mentorship program aims to sustain an atmosphere where all cadets recognize the importance of academic success for commissioning, obtaining their degrees, and other future endeavors. Every cadet should have the resources and encouragement to succeed in the classroom through an established mentorship support system. An aggressive attitude toward meeting the academic standard is highly encouraged. Academic Mentorship also offers a Study Hall program which offers additional mentorship opportunities by offering students hands on academic instruction and tutelage.

ROTC Credit (p. 104)
Army ROTC Website (http://www.armyrotc.gatech.edu)
Department of Naval Science / NROTC

Established in 1926

The NROTC program offers students the opportunity to qualify for service as commissioned officers in the United States Navy or Marine Corps. The program's objectives are to provide students with an understanding of the basic concepts and principles of naval science, associated professional knowledge, and the requirements for national security. NROTC students receive an educational background that allows them to later undertake advanced education in the naval service.

The NROTC program is an officer accession program for the unrestricted line communities (Surface Warfare, Submarines, Aviation, Marine Corps). Upon graduation, the student is commissioned as an officer in the Navy or Marine Corps. Naval officers are ordered to active duty in submarines, surface combatants, or the aviation community. Marines undergo training leading to a variety of specialties. NROTC students are enrolled in one of the following three categories: three-year or four-year scholarship students, college programmers, or two-year scholarship students.

The NROTC Program was established to develop midshipmen mentally, morally and physically and to imbue them with the highest ideals of duty, and loyalty, and with the core values of honor, courage and commitment in order to commission college graduates as naval officers who possess a basic professional background, are motivated toward careers in the naval service, and have a potential for future development in mind and character so as to assume the highest responsibilities of command, citizenship and government.

NROTC - College Program Students

Non-scholarship students may seek a naval commission through the NROTC College Program. Interested students may apply at the NROTC unit in the O'Keefe building on campus. The process includes a review of previous academic performance and interviews with staff personnel. Students accepted into the College Program must complete the naval science curriculum and take a summer assignment between the junior and senior years.

The Navy provides naval science texts. Students who enter advanced standing in the junior year receive a subsistence allowance of $350-$400 per month. College program students are eligible to compete for scholarships ranging from one to three years. Selection criteria are based on academic performance at Georgia Tech and military performance as high school academic performance, and extracurricular activities. Selection criteria include SAT or ACT scores, high school academic performance, and extracurricular activities. The selection process is administered by the chief of Naval Education and Training; however, the NROTC unit will provide guidance and information to applicants. An online application is available at http://www.nrotc.navy.mil.

ROTC Credit (p. 104)
Navy ROTC Website (http://nrotc.gatech.edu)

NROTC - Program Overview

Naval Science Classes

All Navy Option Scholarship students must take:

**Required Courses**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
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</tr>
<tr>
<td>NS 1323</td>
<td>Naval History</td>
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<tr>
<td>NS 2321</td>
<td>Naval Leadership I</td>
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**Additional Courses**

Select one of the following:

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<th>Units</th>
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<tr>
<td>&amp; MATH 1502d Calculus II</td>
<td></td>
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<tr>
<td>MATH 1511 Honors Calculus I</td>
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One term of INTA (contact NROTC unit for required class)

One term of a cultures studies course (contact NROTC unit for required class)

All students must attend weekly Drill Periods in addition to above courses.

**Marine Option**

Marine Option students must only take the previously listed international affairs and cultural studies courses or their equivalent as approved by the professor of naval science.

Any additional requirements are based on whether or not the student is in a technical or nontechnical major, a Navy Option or Marine Option student, and a scholarship or nonscholarship recipient. Each student must obtain from the NROTC Department a complete description of program requirements since the above statement is only a general outline. Students may apply a maximum of 4 credit hours in basic ROTC courses and six credit hours in advanced ROTC courses toward meeting the free elective requirements for any degree.

ROTC Credit (p. 104)
Navy ROTC Website (http://nrotc.gatech.edu)

NROTC - Scholarship Students

Four-year and three-year scholarship students are selected through nationwide competition. Selection criteria include SAT or ACT scores, high school academic performance, and extracurricular activities. The selection process is administered by the chief of Naval Education and Training; however, the NROTC unit will provide guidance and information to applicants. An online application is available at http://www.nrotc.navy.mil.

The NROTC scholarship pays for tuition (and applicable fees) and textbooks. The Navy also provides uniforms and a $250-$400 per month subsistence allowance. The Naval Science Department conducts an orientation program (INFORM) for all new NROTC scholarship students during the week prior to the start of the fall semester. Scholarship students must complete the naval science curriculum and also...
participate in summer assignments from four to six weeks during the summers between academic years.

ROTC Credit (p. 104)
Navy ROTC Website (http://nrotc.gatech.edu)

**NROTC - Two-Year Scholarship Program**

Sophomores may apply and compete nationally for two-year NROTC scholarships. Those selected attend six weeks of training in Newport, Rhode Island, during the summer between the sophomore and junior years. Upon successful completion, the student joins the NROTC program on an equal footing with other students in the junior year naval science classes. Interested students should contact the Naval Science Department.

ROTC Credit (p. 104)
Navy ROTC Website (http://nrotc.gatech.edu)

**School of Economics**

Established in 1990

The School of Economics provides high-quality programs of study leading to a Bachelor of Science in economics or a minor or certificate in economics for students in other disciplines. The school also participates in the International Plan (http://www.internationalplan.gatech.edu) and the Research Option (http://www.undergradresearch.gatech.edu/research-option) for undergraduate students. The program focuses on skills and knowledge critical for a life of learning and leads to careers in academics, management, banking, the public sector, and other professional fields. A degree in economics is especially appropriate for students intending to pursue advanced degrees in the social sciences and in professional schools of management, law, and public administration.

Modern economics is analytically rigorous, requiring a background in mathematics and statistics. At the same time, it is critically linked with the other social sciences and humanities, as well as to applied management and policy studies. The undergraduate curriculum provides a strong, in-depth understanding of economic thought and policy and is intended to prepare students for productive careers, for useful roles in society, and for satisfying personal lives in a technologically complex, culturally diverse world.

The School of Economics offers

- a Bachelor of Science in Global Economics and Modern Languages in cooperation with the School of Modern Languages and
- a Bachelor of Science in Economics and International Affairs in cooperation with the Sam Nunn School of International Affairs.
- a Bachelor of Science in Global Economics and Modern Languages in cooperation with the School of Modern Languages.

These programs provide students an opportunity to broaden their educational experience and to enhance their marketability in these areas.

The School of Economics also offers graduate courses leading to a Master of Science in Economics degree and in support of PhD programs in management, public policy, industrial and systems engineering, and city and regional planning.

**Minors**
- Minor in Economics (p. 551)
- Minor in Health, Medicine, and Society (p. 563)

**Bachelor’s Degrees**
- Bachelor of Science in Economics (p. 339)
- Bachelor of Science in Economics and International Affairs (p. 340)
- Bachelor of Science in Global Economics and Modern Languages (p. 346)

**Master’s Degree**
- Master of Science in Economics (p. 522)

**Doctoral Degree**
- Doctor of Philosophy with a Major in Economics (p. 487)

**Graduate Study in Economics**

**Master’s Degree**
- Master of Science in Economics (p. 522)

**Doctoral Degree**
- Doctor of Philosophy with a Major in Economics (p. 487)

**Graduate Certificate in Science, Technology, and Society**

The Graduate Certificate in Science, Technology, and Society Graduate is designed for students already enrolled in a graduate degree program at Georgia Tech. This certificate is for graduate students who would like to demonstrate additional competence in some aspect of STS or special competence in STS in their home discipline. The certificate is open to students in good standing in any graduate program at Georgia Tech.

The 12-credit hour certificate program helps students to:

- Understand the social, cultural, and epistemic dynamics of science and technology
- Explore these dynamics across world societies and cultures
- Develop sensitivity to issues of gender, race, and justice across areas of knowledge, including: engineering, medicine, environment, cognition, security, innovation, design
- Employ STS approaches as scholars or practitioners (e.g. engineers, scientists, or policy makers)

**Program of Study**

4 Courses Total

**Core Courses**

Select one of the following:

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<th>Course Code</th>
<th>Course Title</th>
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Undergraduate Study in Economics

Minors

- Minor in Economics (p. 551)
- Minor in Health, Medicine, and Society (p. 563)

Bachelor's Degrees

- Bachelor of Science in Economics (p. 339)
- Bachelor of Science in Economics and International Affairs (p. 340)
- Bachelor of Science in Global Economics and Modern Languages (p. 346)

School of History and Sociology

Established in 1990

The School of History and Sociology, dedicated to the ideal of a well-rounded education at a technological university, provides instruction in the social sciences to every student at Georgia Tech. The School offers courses in history and sociology leading to three degrees:

- Bachelor of Science in History, Technology, and Society (BS-HTS);
- Master of Science in History and Sociology of Technology and Science (MS-HSTS); and
- Doctor of Philosophy in History and Sociology of Technology and Science (PHD-HSTS).

The School of History and Sociology also offers minors or participates in interdisciplinary minors in:

- History;
- Sociology;
- Health, Medicine, and Society;
- Science, Technology, and Society;
- Social Justice;
- Sports, Society, and Technology; and
- Women, Science, and Technology.

The School of History and Sociology also offers several certificate programs (http://www.hsoc.gatech.edu/undergraduate/certificates) for students in other undergraduate majors. In addition, the School of History and Sociology participates in the International Plan (http://www.hts.gatech.edu/undergraduate/opportunities/global) and Research Option (https://hts.gatech.edu/undergraduate/opportunities/research).

Minors

- Minor in History (p. 564)
- Minor in Sociology (p. 587)
- Minor in Health, Medicine, and Society (p. 563)
- Minor in Science, Technology and Society (http://catalog.gatech.edu/programs/minor-science-technology-society)
- Minor in Social Justice (p. 586)
- Minor in Sports, Society, and Technology (p. 588)
- Minor in Women, Science, and Technology (p. 590)

Bachelor's Degree

- Bachelor of Science in History, Technology, and Society (p. 356)

Master's Degree

- Master of Science in History and Sociology of Technology and Science (p. 525)

Doctoral Degree

- Doctor of Philosophy with a Major in History and Sociology of Technology and Science (p. 488)

Graduate Study in History and Sociology

Master's Degree

- Master of Science in History and Sociology of Technology and Science (p. 525)

Doctoral Degree

- Doctor of Philosophy with a Major in History and Sociology of Technology and Science (p. 488)

Graduate Certificate in Science, Technology, and Society

The Graduate Certificate in Science, Technology, and Society is designed for students already enrolled in a graduate degree program at Georgia Tech. This certificate is for graduate students who would like to demonstrate additional competence in some aspect of STS or special competence in STS in their home discipline. The certificate is open to students in good standing in any graduate program at Georgia Tech. The 12-credit certificate program helps students to:

- Understand the social, cultural, and epistemic dynamics of science and technology
- Explore these dynamics across world societies and cultures
- Develop sensitivity to issues of gender, race, and justice across areas of knowledge, including: engineering, medicine, environment, cognition, security, innovation, design
• Employ STS approaches as scholars or practitioners (e.g. engineers, scientists, or policy makers)

Program of Study
4 courses total

Core Course
Select one of the following:

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Elective
Elective 1

Total Credit Hours 6

1 Select up to one other elective, subject to student interest and STS Coordinator approval. Many appropriate courses are offered across the Ivan Allen College and the Institute, for example: CS 8893.

Undergraduate Study in History and Sociology

Minors
• Minor in History (p. 564)
• Minor in Sociology (p. 587)
• Minor in Health, Medicine, and Society (p. 563)
• Minor in Science, Technology and Society (http://catalog.gatech.edu/programs/ Minor-science-technology-society)
• Minor in Sports, Society, and Technology (p. 588)
• Minor in Social Justice (p. 586)
• Minor in Women, Science, and Technology (p. 590)

Bachelor's Degree
• Bachelor of Science in History, Technology, and Society (p. 356)

Certificate Programs
Alone or in conjunction with other units of the Ivan Allen College, the School of History and Sociology offers certificates in five fields:

• African American Studies
• Asian Affairs
• European Affairs
• History
• Sociology

For more information on the certificate programs, go to http://www.hts.gatech.edu/undergraduate/certificates.

School of Literature, Media, and Communication

Established in 1990

The School of Literature, Media, and Communication (LMC) is engaged in rethinking the role of humanities education in an increasingly technological and global environment. The faculty is committed to generating humanistic perspectives on a technological world through interdisciplinary research in cultural studies and new media studies at both theoretical and applied levels. In providing humanities and communication courses for all Georgia Tech undergraduates, LMC's curriculum focuses on the scientific and technologically oriented aspects of the humanities, as well as on the incorporation of new electronic media (visual, aural, and textual) into humanities and communication education.

LMC offers a BS in Literature, Media, and Communication (LMC), a BS in Computational Media (CM) jointly administered with the College of Computing; and an MS and a PhD in Digital Media (DM). The School also participates in the interdisciplinary MS in Human-Computing Interaction (HCI), in conjunction with the Schools of Interactive Computing, Industrial Design, and Psychology. Graduates from LMC's undergraduate and graduate programs are positioned to assume important roles in the exciting new fields developing in the interface between technology and culture.

The BS in LMC (formerly the BS Science, Technology, and Culture) is the oldest undergraduate degree program in the Ivan Allen College for the Liberal Arts at Georgia Tech. This program offers a thorough education in the different modes of representation that structure our increasingly technological and global world. Program graduates will have both significant theoretical and hands-on experience with novels, films, games, comic books, web pages, and scientific documents. By learning the modes of communication common to science, technology, and the humanities, LMC graduates are prepared to become leaders in education, business, and the arts.

CM is one of Georgia Tech's fastest-growing programs, going from three students in 2004 to 230 today. The BSCM curriculum gives students a grasp of the computer as a medium: the technical, the historical-critical, and the applied. Students gain significant hands-on and theoretical knowledge of computing, as well as an understanding of visual design and the history of media. CM graduates are uniquely positioned to plan, create, and critique new digital media forms for entertainment, education, and business.

The DM program provides students with a foundational, theoretical background in digital media and the opportunity to practice what is learned in the classroom through active participation in labs and research. MS DM students follow a studio-based curriculum with three core themes (Creativity & Knowledge, Arts & Entertainment, and Civic Media) that prepare students for professional careers in digital media, including: interaction and information design, game design and production, and interactive media design. The PhD program educates research-oriented theorists/practitioners who bring the traditions of the humanities and arts to the design of digital media. Graduates of the program are prepared to work in industry, public service, and universities, shaping the emerging digital genres and expanding our understanding and mastery of the representational power of the computer.
The MS HCI degree program is a cooperative effort of the School of Interactive Computing; the School of Literature, Media and Communication; the School of Industrial Design, and the School of Psychology. The program provides students with the practical and interdisciplinary skills and theoretical understanding they will need to become leaders in the design, implementation, and evaluation of the computer interfaces of the future.

Minors
- Minor in Film and Media Studies (p. 560)
- Minor in Performance Studies (p. 578)
- Minor in Science Fiction Studies (p. 583)
- Minor in Technical Communication (p. 589)
- Minor in East Asian Studies (p. 550)
- Minor in Health, Medicine, and Society (p. 563)
- Minor in Science, Technology, and Society (p. 584)
- Minor in Women, Science, and Technology (p. 590)

Bachelor’s Degrees
- Bachelor of Science in Computational Media (p. 247)
- Bachelor of Science in Literature, Media, and Communication (p. 389)

Master’s Degrees
- Master of Science in Digital Media (p. 522)
- Master of Science in Human-Computer Interaction (p. 526)

Doctoral Degree
- Doctor of Philosophy with a Major in Digital Media (p. 486)

Graduate Study in Literature, Media, and Communication

Master’s Degrees
- Master of Science in Digital Media (p. 522)
- Master of Science in Human-Computer Interaction (p. 526)

Doctoral Degree
- Doctor of Philosophy with a Major in Digital Media (p. 486)

Science, Technology and Society Graduate Certificate
The Science, Technology and Society Graduate Certificate is designed for students already enrolled in a graduate degree program at Georgia Tech. This certificate is for graduate students who would like to demonstrate additional competence in some aspect of STS or special competence in STS in their home discipline. The certificate is open to students in good standing in any graduate program at Georgia Tech.

The 12-credit hour certificate program helps students to:
- Understand the social, cultural, and epistemic dynamics of science and technology
- Explore these dynamics across world societies and cultures
- Develop sensitivity to issues of gender, race, and justice across areas of knowledge, including: engineering, medicine, environment, cognition, security, innovation, design
- Employ STS approaches as scholars or practitioners (e.g. engineers, scientists, or policy makers)

Program of Study
4 Courses Total

Core Courses
Select one of the following: 3

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</table>

Elective 1
Elective 3

Total Credit Hours 6

1 Select up to one other elective, subject to student interest and STS Coordinator approval. Many appropriate courses are offered across the Ivan Allen College and the Institute, for example: CS 8893.

Undergraduate Study in Literature, Media, and Communication

Minors
- Minor in Film and Media Studies (p. 560)
- Minor in Performance Studies (p. 578)
- Minor in Science Fiction Studies (p. 583)
- Minor in Technical Communication (p. 589)
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- Minor in Women, Science, and Technology (p. 590)

Bachelor’s Degrees
- Bachelor of Science in Computational Media (p. 247)
- Bachelor of Science in Literature, Media, and Communication (p. 389)

Writing and Communication Intensive Courses
A number of majors require students to complete writing intensive and communication intensive courses. Several LMC classes may be counted
toward this requirement. Consult course offerings each semester to determine which courses may be counted toward this requirement.

**Advanced Placement**

- Students with a score of 4 or 5 on the College Board Advanced Placement Exam (taken in conjunction with high school classes) in Composition and Literature or Language and Composition receive credit for ENGL 1101.
- Students with a score of 750 or higher on the SAT II Subject Test in English receive credit for ENGL 1101.
- Students with a score of four or higher on the International Baccalaureate Exam receive credit for ENGL 1101.
- Advanced placement credit is not ordinarily given for ENGL 1102.

More Adv Placement Information (p. 101)

**Certificate Programs**

LMC sponsors a series of certificate programs in

- American Literature and Culture,
- Film Studies, and
- Literary and Cultural Studies.

Students should consult the LMC director of undergraduate studies for detailed information on requirements. The courses for these certificates are among those listed in "Courses of Instruction," and all fulfill humanities requirements.

LMC and the School of History and Sociology also cooperate in providing a certificate in African American Studies. Students should consult either school for detailed information concerning requirements. Courses for this certificate are selected from among those listed in "Courses of Instruction" and from the list offered by.

**School of Modern Languages**

Established in 1904

The School of Modern Languages collaborates as an interdisciplinary partner with other units in the Ivan Allen College and across campus to prepare future participants in the global workforce through applied studies in foreign languages that are designed to develop advanced communication skills, creative thinking, and professional competency in the language. The School is building bridges between the languages it teaches and the engineering and technology units at Georgia Tech by integrating into its programs the kind of professional and social language students expect to use after entering the workforce. At the same time, the School offers an opportunity to develop a broad understanding of culture, media and the arts, and daily life in the countries whose languages are taught.

**Minors**

- Minor in Chinese (p. 543)
- Minor in East Asian Studies (p. 550)
- Minor in French (p. 561)
- Minor in German (p. 561)
- Minor in Japanese (p. 568)
- Minor in Korean (p. 568)
- Minor in Linguistics (p. 571)
- Minor in Middle Eastern and North African Studies (http://www.catalog.gatech.edu/programs/minor-menas)
- Minor in Russian Studies (p. 583)
- Minor in Spanish (p. 587)
- Minor in Spanish (p. 587)

**Bachelor's Degrees**

- Bachelor of Science in Applied Language & Intercultural Studies (p. 192)
- Bachelor of Science in Global Economics and Modern Languages (p. 346)
- Bachelor of Science in International Affairs and Modern Language (p. 376)

**Undergraduate Study in Modern Languages**

**Minors**

- Minor in Chinese (p. 543)
- Minor in East Asian Studies (p. 550)
- Minor in French (p. 561)
- Minor in German (p. 561)
- Minor in International Business, Language, and Culture (http://www.catalog.gatech.edu/programs/minor-iblc)
- Minor in Japanese (p. 568)
- Minor in Korean (p. 568)
- Minor in Linguistics (p. 571)
- Minor in Middle Eastern and North African Studies (http://www.catalog.gatech.edu/programs/minor-menas)
- Minor in Russian Studies (p. 583)
- Minor in Spanish (p. 587)

**Bachelor's Degrees**

- Bachelor of Science in Applied Language & Intercultural Studies (p. 192)
- Bachelor of Science in Global Economics and Modern Languages (p. 346)
- Bachelor of Science in International Affairs and Modern Language (p. 376)

**College Credit for High School Study**

Modern Languages will grant 6 to 8 hours of credit in any language taught by the School for high school study in that language, provided the student has two or more years of high school credit in the language in question and has completed six credit hours at the 2000, 3000, or 4000 level with an average grade of C or higher. To have the credit entered on their records, students must submit the Modern Languages Proficiency Credit (Advanced Standing) form http://www.registrar.gatech.edu/docs/pdf/advstanding-ml.pdf to the School of Modern Languages for its approval, and pay $90 for each 3 or 4 hours of credit. No grade is attached to this credit, but the credit can fulfill the humanities requirement for graduation.

- Students submitting a score of four or five on the Advanced Placement (AP) Examination in French, German, or Spanish "Language Level III" or "Literature Level III" may receive six hours of credit for courses numbered 2001-2 in the respective language.
- For the Japanese AP exam, students who receive
  - a score of three can earn three hours of credit for JAPN 2002;
• a score of four can earn six hours of credit for JAPN 2002 and JAPN 3001;
• a score of five can earn six hours of credit for JAPN 3001 and JAPN 3002.

For the Chinese exam, students who receive
• a score of three can earn three hours of credit for CHIN 2002;
• a score of four can earn six hours of credit for CHIN 2002 and CHIN 3003;
• a score of five can earn six hours of credit for CHIN 3003 and CHIN 3004.

Students who submit language scores of five or above for courses taken at the higher level from a certified high school International Baccalaureate program may also receive credit for courses numbered 2001-2 in French, German, or Spanish, for 3001-2 in Japanese, and for 3003-4 in Chinese.

Official scores should be sent to the Registrar’s office for processing.

The School will not grant credit for high school study in a foreign language to students who have taken 1000 level courses in that language or the equivalent at Georgia Tech, or at other college-level institutions for which they have received transfer credit.

Graduate Course Option

Under the Graduate Course Option, undergraduate students with a final grade-point average of 3.5 or higher may count six credit hours of their undergraduate credits toward a master’s degree at Georgia Tech in the same field. This means that qualified IAML students could complete the Master of Science in International Affairs with thirty additional credit hours rather than 36 credit hours if they chose to further their study in International Affairs; likewise, qualified GEML students could complete the MS in Economics with thirty additional credit hours in ECON courses.

Graduate Course Option Information (http://www.catalog.gatech.edu/academics/graduate/masters-degrees/graduate-course-option)

Humanities Credits

Each course is essentially a unit in itself, but beginning students are encouraged to pursue at least the elementary two-semester sequence (1001 and 1002) in order to achieve a minimum level of proficiency and to receive humanities credit for both courses. Humanities credit is awarded for Modern Languages 1001 classes upon successful completion of the corresponding 1002 classes. Humanities credit is awarded for SPAN 1101 only upon the successful completion of SPAN 1102. In some instances, students may complete a Modern Languages course at 1001 and then be placed at the second-semester level and complete the 2001 level course. Therefore, the sequence that will warrant HUM credit for Modern Languages courses may be either the 1001-1002 or the 1001-2001 sequence. Students may not enroll in or receive advanced standing for 1000 level courses after the successful completion of any 2000, 3000 or 4000 level course; nor can credit be earned for 2000 level courses after successful completion of any 3000 or 4000 level course. Courses at the 3000 and 4000 level do not have to be taken in chronological order, provided prerequisites are fulfilled.

With minor exceptions, students can fulfill their humanities requirement for graduation by taking courses in the School of Modern Languages, including linguistics courses and courses taught as ML courses (courses in a language not yet included in the General Catalog). Students should consult the Catalog course descriptions and the section of this catalog titled "Humanities and Social Sciences Requirements (p. 93)" in order to determine which courses are classified as humanities in their respective colleges. With the approval of their major schools, students may take any course offered by the School of Modern Languages on a pass/fail basis.

Humanities Information (p. 93)

Minor Programs

The School of Modern Languages offers minors in Chinese, French, German, Japanese, Korean, and Spanish as well as in Russian Studies. This program is designed for students who wish to develop their language skills to at least an intermediate level and to provide themselves with a greater depth than possible with a certificate program.

1. Students must earn 15 credit hours of language electives in a single language beyond the 2002 course.
   a. Students may include the 2002 course for CHIN/JAPN/KOR/ RUSS (or the 2011 course in CHIN)
   b. All 15 hours of 3/4000-level courses for FREN/GRMN/SPAN
   c. Students pursuing a minor in Russian Studies should take their electives in at least two different departments/schools (Modern Languages, International Affairs, and/or Literature, Media, and Communication)

2. A maximum of 9 semester hours of transfer credit is allowed in each minor. All courses counting toward a minor must be taken on a letter-grade basis, and a grade of C or better must be received in each course.

Students wishing to pursue one or more of these minors should declare the minor by filling out the minor change form (http://www.registrar.gatech.edu/students/formlanding/changeminor.php) with the Director of Undergraduate Studies in Modern Languages

Minor Program of Study & Guidelines (p. 107)

Modern Language Minor Information (http://www.modlangs.gatech.edu/degrees/minors-certificate)

Study Abroad

The School of Modern Languages offers special summer immersion programs in China, France, Senegal, Germany, Japan, Korea, Russia, Ecuador, Mexico, Peru, and Spain. These intensive programs in Languages for Business and Technology (LBAT) consist of six to eight weeks of study abroad in which classroom lessons in business, culture, and technology are combined with field work, cultural events, excursions, and visits to area businesses — all conducted in the target language. The LBAT experience offers a unique opportunity for rapid growth in proficiency, to build a deeper appreciation for the cultures and lifestyle patterns of other peoples, and to make lifelong social and professional contacts. Students will earn nine to fifteen credit hours (depending on the language program and the options available) at the 3000 level; in some programs, lower-division language courses are offered. These credits count toward a certificate, a minor, or the joint majors with International Affairs and Economics or ALIS degree. Program costs vary according to the country visited and the length of the program.

Study Abroad Information (http://www.modlangs.gatech.edu/study-abroad)
Study Abroad and Internships

In collaboration with the Colleges of Engineering and Computing, the School of Modern Languages has initiated a Study Abroad and International Internship program that incorporates intensive applied language acquisition and cultural study. Students who participate in this program can expect to become versed in a foreign culture, fluent in a second language on professional and social levels, and gain advanced practical experience in their field. This program will prepare students for leadership positions in the global workforce in business, industry, and government.

Modern Languages works with international companies and with the Georgia Tech Center for Career Discovery and Development to establish internships and jobs abroad. Programs generally include one semester of study followed by a six month internship with a global company (some limitations as to language and field of study exist). The LBAT summer immersion course or equivalent is recommended, since students will need to take classes in the language spoken. HOPE scholarships and other financial aid apply. Additional language classes are available abroad. Students retain regular status at Georgia Tech by enrolling in FS 4000 during the semester of study and in INTN 3011, INTN 3015, INTN 3018, and in the Modern Language or Co-op International Internship (INTN 3011 or COOP 3011) during the internship. Students participating in this program are encouraged to contact their academic advisors, the International Division in the Center for Career Discovery and Development, the Office of International Education, and Modern Languages advisors. See www.modlangs.gatech.edu (http://www.modlangs.gatech.edu) for more information.

Study Abroad Information (http://www.modlangs.gatech.edu/study-abroad)

Suggested Placement

Students who have never completed any course for high school or college credit in the language should begin in a 1001 course. Students with previous study in Chinese, French, German, Japanese, Russian, and Spanish should take the placement test found at www.modlangs.gatech.edu (http://www.modlangs.gatech.edu) in order to determine their optimal beginning placement. Students interested in any of the other languages should consult with a language advisor for beginning placement. See www.modlangs.gatech.edu (http://www.modlangs.gatech.edu) for more information.

Linguistics Certificate

The Linguistics Certificate consists of 12 credit hours.

Track A: General Linguistics

Required Course
LING 2100 Intro to Linguistics 3

Additional Courses
Select nine credit hours from the following: 9
LING Special Topics 1
3813/4813
SPAN 4170 Span Applied Linguistics
PSYC/LING Human Language Process 2760
PSYC 3011 Cognitive Psychology
PSYC 3790 Intro-Cognitive Science
PSYC 4200 Adv Topics-Cognitive Psy

Track B: Language Processing

Track B: Language Processing is a joint collaboration between the School of Modern Languages and the College of Computing. This certificate is designed with computer science majors in mind who have an interest in linguistics and natural language processing.

Required Course
LING 2100 Intro to Linguistics 3

Additional Courses
Select nine credit hours from the following: 9
CS 3240 Languages and Computation
CS 3600 Intro-Artificial Intell
CS/PSYC 3790 Intro-Cognitive Science

CS 3803 Special Topics 1
or CS 4803/ LING 381

CS 4641 Machine Learning
CS 4650 Natural Language
LING/ Course LING 2760 Not Found
PSYC 2760

Total Credit Hours 12

1 Three credit hours maximum; must be approved by Linguistics advisor

For Track B students, other courses listed under the AI thread or in Linguistics may also count with prior approval from the linguistics advisor.

All courses counting towards a LING certificate must be taken on a letter grade basis and a grade of C or better must be received in each course.

Other information:

1. The School of Modern Languages may also accept one linguistics course on the 3000- or 4000-level taken at other accredited universities for either Track A or Track B. Students wanting to take such a course need to clear its acceptability with the LING advisor at Georgia Tech.
2. A 2000-level course may be accepted by the LING advisor if its contents are based upon examples from another language, given the possible difficulty involved in having enough command of the language to deal with more complex materials.
3. Students who wish to use a course taken abroad to obtain credit towards the LING certificate must submit a copy of the syllabus of the course and petition to obtain approved form the LING advisor prior to travelling abroad.
4. Some CS and ML courses may have language prerequisites.

Certificate Information (http://www.modlangs.gatech.edu/degrees/minors-certiﬁcates)

School of Public Policy

Established in 1990

The School of Public Policy is a research intensive, globally engaged school offering BS, MS, and PhD degrees to those intrigued by complex problem-solving in the public interest.

The School houses one of the world’s top programs in the field of science and technology (S&T) policy. We host a major international conference on S&T policy that brings participants from every continent. Because nearly every policy area is intertwined with S&T issues (such as the environment, communications, transportation, biotechnology and health, regional development, workforce and education) the School is at the center of a wide range of important international, national, and state policy questions. Governance of the Internet, stem education and careers, climate change policy, national and international innovation policy, economic development, risk analysis and management, renewable energy, smart growth, conflict resolution, and business-government relationships – these are a few of the topics addressed in our courses and research projects.

Our faculty members are research oriented, with more than $6 million in externally-funded research underway. Our degrees are analytically oriented, developing skills increasingly in demand in the policy world as data and powerful software become more readily available and policy challenges grow more complex. The School conducts rigorous analyses of policy problems, bringing sophisticated methodologies to bear on research questions. At the same time, we are unusual among policy schools in having an active research program at the intersection of philosophy, ethics, and policy. Our location at Georgia Tech allows for a wide array of collaborative opportunities with faculty and students in science, engineering, business, computing, and city planning.

Students at all levels routinely become involved in research, from undergraduate students helping on faculty research projects or pursuing their own questions, to the opportunities our MS and PhD students have to present or publish their work in scholarly settings. Internships in Atlanta, Washington, and other locales allow students to explore their interests in the public, nonprofit, and business sectors.

Public Policy students are taught by award-winning teachers. They experience policy development in internships, research projects, and capstone projects that use our location in Atlanta as a source of real-world policy problems and contacts. There are numerous opportunities for national and international engagement, with research conducted jointly with partners around the world, by internationally oriented faculty and students, and with opportunities for international exchange in undergraduate and graduate programs. We offer a unique and forward-looking environment.

Minors

- Minor in Public Policy (p. 582)
- Minor in Health, Medicine, and Society (p. 563)
- Minor in Law, Science, and Technology (p. 568)
- Minor in Leadership Studies (p. 569)
- Minor in Philosophy (p. 578)
- Minor in Political Science (p. 580)
- Minor in Women, Science, and Technology (p. 590)

Bachelor’s Degree

- Bachelor of Science in Public Policy (p. 477)

Master’s Degree

- Dual Degree - MCRP/Master of Science in Public Policy (p. 501)
- Master of Science in Public Policy (p. 535)

Doctoral Degrees

- Doctor of Philosophy with a Major in Public Policy (p. 497)
- Doctor of Philosophy with a Major in Public Policy (Joint Degree with Georgia State University) (p. 498)

Pre-law Certificate

The School of Public Policy is home to Georgia Tech’s Law, Science, and Technology/Pre-Law Program. This program offers a wide range of curricular opportunities as well as pre-law advising and support services for students considering law school and careers in law.

The program introduces students to selected areas of law that they are likely to study in law school. Students will begin to develop the skills that they will need to succeed in law school and in law practice. Some of the courses are taught by full-time faculty, while others are taught by attorneys from the Atlanta area, thereby exposing students to academic and practical perspectives on the practice of law.

The program welcomes students from every college and major. Students majoring in the sciences and engineering may be surprised to learn that their undergraduate background gives them a strong start toward specializations such as intellectual property law, products liability law, and construction law. The pre-law program can supplement a student’s scientific or engineering background by developing the reading and writing skills that are fundamental to a successful legal career.

Program of Study

Required Courses

Select one of the following: 3
- PUBP 3000 US Constitutional Issues
- PUBP 3016 Judicial Process
- PUBP 3610 Pre-Law Seminar
- PUBP 4609 Legal Practice

Electives

Select elective PUBP courses to fulfill 12 credit hour requirement. 9

Total Credit Hours 12

1 See Pre-Law website for list of approved electives options.

For additional curricular requirements or any other information, see the pre-law section of the website www.prelaw.gatech.edu (http://www.prelaw.gatech.edu), or contact the pre-law program director (contact information listed at website).

Intellectual Property Certificate

The School of Public Policy is home to Georgia Tech’s Intellectual Property Program. This program offers a wide range of curricular
opportunities as well as networking opportunities for students considering a career in intellectual property or in other areas where knowledge of intellectual property would be helpful.

While earning the certificate, students will have the opportunity to learn about the protections and the limits on those protections of intellectual property including patents, copyrights, trademarks and other forms of intellectual property. Taking an interdisciplinary approach, the certificate in IP will teach students about law, business strategies, and public policies affecting intellectual property. Some of the courses are taught by full-time faculty, while others are taught by attorneys from the Atlanta area, thereby exposing students to academic and practical perspectives on the practice of law.

Program of Study

Required Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>PUBP 4640</td>
<td>Tech Law, Policy, Mgmt</td>
<td>3</td>
</tr>
</tbody>
</table>

Electives

Select elective courses to fulfill 12 hour requirement.¹

Total Credit Hours 12

¹ See Intellectual Property for approved elective options.

For additional curricular requirements or any other information, see the Intellectual Property section of the School of Public Policy website at https://spp.gatech.edu/undergraduate/certificates/intellectual-property; or contact the Intellectual Property program director (contact information listed at website).

Graduate Study in Public Policy

Master's Degree

- Dual Degree - MCRP/Master of Science in Public Policy (p. 501)
- Master of Science in Public Policy (p. 535)

Doctoral Degrees

- Doctor of Philosophy with a Major in Public Policy (p. 497)
- Doctor of Philosophy with a Major in Public Policy (Joint Degree with Georgia State University) (p. 498)

Graduate Certificate in Public Policy

The School of Public Policy offers a certificate in public policy to PhD students from other Schools around campus. The goal of the certificate program is to provide a basic but well-rounded introduction to public policy thinking to Georgia Tech graduate students. The program is designed to address the needs of scientists, engineers, management scholars and others who seek to be more aware of policy, regulatory, ethical, and societal implications of science, technology and innovation. The program will provide breadth and context for those entering employment in any sector. The courses in the program explore the processes through which policy is made.

Although this certificate is not available to policy students, the courses are open to all graduate students, creating an opportunity for students to gain value from divergent perspectives. Students who complete this certificate are eligible to participate in the School’s PRIME international graduate student exchange program.

Eligibility

Graduate students from all programs may take the courses offered as part of this certificate. The certificate will be awarded by the School of Public Policy to any non-public policy graduate student who successfully complete the program requirements and earns a graduate degree from one of Georgia Tech’s degree granting academic units. The requirements for the Graduate Certificate in Public Policy will typically satisfy the minor requirements for the Georgia Tech PhD degree.

Please contact Diana Hicks at dhicks@gatech.edu with any questions.

Certificate Requirements

Students are required to earn at least a B in every course that counts toward the certificate. The credit requirements for the Certificate in Public Policy are 12 credit hours.

Required course

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>PUBP 6012</td>
<td>Fund of Policy Processes</td>
<td>3</td>
</tr>
<tr>
<td>or PUBP 62:Public Policy Analysis</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Electives

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Electives¹</td>
<td>9</td>
</tr>
</tbody>
</table>

Total Credit Hours 12

¹ Three electives are required for the certificate. These electives can be chosen from the list below or from graduate-level special topics offered by the public policy faculty with the agreement of the certificate advisor. The electives are organized by broad area of interest to guide students in choosing electives that best suits their interests. Students are not required to choose all electives from the same grouping.

Analytical Methods

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>PUBP 6112</td>
<td>Research Dsgn-Policy Sci</td>
<td>3</td>
</tr>
<tr>
<td>PUBP 6114</td>
<td>Applied Policy Methods</td>
<td>3</td>
</tr>
</tbody>
</table>

Economic Development

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>PUBP 6602</td>
<td>Econ Dev Analy&amp; Practice</td>
<td>3</td>
</tr>
<tr>
<td>PUBP 6606</td>
<td>Urban Development Policy</td>
<td>3</td>
</tr>
<tr>
<td>PUBP 6415</td>
<td>Tech Regions &amp; Policy</td>
<td>3</td>
</tr>
<tr>
<td>PUBP 6600</td>
<td>Local Econ Dev Plan&amp;Plicy</td>
<td>3</td>
</tr>
<tr>
<td>PUBP 6740</td>
<td>Innovation and the State</td>
<td>3</td>
</tr>
<tr>
<td>PUBP 6741</td>
<td>Geography of Innovation</td>
<td>3</td>
</tr>
</tbody>
</table>

Economics for Public Policy

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>PUBP 6116</td>
<td>Microecon-Policy Analy</td>
<td>3</td>
</tr>
<tr>
<td>PUBP 6118</td>
<td>Public Finance &amp; Policy</td>
<td>3</td>
</tr>
</tbody>
</table>

Ethics and Values

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>PUBP 6010</td>
<td>Ethic,Epistem&amp;Public Pol</td>
<td>3</td>
</tr>
<tr>
<td>PUBP 6326</td>
<td>Environ Values&amp;Pol Goals</td>
<td>3</td>
</tr>
</tbody>
</table>

Environmental & Energy Policy

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>PUBP 6310</td>
<td>Environmental Issues</td>
<td>3</td>
</tr>
<tr>
<td>PUBP 6312</td>
<td>Economics-Environ Policy</td>
<td>3</td>
</tr>
<tr>
<td>PUBP 6314</td>
<td>Policy Tools-Environ Mgt</td>
<td>3</td>
</tr>
<tr>
<td>PUBP 6326</td>
<td>Environ Values&amp;Pol Goals</td>
<td>3</td>
</tr>
<tr>
<td>PUBP 6327</td>
<td>Sustainability &amp; Env Pol</td>
<td>3</td>
</tr>
<tr>
<td>PUBP 6701</td>
<td>Energy Technol &amp; Policy</td>
<td>3</td>
</tr>
</tbody>
</table>
Information Technology
PUBP 6111 Internet & Public Policy 3
PUBP 6501 Information Policy & Mgt 3
PUBP 6502 IT/Comm/Telecom Policy 3

Public Administration
PUBP 6014 Organization Theory 3
PUBP 6017 Public Management 3
PUBP 6018 Policy Implement & Admin 3
PUBP 6226 Business & Government 3

Science and Technology Policy
PUBP 6401 Sci,Tech & Public Policy 3
PUBP 6402 Research Policy & Mgt 3
PUBP 6403 Sci Careers/Workplaces 3
PUBP 6417 Critic Perspect-Sci&Tech 3
PUBP 6440 Sci Tech & Regulation 3
PUBP 6753 Comp Science&Tech Policy 3
PUBP 8803 Special Topics 3

1 PUBP 8803 in public policy. See Oscar catalog for offerings in upcoming semesters. Selection of other courses requires approval of the instructor and the certificate advisor.

Public Policy Graduate Certificate (http://www.spp.gatech.edu/graduate/certificates/pubp)

Graduate Certificate in Science, Technology and Society
The Science, Technology and Society Graduate Certificate is designed for students already enrolled in a graduate degree program at Georgia Tech. This certificate is for graduate students who would like to demonstrate additional competence in some aspect of STS or special competence in STS in their home discipline. The certificate is open to students in good standing in any graduate program at Georgia Tech.

The 12-credit hour certificate program helps students to:

• Understand the social, cultural, and epistemic dynamics of science and technology
• Explore these dynamics across world societies and cultures
• Develop sensitivity to issues of gender, race, and justice across areas of knowledge, including: engineering, medicine, environment, cognition, security, innovation, design
• Employ STS approaches as scholars or practitioners (e.g. engineers, scientists, or policy makers)

Program of Study
4 Courses Total

Core Course
HTS/PUBP/ LMC 6743 STS Core Seminar 3

Select one of the following: 3

HTS 6118 Sci Tech & The Economy
HTS 6121/ Science Tech Security
INTA 8803

Undergraduate Study in Public Policy

Minors
• Minor in Public Policy (p. 582)
• Minor in Health, Medicine, and Society (p. 563)
• Minor in Law, Science, and Technology/Pre-Law (p. 568)
• Minor in Leadership Studies (p. 569)
• Minor in Philosophy (p. 580)
• Minor in Political Science (p. 580)
• Minor in Women, Science, and Technology (p. 590)

Bachelor’s Degree
• Bachelor of Science in Public Policy (p. 477)

The School of Public Policy offers undergraduate certificates and minors in five areas:

• Public Policy: featuring courses on government and business decision processes, especially those involving science, technology, environment, or regional development.
• Law, Science, and Technology/Pre-Law: preparing students to make informed decisions about law school and careers in law through selected courses in public policy, business administration, international affairs, history, and other fields.
• Leadership studies: providing students with an in-depth knowledge of leadership theory, skills, experience, and application through a rigorous program of study that is multi-disciplinary in nature
• Philosophy: providing broad perspectives and critical thinking about science and technology, emphasizing values and ethics.
• Political Science: focusing on how government works, from the local to the national level.
• Women, Science, and Technology: Links science and technology issues with those issues associated with the study of women and gender in society.

The certificates enrich any Georgia Tech degree and particularly serve students who are planning graduate studies in law, medicine, business, or the social sciences. All the certificates require a minimum of twelve semester hours of concentration.

Minors are for students wishing a concentration outside their major that provides greater depth than the certificate programs. Each minor requires a minimum of fifteen hours of credit (twelve semester hours at the 3000
level or higher with a C or better in each. Completion of a minor will be recognized on the student's final university transcript.

Students interested in planning a certificate or minor program in one of the five areas should contact the School of Public Policy for further information. A faculty advisor assists each student in planning a program of study to meet his or her needs and interests.

Minor Program of Study & Guidelines (p. 107)

The Sam Nunn School of International Affairs

Established in 1990

The Sam Nunn School of International Affairs offers educational programs that provide an enhanced understanding of the factors that shape the world in which we live and work in the twenty-first century. The programs of study equip students with the quantitative and qualitative skills needed to engage in strategic planning and analysis in an international context. A unique interdisciplinary curriculum provides students with an understanding of the increasing importance of technology in a borderless world. Many graduates assume professional positions within business, government, and international organizations. Other graduates pursue postgraduate or professional education in a range of disciplines that includes law, business, international affairs, public administration, and economics.

The Sam Nunn School of International Affairs is the only one of its kind at a leading technological institute. The educational programs administered by the Sam Nunn School at Georgia Tech are designed to equip students with the skills, values, and experience to build bridges between the world of science and technology and the world of international relations.

Minors

• Minor in International Affairs (p. 565)
• Minor in Global Development (p. 562)

Bachelor's Degrees

• Bachelor of Science in Economics and International Affairs (p. 340)
• Bachelor of Science in International Affairs (p. 374)
• Bachelor of Science in International Affairs and Modern Language (p. 376)

Master's Degree

• Master of Science in International Affairs (p. 530)

Doctoral Degree

• Doctor of Philosophy with a Major in International Affairs, Science, and Technology (p. 490)

Graduate Certificate in Science, Technology, and Society

The Science, Technology and Society Graduate Certificate is designed for students already enrolled in a graduate degree program at Georgia Tech. This certificate is for graduate students who would like to demonstrate additional competence in some aspect of STS or special competence in STS in their home discipline. The certificate is open to students in good standing in any graduate program at Georgia Tech.

The 12-credit certificate program helps students to:

• Understand the social, cultural, and epistemic dynamics of science and technology
• Explore these dynamics across world societies and cultures
• Develop sensitivity to issues of gender, race, and justice across areas of knowledge, including: engineering, medicine, environment, cognition, security, innovation, design
• Employ STS approaches as scholars or practitioners (e.g. engineers, scientists, or policy makers)

Program of Study

4 Courses Total

Required Courses

Select one of the following: 3

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>HTS/STS Core Seminar</td>
<td>PUBP/LMC 6743</td>
</tr>
<tr>
<td>HTS 6118</td>
<td>Sci Tech &amp; The Economy</td>
</tr>
<tr>
<td>HTS 6121/INTA 8803</td>
<td>Science Tech Security</td>
</tr>
<tr>
<td>HTS 6123/LMC 8803</td>
<td>Social &amp; Cultural BIOMED</td>
</tr>
<tr>
<td>HTS 6124</td>
<td>Sci &amp; Tech Beyond Borders</td>
</tr>
<tr>
<td>PUBP/LMC Social Justice &amp; Design</td>
<td>6748</td>
</tr>
<tr>
<td>LMC/PUBP Feminist Theory and STS</td>
<td>6749</td>
</tr>
</tbody>
</table>

Elective

Elective 3

Total Credit Hours 6

Select up to one other elective, subject to student interest and STS Coordinator approval. Many appropriate courses are offered across the Ivan Allen College and the Institute, for example: CS 8893.

Undergraduate Study in International Affairs

Minors

• Minor in International Affairs (p. 565)
Scheller College of Business

Established in 1913 as the School of Commerce, the school now known as the Scheller College of Business has a distinguished history as a part of a world-renowned technical research university. Scheller College of Business offers a full range of undergraduate and graduate programs. The undergraduate program in business administration leads to the Bachelor of Science in Business Administration degree. The College also offers several Master’s degree programs:

- the Master of Business Administration (MBA), which can be completed in two years as a full-time program or in two to three years as a part-time evening program;
- the Master of Business Administration in Management of Technology, which is offered in a weekend format and can be completed in less than two years;
- the Master of Business Administration in Global Business, which is offered in a weekend format and can be completed in less than two years;
- the Master of Science in Analytics;
- the Master of Science in Quantitative and Computational Finance; and
- an undesignated Master of Science degree.

The College also offers a doctoral program that leads to a PhD in Management.

Students admitted to the graduate programs are admitted only on a degree-seeking basis. The College is accredited by the Association to Advance Collegiate Schools of Business (AACSB) International.

Scheller College is a recognized leader in developing business leaders to succeed in today’s high-tech business world. Programs combine excellence in the functional areas of business education with the multidisciplinary focus on management of technology, international business, and entrepreneurial and innovative processes for a global economy. Students learn to create value that will make a social and economic difference in the lives of individuals, groups, communities, and societies. With a curriculum that emphasizes collaborative learning based on real-world experience, the College offers the resources of centers focusing on business analytics, sustainability, leadership, and entrepreneurship to foster research, teaching excellence, and discussion across the major functional areas of business.

The College of Business and all of its degrees are accredited by the Association to Advance Collegiate Schools of Business (AACSB) International.

Minors

- Minor in Computing and Business (p. 544)
- Minor in Engineering and Business (p. 559)
- Minor in Technology and Business (p. 590)
- Minor in Leadership Studies (p. 569)

Bachelor’s Degree

- Bachelor of Science in Business Administration (p. 219)

Master’s Degree

- Master of Business Administration (p. 503)
- Master of Science in Analytics (p. 509)
- Master of Science in Quantitative and Computational Finance (p. 536)
- Master of Business Administration in Global Business - Executive (p. 504)
- Master of Business Administration in Management of Technology - Executive (p. 505)
- Master of Science with a Major in Management (p. 539)

Doctoral Degrees

- Doctor of Philosophy with a Major in Management (p. 494)
Graduate Study in Business

Master's Degree

• Master of Business Administration (p. 503)
• Master of Science in Analytics (p. 509)
• Master of Science in Quantitative and Computational Finance (p. 536)
• Master of Business Administration in Global Business - Executive (p. 504)
• Master of Business Administration in Management of Technology - Executive (p. 505)
• Master of Science with a Major in Management - Executive (p. 539)

Doctoral Degrees

• Doctor of Philosophy with a Major in Management (p. 494)

Undergraduate Study in Business

Minors

• Minor in Computing and Business (p. 544)
• Minor in Engineering and Business (p. 559)
• Minor in Leadership Studies (p. 569)
• Technology and Business (p. 590)

Bachelor's Degree

• Bachelor of Science in Business Administration (p. 219)

Transfer Credit Policy for Undergraduate Students

Students may transfer business and management courses taken at another accredited institution if the courses are passed with a "C" or better and are deemed by the College of Business to be equivalent to a Georgia Tech course. Such courses will be transferred for the same number of credits as the corresponding College of Business courses, provided they are equal to three or more semester hours of credit. Transfer credits will be accepted from newly-formed institutions of the University System of Georgia prior to accreditation.

Senior- or junior-level courses with three or more semester hours of credit that have no corresponding College of Business course may transfer as electives in management if they are approved by the College of Business.

Because of the difference in the intellectual level of various courses, freshman- or sophomore-level courses taken at other institutions may only be transferred for equivalent freshman- or sophomore-level courses offered at Georgia Tech. Before taking courses at other institutions, students should refer to the Georgia Tech transfer credit policies at www.registrar.gatech.edu/students/transfercredit.php (http://www.registrar.gatech.edu/students/transfercredit.php). Business students considering taking courses at other institutions should keep in mind Georgia Tech's 36-hour Residency Rule, which states that "no student may be considered a candidate for a degree unless the final 36 credit hours required for the degree are earned in residence at Georgia Tech and approved by the major school."

In addition to its degree programs, the College of Business offers students in good standing an opportunity to broaden their areas of expertise or acquire skills or information beyond their major degree requirements. Students who satisfactorily complete this special program will receive a certificate of recognition. Certificates are only available to degree-seeking Georgia Tech undergraduates. Certificates are awarded upon graduation from a Georgia Tech undergraduate program. For certificate requirements, please see the College of Business Website: www.scheller.gatech.edu (http://www.scheller.gatech.edu)

The following certificate programs are available for undergraduate students:

• Accounting
• Business Analytics
• Business Law and Ethics
• Entrepreneurship
• Finance
• Information Technology Management
• International Business
• Leadership and Organizational Change
• Marketing
• Operations and Supply Chain Management
• Strategy and Innovation
ACADEMICS

• Academic Resources (p. 72)
• Colleges and Schools (p. 72)
• Courses (p. 72)
• Distance Learning and International Sites (p. 72)
• Graduate Academics (p. 72)
• Professional Education (p. 78)
• Programs (p. 178)
• Research Support Facilities (p. 79)
• Special Academic Programs (p. 82)
• Undergraduate Academics (p. 91)
• Undergraduate Minors (p. 107)

Academic Resources

Programs & Services

• Academic Advising (http://www.advising.gatech.edu)
• Academic Resources (http://www.undergradstudies.gatech.edu)
• Career Services (http://www.career.gatech.edu)
• Counseling (http://www.counseling.gatech.edu)
• Dean of Students (http://www.deanofstudents.gatech.edu)
• Dining Services (http://www.gatechdining.com)
• Diversity Programs (http://www.diversityprograms.gatech.edu)
• Fellowships (http://fellowships.gatech.edu)
• Freshman Experience Program (http://www.housing.gatech.edu/freshmanexperience)
• Health Services (http://www.health.gatech.edu)
• International Student Services (http://www.oie.gatech.edu)
• LGBTQIA Resource Center (http://lgbtqia.gatech.edu)
• Office of Minority Educational Development (http://omed.gatech.edu)
• Orientation (new students) (http://www.faset.gatech.edu)
• Tutoring & Workshops (http://www.success.gatech.edu/?id=6)
• Women’s Resource Center (http://www.womenscenter.gatech.edu)
• Veteran’s Resource Center (http://veterans.gatech.edu)

Departments

• Admissions (undergraduate) (http://www.admission.gatech.edu)
• Admissions (graduate) (http://www.grad.gatech.edu)
• Alumni Association (http://gtalumni.org)
• Athletic Association (http://www.ramblinwreck.com)
• Bursar’s Office (http://www.bursar.gatech.edu)
• Office of the Vice President for Student Life and Dean of Students (http://studentlife.gatech.edu/content/about-division-student-life)
• Center for Career Discovery and Development (http://www.careerdisccovery.gatech.edu)
• Financial Aid (http://www.finaid.gatech.edu)
• Housing (http://www.housing.gatech.edu)
• Parking and Transportation (http://www.parking.gatech.edu)
• Police (campus) (http://www.police.gatech.edu)
• Registrar’s Office (http://www.registrar.gatech.edu)

Student Life

• Leadership & Civic Engagement (http://engage.gatech.edu)
• Greek Affairs (http://greek.gatech.edu)
• Student Government (http://www.sga.gatech.edu)
• DramaTech (http://dramatech.org)

Facilities

• Campus Recreation Center (http://www.crc.gatech.edu)
• Information Technology (http://www.oit.gatech.edu)
• Library & Information Center (http://www.gatech.edu/libraries)
• Interdisciplinary Research Centers (http://www.gtri.gatech.edu)
• Ferst Center (http://www.ferstcenter.gatech.edu)
• Student Center (http://www.studentcenter.gatech.edu/Pages/default.aspx)

Colleges and Schools

• College of Computing (p. 16)
• College of Design (http://www.catalog.gatech.edu/colleges/coa)
• College of Engineering (http://www.catalog.gatech.edu/colleges/coe)
• College of Sciences (p. 44)
• Ivan Allen College of Liberal Arts (p. 53)
• Scheller College of Business (p. 70)

Courses

• All Courses (p. 594)
• Graduate-Level Courses (http://www.catalog.gatech.edu/courses-grad)
• Undergraduate-Level Courses (http://www.catalog.gatech.edu/courses-undergrad)

Distance Learning and International Sites

Academic content delivered through distance learning is in accordance with the course descriptions as approved by the Institute Curriculum Committee. All courses require approval by the Institute Curriculum Committee and the Academic Senate. All offerings for academic credit delivered through the Division of Professional Education have been approved in this manner.

Academic content delivered at our international sites, such as GT-Lorraine and GT-Shenzhen, is in accordance with the course descriptions as approved by the Institute Curriculum Committee. All courses require approval by the Institute Curriculum Committee and the Academic Senate regardless of where they are delivered. All Study Abroad Programs are approved on a yearly basis by the Institute Undergraduate Curriculum Committee as recommended by the Study Abroad Subcommittee.

Graduate Academics

The faculty of Georgia Tech grants advanced degrees in engineering, science, business, computing, architecture, city and regional planning, public policy, and other technology-related areas. The goals for graduate
studies and research are to establish an educational environment that will strengthen students’ personal and professional development, to encourage students and faculty to pursue the discovery and generation of new knowledge through research, to investigate ways of applying such knowledge for the benefit of society and humanity, and to foster the development of new tools, objects, and ideas.

Students whose interests and aptitudes lead them beyond the limits of the traditional undergraduate curriculum may broaden their knowledge of a given field and pursue independent inquiry through graduate study. A graduate education is of particular benefit to students interested in careers in research, management, development, design, or consulting; to those who aspire to formulate and administer policy; and to those who desire careers in higher education.

• Graduate Policies and Regulations (p. 73)
• Graduate Student Work Loads (p. 74)
• Doctoral Degree Programs (p. 180)
• Requirements for the Doctoral Degree (p. 75)
• Master’s Degree Programs (p. 180)
• Requirements for the Master’s Degree (p. 77)

Graduate Policies and Regulations

The Institute Graduate Curriculum Committee, with the approval of the Academic Faculty Senate, is responsible for establishing academic policy for the graduate programs; however, final authority rests with the Senate. This committee reserves the right to change requirements for degrees as may be appropriate. Students enrolled at the time such changes appear in the Catalog have the privilege of following either the requirements stated in the Catalog effective the semester in which they enrolled or the requirements in the Catalog that records the change.

This catalog records the institute-wide policies and regulations that govern the graduate programs. Schools may make additional rules concerning their programs and the pursuit of their degrees, but such rules may not contradict Institute policies and regulations.

Transfer Credit

A student may not apply for transfer credit until after matriculation at Georgia Tech. The courses to be transferred would typically be those appearing on the approved program of study form for the masters degree. A doctoral student normally does not request transfer credit. The rules relative to and the process for obtaining transfer of credit for graduate-level courses are as follows:

1. Student’s in a master’s degree program requiring fewer than 33 semester credit hours may receive up to six hours of transfer credit for graduate-level courses taken at an institution accredited by a Canadian or U.S. regional accrediting board, or at a foreign school or university that has a signed partner agreement with Georgia Tech, and not used for credit toward another degree. This ensures completion of at least one-third of the courses for a degree in residence at Georgia Tech (applies to programs that are face-to-face and online format). The student must supply a current transcript for this evaluation.

2. To obtain transfer of credit, the student must complete the following procedure:
   a. The student will confer with the graduate advisor to ascertain whether the courses to be transferred are a logical part of the student’s graduate program;
   b. If the courses are appropriate, the student will deliver to the school that teaches such courses a copy of the current transcript, necessary descriptive materials including catalog descriptions, and textbooks used for evaluation. The faculty of the appropriate school will determine the equivalent Georgia Tech course and the number of credit hours accepted. The faculty member who prepares the transfer credit form should have the school chair cosign it. The school should then send the form directly to the registrar with a copy of the student’s Approved Program of Study attached;
   c. If the student wishes to transfer more than the number of hours permitted in item one listed above, a petition must be submitted to the Institute Graduate Curriculum Committee that includes statements of possible justification for the granting of such a petition, transfer credit forms, and the recommendation of the student’s school chair.

3. A joint enrollment student may receive graduate credit for up to one-third of the hours required for the degree for graduate courses taken at Emory University or Georgia State University provided that the following is true:
   a. Georgia Tech does not offer such courses;
   b. The student’s advisor and school chair approve the courses in advance and in writing;
   c. The student passes the courses with a C or better. Advance approval is satisfied when the courses appear on the student’s proposed Program of Study.

4. A student may not receive transfer credit from universities outside the United States and Canada unless the courses were taken at a foreign institution or university that is accredited by a Canadian or U.S. regional accrediting board or has a signed partner agreement with Georgia Tech. In any other case, an international student can obtain credit for courses previously taken but not applied toward another degree by filling out an Examination for Advanced Standing Authorization Request Form, paying the appropriate fee at the Bursar’s Office, and passing the examination for advanced standing. The school or college that normally teaches the equivalent course will administer any necessary examinations.

Double Counting Credit between Master’s Degrees

Students who are pursuing two Master’s degrees at Georgia Tech may double count a maximum of 6 hours of credit for both degrees. This ensures that each degree involves a minimum of 24 hours of coursework completed at Tech that is not double counted.

The six-hour limit may be exceeded when specifically allowed as a component of an approved degree program.
Staff Members
No staff member beyond the rank of instructor in a school may work for a master’s degree in that school. No new staff member with the rank of assistant professor in a school may work for a doctoral degree in that school.

General
A student who wishes to withdraw her/his name from the rolls of degree candidates must formally withdraw the Online Application for Graduation before the end of the seventh week of the semester (or fourth week of the summer term). This privilege will be extended to a degree candidate only once.

Graduate Student Work Loads
Full-time students must be enrolled for at least 12 credit hours on a letter grade or pass/fail basis. As an exception, the advisor and school chair may allow up to three hours out of the minimum 12 to be taken on an audit basis in fall and spring semesters; in summer semesters, the advisor and school chair may allow up to six hours out of the 12 minimum to be taken on an audit basis. (This exception is not applicable for students on immigrant visas or certain fellowships requiring them to enroll in at least 12 credit hours on a letter grade or Pass/Fail basis each academic term.) Hours in excess of the required 12 may be taken on any basis. Full-time students working exclusively on thesis research should be registered for 18 or more hours of 7000 or 9000 level courses (master’s or doctoral thesis courses) in fall and spring semesters, and for up to 16 hours during summer semesters.

The maximum load for graduate students in good standing is 21 hours in fall/spring and 16 hours in summer. The minimum load is three hours, except for the semester of graduation. During the semester of graduation, a student is permitted to register for only one hour of master’s or doctoral thesis courses (7000 or 9000). This exception may be used only once for each degree.

Students with fellowships, graduate research or teaching assistantships, traineeships, tuition waivers, or student visas, and those assigned to the Institute by the armed forces for the purpose of pursuing a degree are required to enroll full time. Part-time doctoral students engaged in research for their Ph.D.s should meet the minimum enrollment requirement and register for the number of 9000 level hours consistent with the time they and their faculty advisors spend on the dissertation research.

Expectations of Advisors and Advisees
The relationship between advisor and advisee is central to the experience of students in research-based graduate programs. Both partners in this relationship must contribute for it to succeed. Successful advisor-advisee relationships enhance the careers of both partners. The relationship can take on three forms: advisor-advisee; supervisor-employee; and mentor-mentee. In the best cases, the three forms work together. This document articulates key contributions from each partner to an advisor-advisee relationship that leads to mutual benefit.

The Advisor
Advising graduate students in research-based programs is part of the job expectation for almost all Georgia Tech faculty members. Graduate students build the faculty member’s research record and reputation by contributing to the advisor’s research program. This situation carries an inherent tension. Although the faculty member’s success depends at least in part on the student’s success, the faculty member may also be responsible to outside sponsors, whose goals may not directly match those of the student. As an educator, the advisor must always protect the student’s interests as well as the sponsor’s and his or her own in the research relationship.

The Advisee
The student’s motivation is to earn a degree, which requires the acquisition of scholarly knowledge and research competence. Participation in the research process is an essential requirement for all Georgia Tech doctoral students and many master’s degree students. In this part of their education, the student’s duty is to put a best faith effort into his or her assigned contribution to the research process. At the same time, Graduate Research Assistants (GRAs) are also employees who help the advisor and research group meet the requirements of a contract or grant; while, Graduate Teaching Assistants (GTAs) and Graders are also employees of the school or program who help the school or program meet their educational requirements. As such they are employees with a set of job responsibilities that may not align with their research objectives or those of their advisors. As with the faculty advisor, this situation sets up an inherent tension between the student’s educational goals and his or her employment responsibilities.

Mutual Expectations
Students Expect from their Advisor:

Respect
- Respect as a person, student, and professional employee
- Recognition and respect for differences in culture, ethnicity, gender, and other dimensions of diversity
- Commitment of time, effort, and financial support; advising only as many students as resources permit
- Ability to communicate and express concerns without the fear of retribution
- Understanding of the student’s commitments to course work and GRA/GTA/Grader responsibilities

Open and clear communications
- Mutually agreed upon expectations for frequency and format of communication
- Clear communication about project timelines, availability and nature of funding, level of effort and research expectations
- Timely review and feedback on the student’s research and academic progress
- Notification of and appropriate resolution of issues that arise within the program, be they academic, research, financial or interpersonal in nature

Guidance on research and degree completion
- Guidance on planning and managing research projects from conception to publication
- Reasonable, mutually agreed upon expectations of the time frame necessary to produce results and complete the dissertation/thesis
- Proper training and resources to successfully complete research projects
• Guidance on professional and ethical standards

Guidance on career

• Advice on advancing professional goals in the direction most desired by the individual student
• Opportunities to participate in career development activities
• Help building professional networks

Advisors Expect from Advisee:

Respect

• Respect both as professor and person; recognizing the value of their time and their responsibilities within and outside the Institute
• Understanding that mentoring is tailored for each individual student and adjusted for progress in the degree program

Open and clear communications

• Mutually agreed upon expectations for frequency and format of communications
• Regular progress reports including what the student has and has not done, including set-backs
• Reasonable, mutually agreed upon expectations of the timeframe necessary to give feedback and review results
• Discussion of difficulties with advisor first, before turning to other means for conflict resolution
• Notification as soon as possible if planning to leave program or advisor sooner than expected

Commitment & Productivity

• Understanding of the expectations of the degree program, advisor and research team, and GRA/GTA/Grader responsibilities
• Learning and progress through the program, with progressively more independence as the student advances
• Commitment and steady effort to make progress towards mutually agreed upon results and deliverables; adhering to timelines and deadlines

Responsibility

• Safe, ethical, and efficient use of resources
• Abiding by professional and safety standards
• Taking feedback seriously and revising in response
• Maintaining good records and documentation that would allow replication of results
• When graduating or leaving the team, leaving behind the organized research materials

Teamwork

• Working well with others; supporting and mentoring others in the team
• Carrying a fair share of the responsibility
• Understanding the common intellectual property principles involved in teamwork
• Meeting deadlines
• Thoughtfully reviewing the work of others, including the advisor

Requirements for the Doctoral Degree

The Doctoral Degree (p. 75)
Admission to Candidacy (p. 75)
Comprehensive Exams (p. 75)
Thesis Topic (p. 75)
Time Limit for Degree Completion (p. 76)
Dissertation (p. 76)
Doctoral Examination (p. 76)
Minor Field of Study (p. 76)
Other Requirements (p. 76)
Enrollment Requirements (p. 76)
Additional Graduation Requirements (p. 76)
Language Requirements (p. 77)
Responsible Conduct for Research (RCR) (p. 77)

The Doctoral Degree

The degree of Doctor of Philosophy recognizes demonstrated proficiency and high achievement in research. After adequate preparation, the candidate must successfully complete both comprehensive examinations in his or her academic field and a searching and authoritative investigation of a special area in the chosen field, culminating in a written dissertation.

Admission to Candidacy

Doctoral students customarily apply for degree candidacy after completing at least three semesters of coursework beyond the bachelor’s degree.

To qualify for candidacy, students must do the following:
1. Complete the requirements for training in Responsible Conduct for Research (RCR) (http://rcr.gatech.edu).
2. Complete all course requirements (except the minor).
3. Achieve a satisfactory scholastic record.
4. Pass the comprehensive examination.
5. Submit a formal statement naming the dissertation reading committee and delineating the research topic for approval to the school chair and Graduate Students (on behalf of the Vice Provost for Graduate Education and Faculty Affairs).

Upon satisfactory completion of these requirements, the Office of Graduate Studies will formally admit the applicant to candidacy for the degree on behalf of the Vice Provost for Graduate Education and Faculty Development.

Comprehensive Exams

The comprehensive examination assesses both general knowledge of the degree area and specialized knowledge of the student’s chosen research field. Each program is responsible for scheduling comprehensive examinations at least once a year and for providing students information regarding exam formats, rules, and scope. Exam retakes are to occur no later than the end of the student’s second full term (Fall, Spring, or Summer) in residence following the failed attempt.

Thesis Topic

Before a student becomes a candidate, he or she should present a formal statement for the approval of the school chair or college dean and Graduate Studies that outlines the student’s dissertation advisor, the
topic selected for investigation, the objectives, and the steps by which the student proposes to achieve them. (Note that individual programs may have additional requirements for approving the dissertation prospectus or proposal before approval by the chair/dean and Graduate Studies.) The dissertation topic must give promise of being either a genuine addition to the fundamental knowledge of the field or a new and better interpretation of facts already known.

**Time Limit for Degree Completion**
Students must complete all degree requirements within seven years from the end of the term in which they pass the comprehensive examination.

**Dissertation**
The dissertation must demonstrate that the candidate possesses powers of original thought, talent for research, and ability to organize and present findings. Dissertations must be submitted electronically via the Electronic Thesis and Dissertation website.

The format of the dissertation (in general appearance) must meet the criteria published in the Manual for Graduate Theses. For other format or style questions, students should refer to style manuals appropriate to their disciplines.

**Doctoral Examination**
If the dissertation advisory committee finds the dissertation satisfactory, it schedules the candidate for an oral examination on the subject matter of the dissertation and the field in which it lies. An examining committee approved by Graduate Studies on behalf of the Vice Provost for Graduate Education and Faculty Development will conduct the examination. The candidate's academic unit should forward the announcement of the oral examination, including the names of the examining committee members, to Graduate Studies at least 10 working days prior to the exam.

If a candidate should fail to pass the final oral examination, the examining committee may recommend permission for one additional examination. In the case of failure, the Registrar does not receive a report of the examination results.

**Minor Field of Study**
In addition to an adequate knowledge of the major field of intended research, the student must demonstrate mastery of another smaller body of knowledge—the minor field—preferably outside the student's school. The purpose of the minor is to encourage a wider interest on the part of the student and to provide a broader basis for the evaluation of the student's capabilities.

The minor will normally consist of at least nine semester hours of work in related courses, selected by the student in consultation with a guidance committee and approved by the Graduate Studies (on behalf of the Vice Provost for Graduate Education and Faculty Development). These courses should be at the 6000 level or above, but the use of certain 4000 level courses may also be approved. The student must receive a letter grade within the minor comprising an overall GPA of 3.0 (B) or higher. (Courses that are taken as pass/fail are not eligible to count toward the doctoral minor). Courses taken at other institutions may be included in the minor. Once the student has satisfactorily completed the minor, the school chair will send a confirmation, accompanied by course grades, to Graduate Studies for final approval and recording.

Although the student need not complete the minor as a prerequisite to become a candidate, the minor must be completed and approved in order to be cleared for graduation.

**Other Requirements**

**Enrollment Requirements**
The matriculation requirements for doctoral students are similar to those outlined for the master's degree with the addition of the residency requirement: doctoral students should spend at least two full-time semesters in residence at Georgia Tech and should complete research for their dissertation while in residence. Under special circumstances, candidates who have met the residency requirement may receive permission to pursue their research in absentia, provided the chair of the appropriate school approves and a faculty member directs the project. Although doctoral students working full-time on thesis research should normally be registered for a full course load of 9000-level dissertation hours each semester, this requirement is at the discretion of the advisor and the department. No minimum number of 9000-level dissertation hours is required for the doctoral degree. Doctoral students must be registered in the semester of graduation.

While no fixed-course requirements apply for the doctoral degree, the student's thesis advisory committee may recommend graduate coursework in both a major and a minor field of study. Doctoral students must be registered in the semester of graduation.

If a student has completed all degree requirements and will no longer require any of the Institute's facilities or faculty time, the student may request an enrollment waiver (http://www.grad.gatech.edu/theses-dissertations-forms).

**Additional Graduation Requirements**
In addition to the requirements listed elsewhere, the candidate is required to complete the following:

1. Complete an Online Application for Graduation (http://www.registrar.gatech.edu/students/deginfo/oag.php) to petition for the degree to the Registrar's Office (http://www.registrar.gatech.edu/students/deginfo/degcandfaq.php) during the term preceding the anticipated final term of work.
2. Have an overall GPA of at least 3.0.
3. Register for a minimum of one hour of dissertation in the term of graduation. This reduction from the normal minimum course load of three hours may be used only once. If all requirements for graduation, including submission of the final approved dissertation, have been completed prior to the last day of registration and the student was registered for the preceding term, the student may apply for a waiver of the enrollment (http://www.grad.gatech.edu/theses-dissertations-forms) requirement.
5. Complete any language requirements.

If both the dissertation and the examination are satisfactory, and the candidate has completed the requirements of residence, minor field, and any additional school requirements, Graduate Studies will certify the candidate as qualified to receive the degree of Doctor of Philosophy.
Language Requirements
The student’s school may require a reading knowledge of one or more foreign languages.

Responsible Conduct for Research (RCR)
All Georgia Tech doctoral students who have an admit date of fall 2011 or later are required to complete Responsible Conduct of Research (RCR) training, which includes an online training component and in-person training. This requirement also applies to students who have transitioned to a doctoral program after enrolling in a master’s program at Georgia Tech in Fall 2011 or later. Beginning in Fall 2014, all master’s students completing a thesis are also required to do RCR training. See www.rcr.gatech.edu (http://www.rcr.gatech.edu) for more information.

Requirements for the Master’s Degree

Graduate Course Option (p. 77)
Enrollment Requirements (p. 77)
Program of Study (p. 77)
Master’s Thesis (p. 77)
Requirements for the Award of the Master’s Degree (p. 78)

Graduate Course Option
Students completing both a bachelor’s and master’s in the same discipline at Georgia Tech may use up to six credit hours of graduate-level coursework in the major discipline for both degrees. Recognizing that some master’s degree programs do not have a unique undergraduate counterpart program and that some master’s programs are offered by several schools, the term “discipline” in the prior sentence will be broadly interpreted in such cases. To qualify for this option, students must complete the undergraduate degree with a cumulative GPA of 3.5 or higher and complete the master’s degree within a two-year period from the award date of the bachelor’s degree.

Enrollment Requirements
While students may enroll in a master’s degree program upon admission with either full or conditional standing, all conditions must be met and the student’s status changed to “full” in order to graduate with a master’s degree. Students enrolled in a master’s degree program must register for at least one semester per year in order for the original requirements for their degree to remain unchanged. In other cases, the school may reevaluate the student’s credentials and impose additional degree requirements.

Students who have completed all coursework and are planning to submit a thesis in partial fulfillment of the requirements for a master’s degree should register for research hours (MAJR 7000) consistent with a realistic appraisal of the amount of remaining thesis work and required faculty involvement. Students are not eligible to receive thesis guidance during any term for which they are not registered.

Students must normally enroll for a minimum of three hours each semester. Thesis students may enroll for one hour of thesis only in the semester of graduation; this option may be used only once. The Institute has no residency requirements for the master’s degree.

If a student has completed all degree requirements and will no longer require any of the Institute’s facilities or faculty time, the student may request an enrollment waiver (http://grad.gatech.edu/theses-dissertations-forms).

Program of Study
The student, in consultation with the faculty advisor, should prepare a program of study for the master’s degree as a guide for planning an academic schedule. In some cases, the student’s school may require that the proposed program be submitted to the chair of that school for approval.

The program of study must be completed satisfactorily within six consecutive calendar years and must include, at a minimum, 30 approved credit hours distributed as follows:

<table>
<thead>
<tr>
<th>Type of Program</th>
<th>Required Minimum Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>With thesis</td>
<td>30 credit hours</td>
</tr>
<tr>
<td>Without thesis</td>
<td>30 credit hours</td>
</tr>
</tbody>
</table>

With thesis: (must have approval of school chair)
1. Minimum course credit hours in major field (a basic field of knowledge, not a department of specialization): 12
2. Minimum course credit hours at 6000 to 9000 level: 12
3. Minimum course credit hours for degree: 18
4. Minimum Thesis hours (7000): 6
5. Total credit hours: 30

Without thesis: (must have approval of school chair)
1. Minimum course credit hours in major field (a basic field of knowledge, not a department of specialization): 18
2. Minimum course credit hours at 6000 to 9000 level: 21
3. Total credit hours: 30

Some schools require more than the minimum credit hours. Refer to specific academic program descriptions for more detailed information.

Other than thesis hours, the student may use only three hours under the pass/fail designation (p. 160) in the approved program of study.

Students who are pursuing two Master’s degrees at Georgia Tech may double count a maximum of 6 hours of credit for both degrees. This ensures that each degree involves a minimum of 24 hours of coursework completed at Tech that is not double counted. Students should consult with their advisors on sharing coursework among Master’s degrees.

Students may be eligible to utilize the Graduate Course Option or participate in an approved BS/MS program. Students should refer to the Catalog for requirements for the Graduate Course Option and for BS/MS program requirements (http://catalog.gatech.edu/academics/special-academic-programs/bs-ms-programs).

Master’s Thesis
To complete the requirements for the master’s degree, the student must submit a master’s thesis unless the school chair determines that additional coursework is of more importance in meeting approved objectives.

Students who meet the requirements for the master’s degree by completing a combination of coursework and thesis must register for a minimum of six hours of thesis credit.

A candidate whose program includes a thesis must present a treatise in which the results of an investigation directed by a member of the faculty of the Institute are set forth in a clear, articulate form. The purpose of the thesis is to further educational development by requiring the
student to plan, conduct, and report an organized and systematic study of importance.

The Manual for Graduate Theses specifies the formatting requirements for the thesis. Information regarding electronic thesis/dissertation submission can also be found on the Graduate Studies (http://grad.gatech.edu/theses-dissertations) website.

**Requirements for the Award of the Master's Degree**

For a student to receive a master's degree from Georgia Tech, the following requirements should be met:

1. During the semester prior to the anticipated final semester of work, students should petition to graduate. This can be done by completing the Online Application for Graduation (http://www.registrar.gatech.edu/students/deginfo/oag.php).

2. The Approved Program of Study (which is listed on the petition for degree application) should show that course requirements for the master's degree will be satisfied before or during the final semester. The Approved Program of Study (http://catalog.gatech.edu/academics/graduate/masters-degree-info/#program-of-study) should be completed within a period of no more than six consecutive calendar years.

3. Students should have an overall GPA of at least 2.70 and satisfy all school academic requirements. (Some schools may require a higher overall GPA, and some programs may have different GPA requirements for certain segments of the program requirements, such as for core classes. If so, this must be reported to the Institute Graduate Curriculum Committee through the initial proposal or as a curriculum change and will be considered an informational item on the agenda. These requirements will be enforced at graduation.)

4. Students should earn a grade of at least D on coursework for it to be considered completed. (Some individual programs may require a grade of C or higher. These requirements must be reported to the Institute Graduate Curriculum Committee either as part of the initial proposal or as part of a curriculum change and will be considered an informational item on the agenda. These requirements will be enforced at graduation.)

5. Students may take three hours on a pass/fail basis, per Institute policy. (However, individual programs may not allow pass/fail grades at all or may restrict them to only specific portions of the degree such as electives. These restrictions must be reported to the Institute Graduate Curriculum Committee as part of the initial proposal or as part of a curriculum change and will be considered an informational item on the agenda. These requirements will be enforced at graduation.)

6. Students should be registered for a minimum of three credit hours at all times. However, thesis students are permitted to enroll for one hour of MAJR 7000 in the semester of graduation. This reduction may be used only once. Students who have met all requirements for graduation before the last day of registration for the graduation term and who were registered the preceding semester may be eligible for a waiver of enrollment.

7. Coursework at the 1000 or 2000 level may not be used for a master's degree. In most cases, coursework at the 3000 level may not be used for a master's degree. But individual programs may allow a reasonable number of 3000-level courses in special circumstances, such as in a program that requires language proficiency. Individual programs may include 4000-level coursework, but this must be reported to the Institute Graduate Curriculum Committee as either part of the initial proposal or clearly stated when revising a program. These rules will be enforced at graduation.

8. Students should have completed satisfactorily any language requirement imposed by the major school.

9. Thesis students must complete the requirements for training in Responsible Conduct for Research (RCR) (http://rcr.gatech.edu).

10. Students should have passed any qualifying or comprehensive examinations required by their school.

11. Students should have completed any required coursework outlined at the time of matriculation.

12. Students should ensure that all requirements for the degree are completed and certified by the Office of the Registrar no later than 48 hours after final grades for the term are due. If a candidate for a degree is not certified by the appropriate deadline, the degree will not be awarded. It is the responsibility of the student to reactivate the degree petition for the following semester.

13. The diploma of a candidate for a degree shall bear the date of the latest commencement ceremony for the term in which the degree is awarded with the exception of summer graduation diplomas, which will bear the date of the official end of term.

**Additional Requirements for Master's Thesis Students**

1. Students should submit the thesis topic and committee form to Graduate Studies for approval and make satisfactory progress on the thesis.

2. Students should complete the requirements for training in Responsible Conduct for Research (RCR) (http://rcr.gatech.edu).

3. Students should submit the thesis electronically to the Electronic Thesis and Dissertation (http://thesis.gatech.edu) website and receive final acceptance from Graduate Studies.

**Language Requirement**

The student's school may require a reading knowledge of one appropriate language other than English.

**Professional Education**

Georgia Tech Professional Education is an academic division of Georgia Tech providing innovative, comprehensive education and training. Professional Education gives participants a world-class learning experience promoting professional and personal success. It comprises the following:

- Degree Programs
- Short Programs
- English as a Second Language
- Community Outreach
- Learning and Meeting Facilities

This year, Professional Education and its programs reached more than 13,000 individuals and 3,100 companies in various locations.

**Atlanta:** The Georgia Tech Global Learning Center is designed, staffed, and equipped with the technology and service to foster the relationship between people and ideas and learning and working. Many courses and programs are hosted at the Center in addition to its being a corporate and professional meeting venue.

**Georgia Tech-Savannah:** The Savannah campus is currently transitioning from a campus offering four undergraduate and graduate degrees to a destination for professional education, including professional master's
degrees and specialized training programs targeting industry and the military.

**Around the World:** Courses are held in multiple cities throughout the Southeast and around the globe including nearly thirty different course locations from Alabama to Singapore.

**Any Location:** Various courses and programs are offered online, via videoconference, or customized and delivered directly to a company.

Learn more about Georgia Tech Professional Education at [www.gtpe.gatech.edu](http://www.gtpe.gatech.edu).

**Community Outreach**

As a flagship institution within the University System of Georgia, the Georgia Institute of Technology is acclaimed, not only in its home state and nation, but, increasingly, around the globe. An important aspect of Georgia Tech's culture of service includes the work of the Center for Education Integrating Science, Mathematics, and Computing (CEISMC).

From educational partnerships and research to fun programs for students, CEISMC advocates and participates in efforts for systemic changes that lead to improved appreciation and performance in STEM for all students at the level of K-12, especially those under represented in science, technology, engineering and mathematics. With a presence at Georgia Tech-Savannah, CEISMC brings its expertise to the people and schools of southeast Georgia.

More information about CEISMC's programs:

- K-12 ([https://pe.gatech.edu/savannah-campusoutreach](https://pe.gatech.edu/savannah-campusoutreach))
- NASA ePDN ([https://pe.gatech.edu](https://pe.gatech.edu))
- Distance Calculus ([https://pe.gatech.edu/subjects/k-12-programs/high-school-math](https://pe.gatech.edu/subjects/k-12-programs/high-school-math))
- Georgia's Race to the Top ([https://ceismc.gatech.edu/rt3](https://ceismc.gatech.edu/rt3))

**English as a Second Language**

The Georgia Tech Language Institute has delivered high-quality, practical English language training for more than fifty years. It serves a spectrum of learners: students preparing for academic work in the United States; professionals looking for career improvement through better language skills; and people who want to increase their English proficiency for social reasons.

Through full- and part-time programs, in daytime and evening classes, our excellent instructors and support staff aim to make learning a productive and enjoyable experience. Students also have access to numerous extracurricular activities, including a conversation partner program, day trips, and volunteer work.

Course options include:

- Intensive English Program (IEP)
- Summer Short Courses
- Summer Graduate Prep Workshops
- Summer Pre-MBA Program

Learn more at [www.esl.gatech.edu](http://www.esl.gatech.edu).

**Professional Education Degree Programs**

Rise to the next level of competitive expertise with graduate programs available through distance learning. A valuable service of Georgia Tech Professional Education for more than thirty-four years, these programs are open to the public and also to corporate sponsors.

In annual rankings from *U.S. News & World Report*, Georgia Tech graduate programs consistently rank in the top ten. The proven excellence of Georgia Tech graduate degrees and the convenience of online delivery make them a compelling choice for working professionals.

The following Master of Science degrees are available online:

- **Engineering** - Aerospace Engineering, Electrical and Computer Engineering, Industrial Engineering, Mechanical Engineering, Medical Physics (with Emory University), and Operations Research
- **Computing** – Computer Science, Computational Science and Engineering, and Information Security

Click here ([http://www.dlpe.gatech.edu/dl/degrees](http://www.dlpe.gatech.edu/dl/degrees)) for more information about an online Master of Science degree.

- **Professional Master’s in Applied Systems Engineering**

Click here ([http://www.pmase.gatech.edu](http://www.pmase.gatech.edu)) for more information about the Professional Master’s in Applied Systems Engineering (PMASE). This hybrid-format degree offers the convenience that a practicing engineer will appreciate and the skills and knowledge that an employer values.

**Professional Education Short Programs**

Georgia Tech Professional Education provides education and training for working professionals and industry partners. These short courses and programs vary in length from one to eight days and help professionals keep pace with the latest development in their fields – defense technology, economic development, engineering, executive education, information technology, OSHA, power systems, and supply chain and logistics.

Taught by Georgia Tech faculty and industry-experienced instructors, our short programs are available in flexible formats whether that is in the classroom, online, or a combination of both.

Professional Education offers thirty-eight programs through which participants can earn a professional certificate by taking several short courses within a sequence. In addition, participants may earn Continuing Education Units (CEUs).

Learn more at [www.pe.gatech.edu](http://www.pe.gatech.edu).

**Research Support Facilities**

- **Advanced Technology Development Center (ATDC)** (p. 80)
- **Georgia Tech Research Corporation** (p. 80)
- **Georgia Tech Research Institute** (p. 80)
- **Joint CNRS Research Laboratory** (p. 80)
- **Logistics Innovation Centers** (p. 81)
- **Oak Ridge Associated Universities** (p. 81)
Advanced Technology Development Center (ATDC)

The Advanced Technology Development Center (ATDC) is the oldest and most experienced university-affiliated technology incubator in the country. It was formed in 1980 by the Governor and General Assembly to increase the technology business base in Georgia. ATDC fulfills this mission by assisting in the formation and growth of advanced technology start-up companies, supporting technology commercialization, and attracting technology companies to the state. In 2004, ATDC received the "Excellence in Technology-led Economic Development" award from the United States Department of Commerce.

ATDC is headquartered in Technology Square and also operates the ATDC Biosciences Center in the Ford Environmental Science and Technology Building. ATDC also has facilities in Columbus, Georgia; Savannah, Georgia; and Warner Robins, Georgia. At these locations, early-stage companies benefit from a strong entrepreneurial working environment, access to professional business consulting, contact with university research faculty, and modern office and laboratory facilities. The ATDC also provides companies with access to facilities, personnel, and students in the University System of Georgia.

- The Advanced Technology Development Center (ATDC) (http://atdc.org)

Georgia Tech Research Corporation

Founded in 1937, the Georgia Tech Research Corporation (GTRC) is a state-chartered, not-for-profit corporation serving Georgia Tech as a University System of Georgia-approved cooperative organization. By charter, GTRC "...shall be operated exclusively for scientific, literary, and educational purposes...conduct laboratories, engage in scientific research, and distribute and disseminate information resulting from research..." GTRC is an IRS section 501(c)(3) not-for-profit organization and serves as the contracting agency for all of the sponsored research activities at Georgia Tech. It also licenses all intellectual property (patents, software, trade secrets, etc.) created at Georgia Tech. Additionally, GTRC assists Georgia Tech in obtaining quality research space, enters into long-term leases for specialized research equipment, and conducts other research support programs as requested by the Institute. All funds collected by GTRC are used to support various Georgia Tech research programs requested by the Institute and as approved by the twelve-member board of trustees. GTRC is located on campus at 505 Tenth Street.

- GTRC Website (http://www.gtrc.gatech.edu)
- Office of Sponsored Programs (http://www.osp.gatech.edu)

Georgia Tech Research Institute

The Georgia Tech Research Institute (GTRI) is one of the world’s leading applied research and development organizations. GTRI’s world-class engineers and scientists solve some of the toughest problems facing government and industry across the nation and around the globe. For more than seventy-seven years GTRI has been uniquely positioned within the Georgia Institute of Technology, one of America’s top research universities.

GTRI is over 1,600 people strong, including some of the world’s top scientists and engineers who conduct more than $248 million in sponsored research each year. Many of GTRI’s experts are recognized worldwide as leaders in a vast array of research domains. GTRI’s core research areas include complex and agile systems engineering, sensor design and integration, information management and cybersecurity, and defense technology development.

Chartered by the Georgia legislature in 1919 and activated in 1934, the GTRI mission is to serve the university, the state, the nation, and the world by maturing selected technologies and developing innovative engineering solutions to important and challenging problems of society.

GTRI’s employees work in eight research laboratories and support units, that are housed on campus, at the Cobb County Research Facility, and in Huntsville, Alabama. GTRI also has field offices located at:

- Huntsville, Alabama;
- Tucson, Arizona;
- San Diego, California;
- Panama City, Florida;
- Orlando, Florida;
- Warner Robins, Georgia;
- Pearl City, Hawaii;
- Aberdeen, Maryland;
- Dayton, Ohio;
- San Antonio, Texas;
- Hampton Roads, Virginia;
- Washington, D.C.; and
- Quantico, Virginia.

One of GTRI’s goals is to support economic and technological development in Georgia. GTRI promotes economic growth in the state and the southeast through mutual programs with the Georgia Tech Enterprise Innovation Institute. GTRI operates strong technology transfer programs and GTRI researchers teach more than half of all courses offered through Georgia Tech’s Distance Learning and Professional Education program. The newest offering is a Professional Master’s Degree in Applied Systems Engineering, which was developed jointly by GTRI and the Georgia Tech College of Engineering. GTRI is also home to the state’s Agricultural Research Technology Program, which conducts research and technology transfer for the poultry industry, one of Georgia’s leading industries and employers.

For additional information, contact the Office of the Vice President and Director GTRI 250 14th Street Atlanta, Georgia 30332-0801 or call 404.407.7400, or visit www.gtri.gatech.edu (http://www.gtri.gatech.edu).

Joint CNRS Research Laboratory

As the result of a strategic alliance between the Georgia Institute of Technology and the French Centre National de la Recherche Scientifique (CNRS), a joint research laboratory, GT-CNRS UMI 2958 was established
Logistics Innovation Centers

Due to an increasing need for the comprehensive examination of trade-chains and in light of the success of the Supply Chain and Logistics Institute (https://www.scl.gatech.edu) in partnering with the National University of Singapore and various agencies of the government of Singapore, a global network of Trade-chain Innovation & Production (TIP) Centers has developed. This network of centers enables a comprehensive program focused on (1) developing insights, strategies, and methodologies to improve the productivity of existing trade-chains, (2) promoting innovation for identifying and enabling new trade-chain opportunities, and (3) providing education related to trade-chain infrastructure, innovation, and productivity.

• Georgia Tech Panama Logistics Innovation and Research Center (http://www.panama.gatech.edu/en)
• Georgia Tech Costa Rica Center for Productivity (http://www.tip.gatech.edu/en)
• Trade and Logistics Innovation Center of Mexico (http://www.citltec.com.mx/en)
• The Logistics Institute - Asia Pacific (http://www.tliap.nus.edu.sg)

Oak Ridge Associated Universities

Since 1946, students and faculty of the Georgia Institute of Technology have benefited from its membership in Oak Ridge Associated Universities (ORAU). ORAU is a consortium of ninety-one colleges and universities and a contractor for the United States Department of Energy (DOE) located in Oak Ridge, Tennessee. ORAU works with its member institutions to help their students and faculty gain access to federal research facilities throughout the country; to keep its members informed about opportunities for fellowship, scholarship, and research appointments; and to organize research alliances among its members.

Through the Oak Ridge Institute for Science and Education (ORISE), the DOE facility that ORAU operates, undergraduates, graduates, postgraduates, and faculty enjoy access to a multitude of opportunities for study and research. Students can participate in programs covering a wide variety of disciplines, including business, earth sciences, epidemiology, engineering, physics, geological sciences, pharmacology, ocean sciences, biomedical sciences, nuclear chemistry, and mathematics. Appointment and program length range from one month to four years. Many of these programs are especially designed to increase the numbers of underrepresented minority students pursuing degrees in science- and engineering-related disciplines. A comprehensive listing of these programs and other opportunities, their disciplines, and details on locations and benefits can be found in the ORISE Catalog of Education and Training Programs, which is available at www.orau.gov/orise/educ.htm, or by calling either of the contacts below.

ORAU's Office of Partnership Development seeks opportunities for partnerships and alliances among ORAU's members, private industry, and major federal facilities. Activities include faculty development programs, such as the Ralph E. Powe Junior Faculty Enhancement Awards, the Visiting Industrial Scholars Program, consortium research funding initiatives, faculty research and support programs, as well as services to chief research officers. For more information about ORAU and its programs, contact:

Charles L. Liotta
Vice Provost for Research and Dean of Graduate Studies
ORAU Councilor for Georgia Institute of Technology
Monnie E. Champion
ORAU Corporate Secretary
865.576.3306
• Oak Ridge Associated Universities (http://www.orau.org)

Skidaway Institute of Oceanography

Located on Skidaway Island near Savannah, Georgia, the Skidaway Institute of Oceanography (SkIO) provides a complex of coastal- and ocean-related educational and research opportunities. School of Biology faculty have laboratory facilities at the institute. Many SkIO faculty hold adjunct appointments with Georgia Tech schools, including Civil and Environmental Engineering, Earth and Atmospheric Sciences, and Biology, and actively participate in graduate research and education. SkIO maintains small boats for local studies and the 92-foot R/V Savannah for conducting ocean research. Other unique coastal research facilities include the Bioremediation and Environmental Research Mesocosms (BERM) facility, the Saltmarsh Ecosystem Research Facility (SERF), a large recirculating flume, and the SkIO library, which is the largest in the state devoted almost exclusively to marine sciences. Areas of faculty expertise at SkIO include chemical, physical, and biological oceanography, marine ecology, and marine geology. Visitor and graduate student housing is available on site, providing convenient access to these facilities.

• Skidaway Institute of Oceanography (SkIO) (http://www.skio.uga.edu)
• School of Biology (http://www.biology.gatech.edu)

VentureLab

The Georgia Tech VentureLab program helps faculty members and students to commercialize technology developed as part of the Institute's research programs. VentureLab evaluates the commercial potential of innovations and matches faculty with experienced entrepreneurs who can help form new ventures.

More details are available on the VentureLab web site (http://venturelab.gatech.edu).

• Blog (http://venturelab.gatech.edu/our-blog)
• Programs (http://venturelab.gatech.edu/educate)
• Portfolio (http://venturelab.gatech.edu/our-portfolio)
• People (http://venturelab.gatech.edu/our-people)
Special Academic Programs

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Academic Common Market

Undergraduate Programs

At the undergraduate level, Georgia Tech has withdrawn its programs from the Academic Common Market (ACM). This policy went into effect in the Summer 2011 semester.

Graduate Programs

At the graduate level only, Georgia Tech participates in the Academic Common Market (ACM), which is a program managed by the Southern Regional Education Board. ACM is an interstate agreement for sharing educational programs and facilities. It allows students to participate in selected programs not offered in their home states without having to pay out-of-state tuition charges.

The main purpose of the Academic Common Market is to assist states in offering together what they cannot offer alone. Residents of the participating states who qualify for admission and gain the approval of their state coordinators may enroll on an in-state tuition basis. Programs are added to and removed from the Market on an annual basis in order to reflect the changing needs of participating states. The State of Georgia currently makes program changes once annually during the spring.

These states currently participate: Alabama, Arkansas, Delaware, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia.

- Southern Regional Education Board (http://www.sreb.org/page/1304/academic_common_market.html)

BS/MS Degree Programs

Many schools at Georgia Tech offer BS/MS degree programs that, like the Graduate Course Option, allow eligible students to use up to 6 credit hours of graduate-level coursework in the major discipline for both degrees. The BS/MS programs typically include research and mentoring components and have their own GPA requirements.

- Aerospace Engineering (http://catalog.gatech.edu/programs/aerospace-engineering-bs/#designatorsandoptionstext)
- Biology (p. )
- Biology and Bioinformatics (BSBIO/MSBINF) (p. )
- Computer Science (p. )
- Chemical & Biomolecular Engineering (http://catalog.gatech.edu/programs/chemical-biomolecular-bs/#designatorsandoptionstext)
- Civil Engineering (http://catalog.gatech.edu/programs/civil-engineering-bs/#designatorsandoptionstext)
- Computational Media & Digital Media (BSCM/MSDM) (http://catalog.gatech.edu/programs/computational-media-bs/#designatorsandoptionstext)
- Earth and Atmospheric Sciences (http://catalog.gatech.edu/programs/earth-atmospheric-science-bs/#designatorsandoptionstext)
- Electrical Engineering (http://catalog.gatech.edu/programs/electrical-engineering-bs/#designatorsandoptionstext)
- Computer Engineering (http://catalog.gatech.edu/programs/computer-engineering-bs/#designatorsandoptionstext)
- Environmental Engineering (http://catalog.gatech.edu/programs/environmental-engineering-bs/#designatorsandoptionstext)
- Industrial Engineering and Supply Chain Engineering (BSIE and MSSCE) (http://catalog.gatech.edu/programs/industrial-engineering-bs/#designatorsandoptionstext)
- International Affairs (http://catalog.gatech.edu/programs/international-affairs-bs/#designatorsandoptionstext)
- International Affairs and Modern Languages (BSIAML/MSINTA) (p. )
- Literature, Media, and Communication/Digital Media (BSLMC/MSDM) (http://catalog.gatech.edu/programs/literature-media-communication-bs/#designatorsandoptionstext)
- Materials Science Engineering (http://catalog.gatech.edu/programs/materials-science-engineering-bs-ms)
- Mechanical Engineering (http://catalog.gatech.edu/programs/mechanical-engineering-ms/#designatorsandoptionstext)
- Nuclear and Radiological Engineering (http://catalog.gatech.edu/programs/nuclear-radiological-bs/#designatorsandoptionstext)
- Public Policy (http://catalog.gatech.edu/programs/public-policy-bs/#designatorsandoptionstext)

Center for Teaching and Learning (CTL)

The Center for Teaching and Learning (CTL) was founded in 1986 with a mission to lead Georgia Tech to a teaching and learning standard of excellence.

CTL’s undergraduate course offerings include:

- Undergraduate Teaching Assistant Preparation,
- Fundamentals of Peer Tutoring, and
- Residence Life Seminar.

CTL offers a graduate-level course in Graduate Teaching Assistant preparation and courses to prepare graduate students for faculty positions.

- Graduate Teaching Assistant Preparation,
- Fundamentals of Teaching and Learning in Higher Education,
Experiential Education

- Center for Career Discovery and Development (p. 83)
- Graduate Cooperative Plan (p. 83)
- Paid and Unpaid Internships (p. 84)

Center for Career Discovery and Development

Georgia Tech believes that obtaining relevant, academically related experience outside of the classroom is an integral part of the educational process. The Center for Career Discovery and Development ("C2D2") offers opportunities to obtain such experience through cooperative education and internships.

The Undergraduate Cooperative Plan (Co-op) has been offered at Georgia Tech since 1912. It offers students the opportunity to integrate practical experience with theory learned in the classroom. More than 600 students participate each semester, working full time on alternate semesters, for a total of three semesters, for employers throughout the United States and the world. Accredited by the Accreditation Council for Cooperative Education, it is the largest optional co-op program in the country and one of the highest ranked programs among public universities.

The Undergraduate Co-op Plan is available for students in all majors with the exception of architecture and building construction. Co-op students remain on the school rolls while on work periods by registering for the appropriate co-op courses. The Graduate Co-op Program is described in greater detail in another section in this catalog.

The work experience received is a valuable asset to graduates starting out in their chosen professions. Neither college laboratory experience nor employment during vacations can take the place of organized co-op training. The plan provides, to a substantial degree, the experience most companies require of their employees before promoting them to positions of higher responsibility. Work experience may also assist students who are undecided about their future plans in determining early in their college careers whether they wish to continue in a particular field.

Moreover, daily contact with diverse groups among their fellow employees offers students practical insight into sociology, psychology, economics, and ethics that no textbook can supply. Finally, students receive compensation for their services from the employer. Typically, co-op students can save enough from their earnings to pay for a substantial part of their school expenses.

Internships provide practical experience for students who choose not to follow the Undergraduate Co-op Plan. Internships, the majority of which are paid positions, are an extremely viable way to obtain out-of-classroom experience. Similar to cooperative education, the jobs and the students' performance are monitored by the Center for Career Discovery and Development to ensure maximum benefit by all parties.

Students in all majors may participate in the internship program and may work any term during the academic year. There are also part-time internships available for those who wish to work while attending classes.

The Center for Career Discovery and Development also works with students to customize their experiential education path, with the option to combine co-op and internship experiences.

For more information on any programs offered through the Center for Career Discovery and Development, visit our website at careerdiscovery.gatech.edu (http://www.careerdiscovery.gatech.edu) or call C2D2 at 404-894-3320.

Graduate Cooperative Plan

The Graduate Cooperative Education Program provides master's and doctoral degree students majoring in any discipline at Georgia Tech the opportunity to supplement their graduate studies with specialized work experience. Graduate co-op students gain experience with top employers, earn competitive salaries to help defray educational expenses, and expand post-graduation career options while on semester-long work assignments.

The Graduate Co-op Program is available to enrolled Georgia Tech students and is based upon academic achievement. Internships related to a student's field of study can receive academic approval as a graduate cooperative work assignment allowing students to work summer, fall, or spring semesters, full-time or part-time.

There are no fees associated with the Graduate Co-op Program and students are provided full-time enrollment status through their registration in a Graduate Co-op course. This permits students to retain all privileges of full-time enrolled students while on work assignments.

To participate in the Graduate Co-op Program, a student must

- have a 3.0 or better GPA,
- complete an online orientation session, and
- obtain a program participation letter from her or his major school.

Students normally identify their own job opportunities, but the Graduate Co-op Office provides access to a job posting database and can assist with career guidance, job searches, resumes, and cover letters. Graduate students accepting a graduate co-op/internship opportunity should see a Graduate Co-op Program advisor regarding offer letters, required academic approvals, registration permits, and any necessary work authorizations. Enrollment in a 6000-level co-op course, a noncredit/no-cost audit course with no student or Institute fees attached, is also required.

International students are eligible to participate, but F-1 visa holders must be enrolled for a minimum of two full-time semesters, excluding Summer sessions, before being able to work off campus. All international students on F-1, J-1, and other appropriate visas must work with the
Office of International Education (http://www.oie.gatech.edu) to secure work authorization documentation.

For more information on the Georgia Tech Graduate Co-op and Internship Program, visit: www.gradcoop.gatech.edu (http://www.gradcoop.gatech.edu).

**Paid and Unpaid Internships**

In addition to the internship and cooperative programs administered through the Division of Professional Practice, students may participate in internships through the academic units. These internships are either paid or unpaid.

Students who receive pay for the internship may not also receive academic credit for it. Students who receive academic credit for an internship may not also receive pay for it. There may be rare exceptions to this policy, such as the legislative internship that is part of the program in Public Policy. Exceptions have to be approved by the curriculum committee.

When students request enrollment in a departmental internship, they must (for credit or pay) complete a departmental approval form. Departmental internship sections are set up by permit only, and the student is permitted for the appropriate section to register for it.

Academic units are strongly encouraged to use the following standard numbering system for internships that they offer for pay or credit. Schools that wish to add an internship course will need to submit a new course proposal form to the curriculum committee and request course numbers under their subject codes.

**Course Numbering**

**Freshmen and Sophomores**

XXXX 2694: Undergraduate Internship for Pay (Audit only)

XXXX 2695: Undergraduate Internship for Credit

**Juniors and Seniors**

XXXX 4694: Undergraduate Internship for Pay (Audit only)

XXXX 4695: Undergraduate Internship for Credit

**Contact Us**

**Georgia Tech-Lorraine**

Georgia Tech-Lorraine (GTL) was established as the Institute's first international campus in 1990 in Metz, France, a city recently named by the New York Times (http://www.nytimes.com/interactive/2009/01/11/travel/20090111_DESTINATIONS.html) as one of the top 44 places to see in the world. Centrally located in eastern France along the Luxembourg and German borders, GTL is less than 90 minutes by train from Paris. A highly innovative institution offering year-round undergraduate, Masters and PhD programs, GTL is also home to a strong sponsored research program that fosters the flow of new ideas, creates new opportunities, and develops highly valuable qualities in our students, such as global leadership and innovative thinking.

GTL affords students the opportunity to pursue their Georgia Tech degree while being immersed in the rich culture of Europe. At GTL, students from around the world get the opportunity to study in the heart of Europe and take courses taught in English by Georgia Tech faculty. As a faculty-led program, Georgia Tech-Lorraine offers a balance of engineering, computer science, humanities, French language, management, and social science courses from the Georgia Tech course catalog. Courses are specifically designed to fulfill the student's major and International Plan requirements and students may also take advantage of undergraduate research and international internship opportunities. GTL also provides tremendous value. Out-of-state students save, on average, several thousand dollars in tuition when studying at GTL versus studying on the Atlanta campus and in-state students may take advantage of the HOPE scholarship to study at GTL.

Georgia Tech-Lorraine offers an extensive graduate program encompassing a broad range of study in the areas of mechanical engineering, electrical and computer engineering, as well as computer science. Programs leading to the Master's or PhD degree from the Georgia Tech are available. GTL is home to the Unité Mixte Internationale GT-CNRS UMI 2958, a joint research laboratory with the Centre National de la Recherche Scientifique, the largest scientific research organization in Europe. The UMI has state-of-the-art research facilities and a well-funded research program. Cooperative agreements with local partner institutions enable GTL graduate students to pursue double degrees in engineering and sciences in addition to degrees from Georgia Tech. Upon successful completion of these highly innovative and integrated programs, students are awarded a Master's degree from the Georgia Tech and a Master's degree from a partner institution.

For more information, visit the Georgia Tech-Lorraine website (http://lorraine.gatech.edu) or call 404.385.1865.

**Dual Enrollment Program for High School Students**

Georgia Tech partners with high school and home study programs to enroll students in advanced courses. Our program intends to enrich the high school experience, not replace it. Students who take classes at Georgia Tech usually continue taking classes and participating in activities and organizations in their high school communities.

Admission for Dual Enrollment is available for fall semester only. If you are admitted for fall semester, you may enroll in spring semester courses pending satisfactory academic performance in the fall. Summer courses are not available.

The admission process is selective and a prospective student should have a profile like students in the top quarter of our freshman class to be competitive. Visit the Office of Undergraduate Admission website (http://admission.gatech.edu/dual-enrollment) for more details.

**Learning Support Policies**

The Office of the Vice Provost for Undergraduate Education (OUE) administers the Learning Support (LS) Program. College preparatory courses (for non-academic credit) are offered in mathematics and English for students who need further preparation to be successful in English, mathematics, and related courses.

Georgia Tech uses benchmark scores earned via the SAT (Critical Reading and Math) or ACT (English and Math) to determine placement in Learning Support. Students who score below a 24 on the SAT Reading Test (or 17 on the ACT English) will be required to complete the LS program for English. Students who score below a 26.5 on the SAT Math Test (or 21 on the ACT Math) will be required to complete the LS program
for Math. Students may be required to complete the LS program for both English and Math. Georgia Tech will consider the higher of the SAT and ACT scores when determining LS placement.

Students who are required by the Institute to take courses in the Learning Support Program will be notified in writing. They must then register for a co-requisite class to a college level course. Students placing into learning support for English will be required to take ENGL 0999 in conjunction with ENGL 1101. Students

Students placing into learning support for English will be required to take ENGL 0999, a three-hour (non-academic credit), course designed to reinforce critical reading and communications concepts concurrently with ENGL 1101, a three-hour course.

Students placing into learning support for math will be required to take MATH 0999, a two-hour (non-academic credit), course designed to reinforce basic mathematical concepts, concurrently with MATH 1111, College Algebra, a four-hour course.

MATH 0999 and ENGL 0999 are not college level classes and cannot be applied to degree requirements, including free electives.

Students will have completed their learning support requirement when they have passed the college level course ENGL 1101 or MATH 1111 with a grade of D or better. Students who do not pass ENGL 1101 or MATH 1111 will be required to take the co-requisite class ENGL 0999 or MATH 0999 as well. Students will continue to take the combination of courses until they have passed the college level course, ENGL 1101 or MATH 1111. There is no limit to the number of times these classes and the corresponding co-requisite may be attempted.

The learning support requirements program should be completed as soon as possible after matriculation to Georgia Tech. Students should work with advisors to determine the best timing for these requirements.

Contact Us.

Living Learning Communities

Living Learning Communities are an academic strategy that link academics to on-campus living. Each Georgia Tech community is an integrated experience that promotes interactions between faculty and students, fosters collaboration among students, improves student GPA, enhances campus and civic engagement, increases retention, and eases both the academic and social transition to college.

As an entering first-year student, students admitted to Georgia Tech are invited to apply to:

- Global Leadership Living Learning Community
- Grand Challenges Living Learning Community
- Honors Program Living Learning Community
- Science and Math Research Training (SMaRT) Living Learning Community
- Science, Health, and Related Professions (SHaRP) Living Learning Community
- iGniTe Summer Programs Living Learning Community (Summer)

While each of these communities offers a different focus, they all have required academic coursework, a first year living requirement, and the option to continue living with members of the community in nearby apartments as upper-level students.

Rising second-year students are invited to apply to:

- Women, Science, and Technology (WST) Living Learning Community
- International House (I-House) Living Learning Community

WST and I-House require students to participate in community activities and events and offer optional coursework.

http://enrichment.gatech.edu/llc

Preprofessional Programs

Georgia Tech offers Pre-professional programs and advising in the following areas:

- Pre-Health (http://www.prehealth.gatech.edu) (includes all health professions, including pre-med, pre-dentistry, pre-pharmacy, and more)
- Pre-law (http://www.prelaw.gatech.edu)
- Pre-teaching (http://www.preteaching.gatech.edu) (K-12)

Students can look these advisors up on the Advising Web page (http://www.advising.gatech.edu).

Professional schools typically admit students with strong academic credentials, a well-balanced education, good communication skills, and a broad range of experiences. With the appropriate selection of elective courses, most majors at Georgia Tech provide suitable preparation for professional schools in any area.

The best choice of a major is usually the one in which the student has the greatest inherent interest. No specific major offers an obvious competitive advantage in assuring admission to professional schools.

Georgia Tech has elected not to have majors designated as pre-medicine, pre-dentistry, or pre-law. This approach to pre-professional education has two major advantages. First, students who elect not to enter professional school upon graduation are prepared for alternative careers immediately. Second, students who do continue on to professional school have backgrounds that often provide them with unique opportunities within their selected professions. Examples include medical research, development of medical devices and apparatus, patent law, or the legal aspects of design and construction.

President’s Scholarship Program

The Stamps President’s Scholars Program is Georgia Tech’s premier merit-based scholarship. Recipients are selected from the top applicants for admission to Georgia Tech based on demonstrated excellence in scholarship, leadership, progress, and service as described on the Stamps President's Scholars Program (http://stampps.gatech.edu) web page. From the applicant pool, students selected as semi-finalists submit a one-page resume before being interviewed. The top semi-finalists are named finalists and invited, with their parents, to campus for additional interviews and an information weekend in March.

Transfer students are not eligible for the four-year award. Recipients must be US Citizens, US Permanent Residents, or UK Citizens.

Each year, 40 incoming freshmen receive the Stamps President’s Scholarship, which is renewable for up to four academic years or eight semesters, contingent upon honors-level performance and continued leadership development as evidenced by involvement in program, campus, and community activities. Scholarships are "full ride," including
tuition and mandatory fees, room and board, books, and personal expenses. See the website below for more information on stipends.

To ensure consideration, a student must apply as an incoming freshman, and submit the Georgia Tech Application for Freshman Admission, along with the application fee by the early action deadline of October 15th.

More information:

- Stamps President’s Scholars Program (http://stampsp.s.gatech.edu)

**ROTC**

Georgia Tech offers three voluntary ROTC programs: Army, Navy, and Air Force.

Depending on the student’s major, Basic and Advanced ROTC classes count as a portion of elective credit. (Students may apply a maximum of 4 credit hours in Basic ROTC courses and six credit hours in Advanced ROTC courses toward meeting the elective requirements for any degree at the discretion of the school.) Consult specific colleges to determine the amount of hours that will count toward a degree. After earning a baccalaureate degree and completing the Advanced ROTC courses for any of the three services, a student may receive a commission as an officer in either the reserve or active forces.

Students accepted into the program earn more than just money for a college degree. Cadets and midshipmen receive training and experience in the one quality which is always in great demand: Leadership.

Students may apply a maximum of 4 credit hours in basic (1000-2000 level courses) ROTC courses and six hours in advanced (3000-4000 level) ROTC courses toward meeting the free elective requirements for any degree. Students should begin taking basic ROTC courses during the first term they are enrolled. For further information, see individual curricula for the schools. Please note some departments may have stricter guidelines regarding ROTC courses.

Airforce ROTC Information (http://www.catalog.gatech.edu/colleges/cola/air-force-aerospace-studies)

Army ROTC Information (http://www.catalog.gatech.edu/colleges/cola/military-science-army-rotc)

Navy ROTC Information (http://www.catalog.gatech.edu/colleges/cola/naval-science)

ROTC Credit (http://catalog.gatech.edu/academics/undergraduate/credit-tests-scores/rotc-credit)

Air Force ROTC Website (http://www.afrotc.gatech.edu)

Army ROTC Website (http://www.armyrotc.gatech.edu)

Navy ROTC Website (http://nrotc.gatech.edu)

**Summer Language Programs**

**Languages for Business and Technology (LBAT)**

The School of Modern Languages offers special summer immersion programs in the countries/regions related to our areas of language study: Chinese, French, German, Japanese, Korean, Russian, and Spanish. These intensive programs in Languages for Business and Technology (LBAT) consist of study abroad in which classroom lessons in business, culture, and technology are combined with fieldwork, cultural events, excursions, and visits to area businesses, government agencies, and social concerns, all conducted in the target language. The professional visits provide students with firsthand experience of business life, the protocols and strategies of business and technology interactions, and a heightened awareness of the current economic and social issues facing the host country. The LBAT experience offers a unique opportunity for rapid growth in proficiency, for building a deeper appreciation for the cultures and lifestyle patterns of other peoples, and for making lifelong social and professional contacts.

Depending on the particular program, students will spend 6-8 weeks abroad and earn 9-15 semester hours at the 3000 level (with some programs including offerings at the 1000 or 2000 level); these credits often can count toward a certificate, a minor, or the joint majors offered by the School of Modern Languages. Program costs vary according to the country visited and the length of the program. The HOPE scholarship applies. See the School of Modern Languages "LBAT Programs (http://www.modlangs.gatech.edu/study-abroad)" web page for more information.

**The International Plan**

In today’s economy, employers are expecting to hire college graduates with international experience, global perspectives, intercultural communication skills, and the ability to work in diverse teams. In response to this need, Georgia Tech developed the International Plan, a globally-focused degree designation.

The International Plan is a challenging undergraduate academic program aimed at developing a student’s global competence within the context of his or her major. It is an optional degree-long program that integrates overseas experiences, language proficiency, and globally-focused coursework into any participating major at Georgia Tech. It builds on existing undergraduate degree requirements and international opportunities and is intended to be completed within the normal time frame of a four-year undergraduate degree. Completion of the International Plan is recognized by a designation on the student’s diploma indicating a commitment to developing global competence as part of the degree, e.g., “B.S. in Electrical Engineering: International Plan.”

A defining feature of the International Plan is coherence, which refers to the relationship between the destination(s) chosen to complete the international experiences, the language chosen to satisfy the language requirement, and the appropriateness to the student’s discipline. While some students’ plans are inherently coherent though language and culture, other students may choose to structure their plan with an intellectually coherent approach. The program is designed to give students a deep understanding of another culture so that they develop strong intercultural skills that will help them function effectively in a global environment. Students are encouraged to think strategically about their academic and international experience choices with the guidance of their advisors.

In order to earn the International Plan designation in a participating major, students will complete the following components:

1. Globally-focused coursework: complete three courses, to include one from each of the following categories:
   a. International relations
   b. A course about the country or region of the overseas experience
c. Global economics

2. International Experience: Two terms abroad (at least twenty-six weeks) engaged in any combination of study abroad, research, and/or internship. International Experiences for the International Plan must be approved by the International Plan staff as well as the major IP faculty representative.

3. Second language proficiency: At a minimum, students in the program are expected to demonstrate proficiency equivalent to two years of college-level language study. An optional Language Proficiency Distinction is available to students who demonstrate more advanced oral proficiency skills.

4. Culminating Course: A capstone course in the major designed to tie the international studies and experiences together with the student's discipline.

5. Maintain a cumulative GPA of at least 2.7

For additional information about the International Plan visit https://oie.gatech.edu/content/international-plan.

International Relations - International Plan Electives

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Culminating Course - International Plan Capstone

The IP Capstone is commonly integrated into the major’s senior design/ seminar course. Be sure to enroll in the appropriate course and section for your major as listed below. See your major’s IP faculty representative for additional information and instructions.

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Transfer Programs

Dual Degree Program

Under the Dual Degree Program, students attend the participating Dual Degree school for three years and then come to Georgia Tech for approximately two years. Students participating in the Dual Degree Program may seek a degree from any undergraduate degree-granting program in the College of Engineering. Upon completion of the program, the student receives a bachelor’s degree from the first school and a bachelor’s degree in one of the engineering disciplines at Georgia Tech.

Participating in the Dual Degree Program are many of the schools in the University System of Georgia, including Morehouse College, Spelman College, Clark Atlanta University, and other historically black colleges and universities (HBCU) and predominantly women’s colleges in the southeast. For additional information on either of these programs, contact the College of Engineering at Georgia Tech or the Regents’ Engineering Transfer Program (RETP) or Dual Degree coordinator at a participating RETP or Dual Degree institution.

Regents’ Engineering Transfer Program

The Regents’ Engineering Transfer Program (RETP) is a cooperative program between Georgia Tech and colleges in the University System of Georgia.

For the first two years, students in this program attend one of the participating institutions, where they take all of the mathematics and science and many of the engineering courses required in the first two years of the Georgia Tech engineering curricula. Upon successful completion of the RETP requirements at the RETP institution, students are admitted to Georgia Tech to work toward completion of a Bachelor of Science in Engineering degree.

By enrolling in RETP students may attend a college close to home, thereby decreasing the cost of their education and easing the adjustment to college life. At the same time, RETP students enjoy many of the advantages of Tech students: they have equal access to engineering
majors at Tech, they can participate in the co-op program, and they are invited to the Tech campus once a year for campus tours, information sessions, and meetings with advisors in their engineering majors.

RETP Information (http://www.coe.gatech.edu/content/regents-engineering-transfer-program-retp)
RETP Transfers - Admissions (http://www.admission.gatech.edu/transfer/#RETP)

Dual Degree Program

Under the Dual Degree Program, students attend the participating Dual Degree school for three years and then come to Georgia Tech for approximately two years. Students participating in the Dual Degree Program may seek a degree from any undergraduate degree-granting program in the College of Engineering. Upon completion of the program, the student receives a bachelor's degree from the first school and a bachelor's degree in one of the engineering disciplines at Georgia Tech.

Participating in the Dual Degree Program are many of the schools in the University System of Georgia, including Morehouse College, Spelman College, Clark Atlanta University, and other historically black colleges and universities (HBCU) and predominantly women's colleges in the southeast. For additional information on either of these programs, contact the College of Engineering at Georgia Tech or the Regents' Engineering Transfer Program (RETP) or Dual Degree coordinator at a participating RETP or Dual Degree institution.

Regents' Engineering Transfer Program

The Regents' Engineering Transfer Program (RETP) is a cooperative program between Georgia Tech and colleges in the University System of Georgia.

For the first two years in this program, students attend one of the participating institutions, where they take all of the mathematics and science and many of the engineering courses required in the first two years of the Georgia Tech Engineering curricula. Upon successful completion of the RETP requirements at the partnering institution, students are admitted to Georgia Tech to work toward completion of a Bachelor of Science in Engineering degree.

By enrolling in RETP, students may attend a college close to home, thereby decreasing the cost of their education and easing the adjustment to college life. At the same time, RETP students enjoy many of the advantages of Georgia Tech students: they have equal access to engineering majors at Tech, they can participate in the co-op program, and they are invited to the Georgia Tech campus once a year for campus tours, information sessions, and meetings with advisors in their engineering majors.

More information:
- Regents' Engineering Transfer Program (RETP)
- Transfer Admission (http://admission.gatech.edu/transfer/#RETP)

Undergraduate Research Opportunities Program

Undergraduate research offers students a unique opportunity to apply knowledge in a meaningful, real-world context to solve problems and explore issues no one has ever addressed before. Students doing undergraduate research also have the chance to develop deeper relationships with faculty and graduate students and to add résumé items that will make them stand out to graduate schools and potential employers.

The Undergraduate Research Opportunities Program (UROP) facilitates research experiences for undergraduates across all disciplines. UROP creates initiatives to encourage students to participate in knowledge creation and research enterprise with Georgia Tech's world-class faculty. Students may participate in laboratory, scientific, or computing research, or they may be involved in new discoveries in literature, social sciences, architecture, or business. Undergraduate students can participate in part-time or full-time research for course credit or pay. Opportunities are available Institute-wide, within specific colleges and schools, or in interdisciplinary settings.

UROP is also charged with providing support and leadership in the area of student innovation. We assist students in finding practical applications for their work and promote the importance of moving research and innovation into society to solve the world's problems. The InVenture Prize, one of the largest invention competitions in the United States, seeks students with an entrepreneurial and inventive interest to apply their skills and see the world as endless opportunities.

Additional opportunities include the President's Undergraduate Research Awards (PURA), the Research Option, spring symposia, and workshops and training sessions promoting good research practices. Students may also be interested in participating in the Georgia Tech's Undergraduate Research Journal, The Tower. Students may also reach out to the Undergraduate Research Ambassadors (http://urop.gatech.edu/content/undergraduate-research-ambassadors) regarding any of the UROP programs or for assistance in finding research opportunities at Georgia Tech.

More information is available on the Undergraduate Research (http://urop.gatech.edu) web page.

The Research Option

The Research Option offers students the opportunity for an in-depth, long-term research experience that culminates in a final paper or thesis. While the exact requirements for a research option vary by academic unit, students typically take the following steps:

1. Write a research proposal.
2. Complete at least nine units of undergraduate research. At least six of the nine required hours should be on the same project. This research must be done with an approved Georgia Tech faculty member.
3. a. Over at least two, preferably three, terms
   b. Research may be for either pay or credit (specific option plans differ by department).
      i. For research for-pay to count towards the Research Option, you must register for an audit-only class (2698 or 4698 in most but not all academic units).
4. Take the sequence of two one-hour courses:
   a. LMC 4701 (typically taken during the first or second term of research in order to help students complete their required proposal), and
b. LMC 4702 (taken during the term in which the thesis is completed). 

5. Write an undergraduate thesis/report of research on their findings.

6. Submit the Certification Form for their participating school into the Undergraduate Research Opportunities Program office prior to graduation. The forms may be found here (http://urop.gatech.edu/research-option). This form must be signed by two faculty readers (one being the primary faculty mentor), the undergraduate coordinator for the participating school and the student.

For more information on specific plans and a list of participating schools, visit the Research Option (http://urop.gatech.edu/research-option) web page.

**Undergraduate Academics**

- Bachelor’s Degree Programs (p. 180)
- BS/MS Degree Programs (p. 91)
- Cooperative Agreements (p. 91)
- Core Curriculum (p. 91)
- Credit/Tests Scores (p. 101)
- New Sequence of Math Core Courses (p. 106)
- Undergraduate-Level Courses (http://www.catalog.gatech.edu/courses-undergrad)

**BS/MS Degree Programs**

Many schools at Georgia Tech offer BS/MS degree programs that, like the Graduate Course Option, allow eligible students to use up to 6 credit hours of graduate-level coursework in the major discipline for both degrees. The BS/MS programs typically include research and mentoring components and have their own GPA requirements.

- Aerospace Engineering (http://catalog.gatech.edu/programs/aerospace-engineering-bs/#designatorsandoptionstext)
- Biology (p. )
- Biology and Bioinformatics (BSBIO/MSBINF) (p. )
- Computer Science (p. )
- Chemical & Biomolecular Engineering (http://catalog.gatech.edu/programs/chemical-biomolecular-bs/#designatorsandoptionstext)
- Civil Engineering (http://catalog.gatech.edu/programs/civil-engineering-bs/#designatorsandoptionstext)
- Computational Media & Digital Media (BSCM/MSDM) (http://catalog.gatech.edu/programs/computational-media-bs/#designatorsandoptionstext)
- Earth and Atmospheric Sciences (http://catalog.gatech.edu/programs/earth-atmospheric-science-bs/#designatorsandoptionstext)
- Electrical Engineering (http://catalog.gatech.edu/programs/electrical-engineering-bs/#designatorsoptionstext)
- Computer Engineering (http://catalog.gatech.edu/programs/computer-engineering-bs/#designatorsoptionstext)
- Environmental Engineering (http://catalog.gatech.edu/programs/environmental-engineering-bs/#designatorsandoptionstext)
- Industrial Engineering and Supply Chain Engineering (BSIE and MSSCE) (http://catalog.gatech.edu/programs/industrial-engineering-bs/#designatorsandoptionstext)
- International Affairs (http://catalog.gatech.edu/programs/international-affairs-bs/#designatorsandoptionstext)
- International Affairs and Modern Languages (BSIAML/MSINTA) (p. )
- Literature, Media, and Communication/Digital Media (BSLMC/MSDM) (http://catalog.gatech.edu/programs/literature-media-communication-bs/#designatorsandoptionstext)
- Materials Science Engineering (http://catalog.gatech.edu/programs/materials-science-engineering-bs-ms)
- Mechanical Engineering (http://catalog.gatech.edu/programs/mechanical-engineering-ms/#designatorsandoptionstext)
- Nuclear and Radiological Engineering (http://catalog.gatech.edu/programs/nuclear-radiological-bs/#designatorsandoptionstext)
- Public Policy (http://catalog.gatech.edu/programs/public-policy-bs/#designatorsandoptionstext)

**Cooperative Agreements**

**Georgia Institute of Technology and Emory University - Bachelor of Science/Juris Master’s (BS-JM)**

For more information on the cooperative agreement between the Georgia Institute of Technology and Emory University to offer a Bachelor of Science/Juris Master’s (BS-JM), please see the link below.

http://law.emory.edu/academics/jm-degree-program/jm-dual-degrees.html

**Georgia Institute of Technology and Georgia State University - Bachelor of Science/Master of Teaching program (BS-MAT)**

For more information on the cooperative agreement between the Georgia Institute of Technology and Georgia State University to offer a Bachelor of Science/Master of Teaching program (BS-MAT), please see the link below.

http://mse.education.gsu.edu/programs/bachelors-and-non-degree-programs/georgia-tech-b-s-m-a-t-collaboration/

**Core Curriculum**

**Important Note:**

On March 9, 2016, the Board of Regents of the University System of Georgia approved a revision to system-wide policies related to the Core Curriculum.

1. Institutions in the University System of Georgia will not be required to identify or track overlay requirements related to US Perspectives, Global Perspectives, and Critical Thinking.
2. Students will not be required to complete the overlay requirements from this point forward.
3. Students who are scheduled to graduate in the Spring 2016 Semester and who have not completed the overlays may graduate without fulfilling this requirement.
University System of Georgia Core Curriculum Requirements

The following describe the core requirements, effective in Fall 2011 and reflecting an important change in March 2016.

The courses that can be used to satisfy the various area requirements are subject to change, and will be updated as soon as possible. Students and advisors are encouraged to check this section of the Catalog regularly to obtain the most current information.

Any courses completed that were listed in prior catalogs as satisfying the Humanities/Social Science Requirement and were completed while that edition of the Catalog was in effect may also be used to satisfy that requirement.

More information about the University System of Georgia’s Core Curriculum policies is available on the USG web site.

Core Curriculum Requirements:

- Constitution and History (p. 92)
- Core Area A1 (p. 92)
- Core Area A2 (p. 92)
- Core Area B (p. 93)
- Core Area C (p. 93)
- Core Area D (p. 97)
- Core Area E (p. 97)
- Core Area F (p. 100)
- Ethics (p. 100)
- Global Perspectives (p. 101)*
- U.S. Perspectives (p. 101)*
- Wellness (p. 101)

Constitution and History

Important Note:

On March 9, 2016, the Board of Regents of the University System of Georgia approved a revision to system-wide policies related to the Core Curriculum.

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2. Students will not be required to complete the overlay requirements from this point forward.
3. Students who are scheduled to graduate in the Spring 2016 Semester and who have not completed the overlays may graduate without fulfilling this requirement.

Constitution and History Requirements

The Georgia law, as amended March 4, 1953, requires that before receiving an undergraduate degree all students pass an examination or a comparable course in United States and Georgia history/constitution.

Courses that fulfill the United States and Georgia History/Constitution Requirement are:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIST 2111</td>
<td>United States to 1877</td>
<td>3</td>
</tr>
<tr>
<td>HIST 2112</td>
<td>United States since 1877</td>
<td>3</td>
</tr>
<tr>
<td>POL 1101</td>
<td>Government of the U.S.</td>
<td>3</td>
</tr>
<tr>
<td>PUBP 3000</td>
<td>US Constitutional Issues</td>
<td>3</td>
</tr>
<tr>
<td>INTA 1200</td>
<td>American Government</td>
<td>3</td>
</tr>
</tbody>
</table>

Courses that carry the Social Science (p. 97) attribute and that appear on the list above can serve both purposes.

Core Area A1

Core Area A1: Communication Outcomes

Area A1 is satisfied by completion of 6 credit hours as follows.

Required for all majors:

**Effective Fall 2010**, for freshmen entering the USG system Fall 2010, students who have earned 60 hours but have not completed Area A1 must enroll in the next course necessary to make progress toward completing this Area in every semester in which they take classes.

**Effective Fall 2011**, this hour limit is lowered to 45 hours for freshmen entering the USG system Fall 2011, Spring 2012, and Summer 2012.

**Effective Fall 2012**, the hour limit is lowered to 30 hours for freshmen entering the USG system Fall 2012 and thereafter.

- ENGL 1101 English Composition I 3
- ENGL 1102 English Composition II 3

Core Area A2

Core Area A2: Quantitative Outcomes

Required of all students majoring in the College of Architecture, College of Computing, College of Engineering, College of Sciences:

Area A2 is satisfied by completion of 4 semester hours as follows:

- MATH 1552 Integral Calculus 4

Required of all other majors. Select one of the following:

- MATH 1712 Survey of Calculus 4
  or MATH 1552 Integral Calculus

1. In the case of a degree (major) that is jointly offered and the Colleges’ requirements in this area are different, the student must complete the course that is specified in the curriculum for the degree, regardless of which college is the declared “home” of the student. This area of the Core Curriculum is driven by the requirements of the specific degree program, not by the general requirements of the College, if a degree is jointly offered.

**Effective Fall 2010**, for freshmen entering the USG system Fall 2010, students who have earned 60 hours but have not completed Area A2 must enroll in the next course necessary to make progress toward completing this Area in every semester in which they take classes.
**Effective Fall 2011**, this hour limit is lowered to 45 hours for freshmen entering the USG system Fall 2011, Spring 2012, and Summer 2012.

**Effective Fall 2012**, freshmen entering the USG system Fall 2012 and thereafter, the hour limit is lowered to 30 hours.

### Core Area B

**Core Area B: Institutional Options**

Area B is satisfied by students completing the following:

CS 1301    Intro to Computing  

1 Or another CS class designated by the School

### Core Area C

**Core Area C: Humanities, Fine Arts, and Ethics**

Core Area C is satisfied by completion of 6 semester hours in courses that carry the HUM (Humanities) attribute. Fine Arts and some ethics related courses are included under Humanities at Georgia Tech. Courses that carry both the HUM and ETHS attribute can serve both purposes.

**Notice:**

On March 9, 2016 the Board of Regents approved a revision to Board of Regents policies related to the Core Curriculum.

**Effective immediately:**

1. Institutions will not be required to identify or track overlay requirements related to US Perspectives, Global Perspectives, and Critical Thinking.
2. Students will not be required to complete the overlay requirements from this point forward.
3. Students who are scheduled to graduate this semester and who have not completed the overlays may graduate without fulfilling this requirement.

**Note:**

1. Any courses completed that were listed in prior catalogs as satisfying the humanities or ethics requirement and were completed while that catalog was in effect may also be used to satisfy this requirement.
2. Humanities credit is awarded for Modern Languages 1001 classes upon successful completion of the corresponding 1002 classes. Humanities credit is awarded for SPAN 1101 only upon the successful completion of SPAN 1102. In some instances, students may complete a Modern Languages course at 1001 and then be placed at the second-semester level and complete the 2001 level course. Therefore, the sequence that will warrant HUM credit for Modern Languages courses may be either the 1001-1002 or the 1001-2001 sequence.
3. Undergraduate Research courses numbered 2698, 2699, 4698, and 4699 cannot be used to fulfill requirements for humanities.
4. Additional information on Music courses: Students can earn humanities credit for participation in ensembles.
5. **Humanities Credit for Ensemble Participation**

Students can earn Humanities credit for participation in one or more specified School of Music ensembles. Each ensemble course is repeatable for credit and the following ensembles carry the humanities attribute:

- MUSI 3121 Concert Band
- MUSI 3131 Symphonic Band
- MUSI 3231 Chamber Choir
- MUSI 3241 Chorale
- MUSI 3251 Glee Club
- MUSI 3261 Women’s Choir
- MUSI 3311 Jazz Ensemble
- MUSI 3511 Percussion Ensemble
- MUSI 3531 New Music Ensemble
- MUSI 3551 Rock and Pop Ensemble
- MUSI 3611 Symphony Orchestra

6. **Transfer Students:**

   Please be aware that when you see courses on your GT record that are listed with an “X” in the number (ECON 3XXX or JAPN 10X2, for example) it means that these are transfer courses and although they were not equated exactly with a GT course, they may have been accepted to meet a Core area such as Humanities and Social Science.

   If you review your records in DegreeWorks (http://www.degreeworks.gatech.edu), you will be able to see how your transfer credit applies to your GT degree program. Refer to your academic advisor for more information.

### Humanities Courses

- **ARBC 1002** Elementary Arabic II  
- **ARBC 1501** Understand Arab Culture  
- **ARBC 2001** Intermediate Arabic I  
- **ARBC 2002** Intermediate Arabic II  
- **ARBC 2301** Arts Sci Tech Thru Hist  
- **ARBC 3001** Advanced Arabic I  
- **ARBC 3002** Advanced Arabic II  
- **ARBC 3501** Men-Women In Islam  
- **ARBC 3691** Intensive Advanced ARBC  
- **ARBC 3692** Arabic Business & Tech I  
- **ARBC 3693** Arabic Business &Tech II  
- **ARCH 2111** History of Arch I  
- **ARCH 2112** History of Arch II  
- **ARCH 2115** Modern Arch & Art  
- **ARCH 4109** Arch and Minimalism  
- **ARCH 4110** Public Space  
- **ARCH 4113** Renaissance&Manner Arch  
- **ARCH 4114** Medieval Architecture  
- **ARCH 4117** Arts and Crafts Arch  
- **ARCH 4118** American Academic Arch  
- **ARCH 4119** Arch-Frank Lloyd Wright  
- **ARCH 4120** Atlanta Architecture  
- **ARCH 4124** Hist of Arch in the U.S.  
- **ARCH 4128** Barcelona Architecture  
- **ARCH 4151** History of Urban Form  
- **ARCH 4305** Cross-Cultural Practice
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Notes</th>
</tr>
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<td>CHIN 1002</td>
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<td>French LBAT II</td>
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<tr>
<td>CHIN 1012</td>
<td>Accelerated Elem Chin II</td>
<td>4</td>
<td>French LBAT III</td>
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<td>CHIN 2001</td>
<td>Intermediate Chinese I</td>
<td>3</td>
<td>LBAT French Sem Abroad</td>
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<td>CHIN 2002</td>
<td>Intermediate Chinese II</td>
<td>3</td>
<td>French Stylistics</td>
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<td>CHIN 2011</td>
<td>Accelerated Inter Chin I</td>
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<td>French Art</td>
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<td>CHIN 2012</td>
<td>Accelerated Intm Chin I</td>
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<td>Literature &amp; Visual Arts</td>
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<td>CHIN 3003</td>
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<td>Chin Society &amp; Culture I</td>
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<td>Francophone Lit I</td>
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<td>CHIN 3022</td>
<td>Chin Society &amp; Culture II</td>
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<td>CHIN 3691</td>
<td>Chinese Current Events</td>
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<td>Francophone Africa</td>
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<td>CHIN 4003</td>
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<td>African Diasporas France</td>
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<td>CHIN 4004</td>
<td>Advanced Chinese III</td>
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<td>Intro French Philosophy</td>
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<td>CHIN 4006</td>
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<td>CHIN 4031</td>
<td>Chin-Language Cinema</td>
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<td>France and Globalization</td>
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<td>Art &amp; Arch in Italy I</td>
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<td>COA 3116</td>
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<td>City in Fiction &amp; Film</td>
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<td>Conversation &amp; Composition</td>
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<td>ENGL 1102</td>
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<td>FREN 1002</td>
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<td>French Culture I</td>
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<td>FREN 3000</td>
<td>Survey of French Lit</td>
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<td>TV &amp; Electronic Culture</td>
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<td>FREN 3001</td>
<td>French Lit 1800-1900</td>
<td>3</td>
<td>Structure,Commun &amp; Corr</td>
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<td>French Lit 1900-Present</td>
<td>3</td>
<td>Ger Film and Literature</td>
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<td>Drama Workshop</td>
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<td>FREN 3011</td>
<td>France Today I</td>
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<td>German Post-Wall Cinema</td>
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<td>FREN 3012</td>
<td>France Today II</td>
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<td>Adv Business German I</td>
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<td>Intro To Contemp France</td>
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<td>Social Identities French</td>
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<td>Literary Repr of History</td>
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<td>FREN 3017</td>
<td>Paris: Modernity Today</td>
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<td>FREN 3061</td>
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Courses that fulfill both Humanities and Ethics Requirements

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96  Core Area C  

96  Core Area C
Core Area D

Core Area D: Natural Sciences, Math, and Technology

Core Area D is satisfied by students completing 8 semester hours from the science list and 4 semester hours from the Mathematics list.

Science

8 semester hours

- CHEM 1211K Chemical Principles I 4
- CHEM 1212K Chemical Principles II 4
- CHEM 1310 General Chemistry 4
- BIOL 1220 Biology of Sex & Death 4
- BIOL 1510 Biological Principles 4
- BIOL 1520 Intro to Organismal Biol 4
- EAS 1600 Intro-Environmental Sci 4
- EAS 1601 Habitable Planet 4
- EAS 2600 Earth Processes 4
- PHYS 2211 Intro Physics I 4
- PHYS 2212 Intro Physics II 4

Mathematics

4-6 semester hours

All students with majors in the Colleges of Architecture, Engineering, and Science

- MATH 1551 Differential Calculus 2
- MATH 1553 Intro to Linear Algebra 2

All students with majors in the College of Computing

- MATH 1551 Differential Calculus 2
- MATH 1554 Linear Algebra 4

All other majors 1

Select one of the following:

- MATH 1711 Finite Mathematics 4

or MATH 1551 Differential Calculus & MATH 1553 Intro to Linear Algebra 4

Honors versions of the above courses are also accepted.

1 In the case of a degree (major) that is jointly offered and the Colleges' requirements in this area are different, the student must complete the course that is specified in the curriculum for the degree, regardless of which college is the declared "home" of the student. This area of the Core Curriculum is driven by the requirements of the specific degree program, not by the general requirements of the College, if a degree is jointly offered.

Core Area E

Core Area E: Social Sciences

Area E is satisfied by completion of 12 credit hours as follows:

Select one of the following:

- HIST 2111 United States to 1877

HIST 2112 United States since 1877
- POL 1101 Government of the U.S.
- INTA 1200 American Government
- PUBP 3000 US Constitutional Issues

Select 9 credit hours from the following list.

Total Credit Hours 12

Some social science courses also carry the ethics attribute. Those courses (p. 100) may be used to satisfy both the SOC SCI and the Ethics (p. 100) requirements. Credit not awarded for both POL 1101 and INTA 1200.

Any courses completed that were listed in prior catalogs as satisfying the humanities/social science requirement and were completed while that catalog was in effect may also be used to satisfy this requirement.

Students can receive three credit hours for any one of:

Select one of the following:

- ECON 2100 Economics and Policy
- ECON 2101 The Global Economy
- ECON 2105 Prin of Macroeconomics
- ECON 2106 Prin of Microeconomics

Total Credit Hours 3

The only combination for which students can receive six credit hours is ECON 2105 together with ECON 2106.

Undergraduate Research courses numbered 2698, 2699, 4698, and 4699 cannot be used to fulfill requirements for Social Sciences.

Transfer Students: Please be aware that when you see courses on your GT record that are listed with an "X" in the number (ECON 3XXX or JAPN 10X2, for example) it means that these are transfer courses and although there were not equated exactly with a GT course, they may have been accepted to meet a Core area such as Humanities and Social Science. If you review your records in DegreeWorks (http://www.degreewoks.gatech.edu), you will be able to see how your transfer credit applies to your GT degree program. Refer to your academic advisor for more information.

Social Sciences Courses

- ARCH 3135 City Literacy 3
- ARCH 4107 Intro to Historic Preser 3
- ARCH 4126 Paris Urban History 3
- ARCH 4137 Postwar Arch & Urbanism 3
- ARCH 4335 Social Practice of Arch 3
- ARCH 4770 Environmental Design 3
- CP 4010 Found-Urban&Region Devel 3
- CP 4020 Intro-Urban&Region Plan 3
- CP 4030 City and Technology 3
- CS 4752 Phil Issues-Computation 3
- ECON 2100 Economics and Policy 3
- ECON 2101 The Global Economy 3
- ECON 2105 Prin of Macroeconomics 3
- ECON 2106 Prin of Microeconomics 3
- ECON 3300 Intl Energy Markets 3
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</table>

Georgia Institute of Technology - DRAFT COPY 99
Core Area F

Core Area F - Lower-Division Major Requirements

Core Area F requirements vary with degree and major. It is expected that there will be 18 credit hours of lower division requirements in each major.

Ethics

The courses listed below carry the Georgia Tech-specific Ethics attribute. While some courses (as designated) meet Humanities (p. 93) or Social Science (p. 97) requirements, not all of the courses listed below will meet Core requirements. Additionally, some programs may require certain ethics courses to fulfill their degree requirements. Check with the major school accordingly.

Biol 4650 Bioethics 2
Biol 4651 Foundations of Bioethics 3
Chbe 4515 Chemical Process Safety 1
Cs 4001 Computing & Society 3
Cs 4726 Privacy Tech Policy Law 3
Hts 1081 Engineering in History 3
Hts 2061 Traditional Asia 3
Hts 2084 Technology and Society 3
Hts 2100 Sci, Tech & Modern World 3
Hts 3032 Europe Intellectual Hist 3
Inta 2030 Ethics in Int'l Affairs 3
Lmc 3219 Literature & Medicine 3
Lmc 3304 Science, Tech & Gender 3
Lmc 3318 Biomedicine & Culture 3
Mgt 3608 Tech Law And Ethics 3
Mgt 4047 Ethics & Accounting 3
Mgt 4726 Privacy Tech Policy Law 3
Ns 4322 Naval Leadership II 3
Phil 3105 Ethical Theories 3
Phil 3109 Engineering Ethics 3
Phil 3127 Sci, Tech & Human Values 3
Phil 3140 Philosophy of Food 3
Phil 4176 Environmental Ethics 3
Psyc 1101 General Psychology 3
Psyc 2015 Research Methods 4
Psyc 2210 Social Psychology 3
Psyc 2220 Industrial/Organiz Psy 3
Psyc 2230 Abnormal Psychology 3
Psyc 2240 Personality Theory 3
Psyc 2270 Engineering Psychology 3
Psyc 3600 Sustain,Tech & Policy 3

Social Sciences Courses that Also Satisfy Ethics Requirement

Hts 1081 Engineering in History 3
Hts 2061 Traditional Asia 3
Hts 2084 Technology and Society 3
Hts 2100 Sci, Tech & Modern World 3
Hts 3032 Europe Intellectual Hist 3
Inta 2030 Ethics in Int'l Affairs 3
Psyc 1101 General Psychology 3
Psyc 2015 Research Methods 4
Psyc 2220 Industrial/Organiz Psy 3
Psyc 2230 Abnormal Psychology 3
Psyc 2240 Personality Theory 3
Psyc 2270 Engineering Psychology 3
Psyc 3600 Sustain,Tech & Policy 3

Soc 1101 Intro to Sociology 3
Global Perspectives

Important Note:

On March 9, 2016, the Board of Regents of the University System of Georgia approved a revision to system-wide policies related to the Core Curriculum.

1. Institutions in the University System of Georgia will not be required to identify or track overlay requirements related to US Perspectives, Global Perspectives, and Critical Thinking.
2. Students will not be required to complete the overlay requirements from this point forward.
3. Students who are scheduled to graduate in the Spring 2016 Semester and who have not completed the overlays may graduate without fulfilling this requirement.

U.S. Perspectives

Important Note:

On March 9, 2016, the Board of Regents of the University System of Georgia approved a revision to system-wide policies related to the Core Curriculum.

1. Institutions in the University System of Georgia will not be required to identify or track overlay requirements related to US Perspectives, Global Perspectives, and Critical Thinking.
2. Students will not be required to complete the overlay requirements from this point forward.
3. Students who are scheduled to graduate in the Spring 2016 Semester and who have not completed the overlays may graduate without fulfilling this requirement.

Wellness

Wellness Requirement

All undergraduate students attending Georgia Tech must satisfactorily complete a wellness requirement.

APPH 1040 Sci Foundation of Health 1
APPH 1050 Sci of Phys Act & Health 2

1 Previously offered as HPS 1040 (Health).

Credit/Tests & Scores

- Advanced Levels (A-Levels) (p. 101)
- Advanced Placement Exams (p. 101)
- Advanced Standing (p. 103)
- Departmental Exams (p. 103)
- French Baccalaureate (p. 103)
- German Language Exams (DSD) (p. 103)
- International Baccalaureate Exams (p. 103)
- ROTC Credit (p. 104)
- Regents’ Testing Program (p. 104)
- SAT II Subject Tests (p. 104)
- Transfer Courses with ‘X’ Numbers (p. 105)
- Transfer Credit (p. 105)
- Undergraduate Students Taking Graduate Courses (p. 106)

Advanced Placement Exams

Students entering Georgia Tech may receive college credit based upon their scores on the College Board Advanced Placement (AP) Exams taken in conjunction with designated high school advanced placement classes, SAT II Subject Tests, The International Baccalaureate, or A-Level Examinations for credit. All examinations must be completed prior to the student’s enrollment date. Students who offer satisfactory evidence that they are qualified to do so may receive credit for a course by examination at Georgia Tech. Such an examination is called an Examination for Advanced Standing.

<table>
<thead>
<tr>
<th>Subject</th>
<th>Course</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biology</td>
<td>Grade: A = BIOL 1510</td>
<td>4</td>
</tr>
<tr>
<td>Chemistry</td>
<td>Grade: A or B = CHEM 1310</td>
<td>4</td>
</tr>
<tr>
<td>Economics</td>
<td>Grade: A = ECON 2100 1</td>
<td>3</td>
</tr>
<tr>
<td>Math</td>
<td>Grade: A or B = MATH 1551</td>
<td>2</td>
</tr>
<tr>
<td>Physics</td>
<td>Grade: A = PHYS 2211 &amp; PHYS 2212 2</td>
<td>8</td>
</tr>
</tbody>
</table>

1 Effective for the 2019-20 Catalog Year.
2 Students who receive a grade of B will be contacted by the School of Physics after submitting official A-Level results to the Office of the Registrar with information about taking a placement test to validate the credit. If students pass the test, they will be awarded credit. Placement tests are normally offered early to mid August each year.
## College Board Advanced Placement Exams

<table>
<thead>
<tr>
<th>Subject</th>
<th>Course</th>
<th>Hours</th>
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<tbody>
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<td>Art History</td>
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</tr>
<tr>
<td>Biology</td>
<td>AP Score: 4 or 5 = BIOL 1510</td>
<td>4</td>
</tr>
<tr>
<td>Mathematics - Calculus AB</td>
<td>AP Score: 4 or 5 = MATH 1551</td>
<td>2</td>
</tr>
<tr>
<td>Mathematics - Calculus BC</td>
<td>AP Score: 4 or 5 = MATH 1551 &amp; MATH 1552</td>
<td>6</td>
</tr>
<tr>
<td>Chemistry - Effective Summer 2010</td>
<td>AP Score: 4 = CHEM 1211K</td>
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</tr>
<tr>
<td>Chemistry</td>
<td>AP Score: 4 = CHEM 1310</td>
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</tr>
<tr>
<td>Chinese Language and Culture</td>
<td>AP Score: 3 = CHIN 2002</td>
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</tr>
<tr>
<td></td>
<td>AP Score: 4 = CHIN 2002 &amp; CHIN 3003</td>
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</tr>
<tr>
<td></td>
<td>AP Score: 5 = CHIN 3003 &amp; CHIN 3004</td>
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<tr>
<td>Computer Science (A)</td>
<td>AP Score: 4 or 5 = CS 1301</td>
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<tr>
<td>Computer Science Principles</td>
<td>AP Score: 4 or 5 = CS 1XXX</td>
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<tr>
<td>English Language and Composition</td>
<td>AP Score: 4 or 5 = ENGL 1101</td>
<td>3</td>
</tr>
<tr>
<td>English Literature and Composition</td>
<td>AP Score: 4 or 5 = ENGL 1101</td>
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<td>Environmental Science</td>
<td>AP Score: 4 or 5 = EAS 1600</td>
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</tr>
<tr>
<td>European History</td>
<td>AP Score: 4 or 5 = HTS 1031</td>
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<tr>
<td>French Language and Culture</td>
<td>AP Score: 4 or 5 = FREN 2001 &amp; FREN 2002</td>
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<tr>
<td>German Language and Culture</td>
<td>AP Score: 4 or 5 = GRMN 2001 &amp; GRMN 2002</td>
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<tr>
<td>Government and Politics: Comparative</td>
<td>AP Score: 4 or 5 = INTA 12003</td>
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<tr>
<td>Government and Politics: U.S.</td>
<td>AP Score: 4 or 5 = POL 11013</td>
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<td>Human Geography</td>
<td>AP Score: 4 or 5 = SS 1XXX</td>
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<tr>
<td>Italian Language and Culture</td>
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<td>Japanese Language and Culture</td>
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<td>AP Score: 4 = JAPN 2002 &amp; JAPN 3001</td>
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<tr>
<td>Latin (Language and Culture)</td>
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<tr>
<td>Economics (Macroeconomics)</td>
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<td>Economics (Microeconomics)</td>
<td>AP Score: 4 or 5 = ECON 2106</td>
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<td>Music Theory</td>
<td>AP Score: 3 = MUSI 2600</td>
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<td></td>
<td>AP Score: 4 or 5 = MUSI 2600 &amp; MUSI 3600</td>
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<td>Physics B</td>
<td>AP Score: 4 or 5 = PHYS 3 2XXX</td>
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<td>AP Score: 4 or 5 = PHYS 22114</td>
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<td>Physics C, Part II: Elect &amp; Magnetism</td>
<td>AP Score: 4 or 5 = PHYS 22124</td>
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<tr>
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<td>AP Score: 4 or 5 = PHYS 3 2XXX</td>
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</tr>
<tr>
<td>Physics 2: Algebra-Based</td>
<td>AP Score: 4 or 5 = PHYS 3 2XXX</td>
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</tr>
<tr>
<td>Psychology</td>
<td>AP Score: 4 or 5 = PSYC 1101</td>
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<tr>
<td>Spanish Language &amp; Culture</td>
<td>AP Score: 4 or 5 = SPAN 2001 &amp; SPAN 2002</td>
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<tr>
<td>Spanish Literature &amp; Culture</td>
<td>AP Score: 4 or 5 = SPAN 2001 &amp; SPAN 2002</td>
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</tr>
<tr>
<td>Statistics</td>
<td>No Credit Awarded</td>
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<tr>
<td>Studio Art: 2-D Design</td>
<td>AP Score: 4 or 5 = ARCH 1XXX</td>
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</tr>
<tr>
<td>Studio Art: 3-D Design</td>
<td>AP Score: 4 or 5 = ARCH 1XXX</td>
<td>3</td>
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<tr>
<td>Studio Art: Drawing</td>
<td>No Credit Awarded</td>
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<tr>
<td>United States (American) History</td>
<td>AP Score: 4 or 5 = HIST 2111</td>
<td>3</td>
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<tr>
<td>World History</td>
<td>AP Score: 4 or 5 = HTS 1XXX2</td>
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</table>

1. With a score of 4 or 5 in both macroeconomics and microeconomics, a student could instead elect to receive 3 semester hours of credit for ECON 2100.
2. HTS 1XXX represents a 1000 level elective course.
3. Students cannot receive credit for both INTA 1200 and POL 1101.
4. Students who receive a score of 4 will be contacted by the School of Physics after the AP scores are received (early in August each year) with information about taking a placement test to validate the credit. If students pass the test, they will be awarded credit.

SAT II Subject Tests (p. 104)

International Baccalaureate (p. 103)
Advanced Standing

Examinations for Advanced Standing
1. Students who offer satisfactory evidence that they are qualified to do so may receive credit for a course by examination. Such an examination is called an "Examination for Advanced Standing."
2. Examinations for advanced standing require the recommendation of the department in instruction in which the course is offered, payment of the appropriate fee to the Office of the Bursar, and authorization by the Office of the Registrar.
3. Examinations for Advanced Standing will usually be offered during the Final Examination Period.
4. A student will not be allowed to take an Examination for Advanced Standing in a given course more than twice.
5. Students will not be allowed to take an Examination for Advanced Standing in a course for which any prerequisite has not been met, except with the consent of the school offering the course.
6. An Examination for Advanced Standing will be reported with an "S" or "U" grade. Neither grade will be included in the calculation of grade-point average (GPA).
7. Advanced standing is not allowed for laboratory or studio classes, except with the consent of the school offering the course.
8. Students may not use more than nine credits of advanced standing to meet degree requirements.
9. Students may submit the Advanced Standing Application and Fee to obtain six to eight hours of proficiency credit for foreign language at the 1001 or 1002 levels upon completion of two classes in the same language at the 2000 level or higher with a minimum grade of "C."

Advanced Standing Form (http://www.registrar.gatech.edu/students/formlanding/advstanding.php)

Departmental Exams

Advanced Placement in Mathematics
The School of Mathematics will offer optional GT advanced placement mathematics examinations to incoming freshmen who wish to test out of MATH 1113, MATH 1551 (Differential Calculus), MATH 1552 (Integral Calculus) and/or MATH 1553 (Intro to Lineal Algebra).

If a student already has GT credit for MATH 1551 the student does not have to take the optional GT Advanced Placement exam for MATH 1551. Such a student may elect to take the optional GT Advanced Placement exam for MATH 1552.

French Baccalaureat
Students entering Georgia Tech may receive college credit based upon their scores on the College Board Advanced Placement (AP) Exams taken in conjunction with designated high school advanced placement classes, SAT II Subject Tests, The International Baccalaureate, Advanced Levels (A-Levels), and/or Georgia Tech Departmental Exams.

Once enrolled at Georgia Tech, students are not allowed to take College Board (Advanced Placement and SAT II), International Baccalaureate, or A-Level Examinations for credit. All examinations must be completed prior to the student’s enrollment date. Students who offer satisfactory evidence that they are qualified to do so may receive credit for a course by examination at Georgia Tech. Such an examination is called an Examination for Advanced Standing.

<table>
<thead>
<tr>
<th>Subject</th>
<th>Score</th>
<th>Course</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scientifique Math¹ ²</td>
<td>10 or higher with coefficient of 4 or higher</td>
<td>MATH 1551 &amp; MATH 1552</td>
</tr>
<tr>
<td>English Language &amp; Literature¹ ²</td>
<td>16 or higher</td>
<td>ENGL 1101</td>
</tr>
<tr>
<td>History - Geography</td>
<td>14 or higher</td>
<td>HTS 1XXX (3 semester hours)</td>
</tr>
</tbody>
</table>

¹ Effective for the 2019-20 Catalog Year.
² Students must bring French Baccalauréat transcript to the Registrar’s Office for evaluation.

German Language Exams (DSD)
Students entering Georgia Tech may receive college credit based upon their scores on the College Board Advanced Placement (AP) Exams taken in conjunction with designated high school advanced placement classes, SAT II Subject Tests, The International Baccalaureate, Advanced Levels (A-Levels), and/or Georgia Tech Departmental Exams.

Once enrolled at Georgia Tech, students are not allowed to take College Board (Advanced Placement and SAT II), International Baccalaureate, or A-Level Examinations for credit. All examinations must be completed prior to the student’s enrollment date. Students who offer satisfactory evidence that they are qualified to do so may receive credit for a course by examination at Georgia Tech. Such an examination is called an Examination for Advanced Standing.

<table>
<thead>
<tr>
<th>Subject</th>
<th>Course</th>
<th>Credits</th>
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<tbody>
<tr>
<td>DSD I¹ ²</td>
<td>GRMN 3XXX</td>
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<tr>
<td>DSD II¹ ²</td>
<td>GRMN 3XXX</td>
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</table>

¹ Effective for the 2019-20 Catalog Year.
² Students must bring Deutsches Sprachdiplom transcript to the Registrar’s Office for evaluation.

International Baccalaureate Exams
Students entering Georgia Tech may receive college credit based upon their scores on the College Board Advanced Placement (AP) Exams taken in conjunction with designated high school advanced placement classes, SAT II Subject Tests, The International Baccalaureate, and/or Georgia Tech Departmental Exams.

Once enrolled at Georgia Tech, students are not allowed to take College Board (Advanced Placement and SAT II), International Baccalaureate, or A-Level Examinations for credit. All examinations must be completed prior to the student’s enrollment date. Students who offer satisfactory evidence that they are qualified to do so may receive credit for a course by examination at Georgia Tech. Such an examination is called an Examination for Advanced Standing.

International Baccalaureate - High Level

<table>
<thead>
<tr>
<th>Subject</th>
<th>Higher Level Exam Scores</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biology</td>
<td>4 or 5</td>
<td>4 hours (BIOL 1510)</td>
</tr>
</tbody>
</table>
Georgia Tech offers three voluntary ROTC programs: Army, Navy, and Air Force.

Depending on the student’s major, Basic and Advanced ROTC classes count as a portion of elective credit. (Students may apply a maximum of 4 credit hours in Basic ROTC courses and six credit hours in Advanced ROTC courses toward meeting the elective requirements for any degree at the discretion of the school.) Consult specific colleges to determine the amount of hours that will count toward a degree. After earning a baccalaureate degree and completing the Advanced ROTC courses for any of the three services, a student may receive a commission as an officer in either the reserve or active forces.

Students accepted into the program earn more than just money for a college degree. Cadets and midshipmen receive training and experience in the one quality which is always in great demand: Leadership.

Students may apply a maximum of 4 credit hours in basic (1000-2000 level courses) ROTC courses and six hours in advanced (3000-4000 level) ROTC courses toward meeting the free elective requirements for any degree. Students should begin taking basic ROTC courses during the first term they are enrolled. For further information, see individual curricula for the schools. Please note some departments may have stricter guidelines regarding ROTC courses.

Airforce ROTC Information (http://www.catalog.gatech.edu/colleges/cola/air-force-aerospace-studies)

Army ROTC Information (http://www.catalog.gatech.edu/colleges/cola/military-science-army-rotc)

Navy ROTC Information (http://www.catalog.gatech.edu/colleges/cola/naval-science)

ROTC Credit (http://catalog.gatech.edu/academics/undergraduate/credit-tests-scores/rotc-credit)

Air Force ROTC Website (http://www.afrotc.gatech.edu)

Army ROTC Website (http://www.armyrotc.gatech.edu)

Navy ROTC Website (http://nrotc.gatech.edu)

**Regents’ Testing Program**

**Effective Spring 2010**

The Regents’ exam is no longer required at Georgia Tech as a result of a recent decision by The Board of Regents’.

**SAT II Subject Tests**

Students entering Georgia Tech may receive college credit based upon their scores on the College Board Advanced Placement (AP) Exams taken in conjunction with designated high school advanced placement classes, SAT II Subject Tests, The International Baccalaureate, and/or Georgia Tech Departmental Exams.

Once enrolled at Georgia Tech, students are not allowed to take College Board (Advanced Placement and SAT II), International Baccalaureate, or A-Level Examinations for credit. All examinations must be completed prior to the student’s enrollment date. Students who offer satisfactory evidence that they are qualified to do so may receive credit for a course by examination at Georgia Tech. Such an examination is called an Examination for Advanced Standing.

The table below describes the course credit a student may earn if she/he achieves a specific score on a specific SAT II Subject Test.

<table>
<thead>
<tr>
<th>Subject</th>
<th>Score</th>
<th>Semester Course</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemistry</td>
<td>680</td>
<td>CHEM 121 K</td>
<td>4</td>
</tr>
<tr>
<td>Chemistry</td>
<td>730</td>
<td>CHEM 1310</td>
<td>4</td>
</tr>
</tbody>
</table>
Policy on Transfer Credit

Transfer Credit Policy

In domestic and international situations, students may attend another institution as a transient student during terms when not enrolled at Georgia Tech. Students should discuss their course selection with their academic advisor to ensure transferability and terms when not enrolled at Georgia Tech. Students should discuss their course selection with their academic advisor to ensure transferability and terms when not enrolled at Georgia Tech. Students should seek advisement from their academic unit regarding the use of these courses toward fulfilling degree requirements.

Transfer Credit

The basic policy regarding the acceptance of courses by transfer is to allow credit for courses completed with satisfactory grades (C or better) at other accredited colleges and universities in the United States and Canada, provided the courses correspond in time and content to courses offered at Georgia Tech. The Institute will not accept credit for courses successfully completed at another institution but previously taken at Georgia Tech unless the final grade received at Georgia Tech is a "W." The student must request and file an official transcript of transfer courses before the Institute can award credit. Coursework completed at colleges and universities outside the United States and Canada will be evaluated on a case-by-case basis. Transfer credit is not calculated in the Georgia Tech grade-point average.

Students may attend another institution as a transient student during terms when not enrolled at Georgia Tech. Students should discuss their course selection with their academic advisor to ensure transferability and applicability toward their degree programs. With the exception of officially sanctioned cross-enrolled programs, students are not to be enrolled at Georgia Tech and another institution during the same term without the prior approval of the Institute Undergraduate Curriculum Committee or Institute Graduate Curriculum Committee, as appropriate.

Transfer Credit Policy

Policy on Transfer Credit

A. Only official transcripts from other schools may be used to evaluate and/or award credit.
   • New students must request that an official transcript from all previously attended colleges and universities be mailed to the Admissions Office.
   • Georgia Institute of Technology
     Undergraduate Admissions Office
     Atlanta, GA 30332-0320
   • Current or previously enrolled Georgia Tech students must have an official transcript from all other colleges and universities mailed to:
     • Georgia Institute of Technology
       Office of the Registrar

B. The basic policy regarding the acceptance of courses by transfer is to allow credit for courses completed with satisfactory grades (C or better) in other accredited colleges provided the courses correspond in time and content to courses offered at the Georgia Institute of Technology. Georgia Tech assumes responsibility for the academic quality of any work or credit recorded on the institution's transcript. Transfer credits will be accepted from newly-formed institutions of the University System of Georgia prior to accreditation.

C. Georgia Tech will not award credit for courses successfully completed at another institution which were previously taken at Georgia Tech.

D. A petition to the faculty must be approved to use course work more than ten years old.

E. Georgia Tech reserves the right to test the proficiency of any student in course work transferred from other institutions and to disallow credit in courses in which the student cannot demonstrate acceptable proficiency.

Transfer Credit for Online Courses

A. Currently, online versions of all Lab Science courses, International Affairs, Psychology, Economics and courses equivalent to HIST 2111 and HIST 2112 are not eligible for transfer credit consideration. In most cases Mathematics courses are not eligible for consideration unless sufficient documentation is provided to show the course exams are proctored. Students interested in taking the online versions of any Mathematics courses that meet this requirement, or have questions regarding this policy, the Office of the Registrar via email: comments@registrar.gatech.edu.

Requesting Transfer Credit for Courses Not Previously Evaluated

A. Check the online equivalency database (https://oscar.gatech.edu/pls/bprod/wwsktrna.P_find_location) for updates. New evaluations are posted daily.

B. Notify the Office of the Registrar’s Transfer Credit Department of any not-awarded credit. Send an email to comments@registrar.gatech.edu

C. Using the Transfer Credit web site (https://transfercredit.gatech.edu), submit courses for evaluation.

About Transfer Credit

A. Georgia Tech does not offer correspondence courses and does not grant credit for correspondence courses taken at other institutions. Academic units reserve the right to take such things as delivery method into consideration. For example, on-line courses and computer-instructed courses may not be accepted by some academic units for credit.

B. Georgia Tech does not grant credit for the College Level General Educational Development Tests, CLEP USAFI courses, or courses completed at any United States armed services, with the exception of the military academies and schools with full accreditation by a regional accrediting body.

C. Georgia Tech does not grant credit for professional certificate programs.

D. The following items are among other circumstances in which non-resident credit is not granted:
Undergraduate Students Taking Graduate Courses

- Courses previously completed at Georgia Tech.
- College courses taken to meet freshman admissions requirements.
- Remedial courses.
- Courses basically secondary school or pre-college level.
- Courses with essentially non-academic content.
- Vocational courses.
- Learning support courses.

E. Non-resident credit is not computed as a part of the student's grade point average at Georgia Tech.

Transfer Credit for Online Courses

A. Currently, online versions of all Lab Science courses, International Affairs, Psychology, Economics and courses equivalent to HIST 2111 and HIST 2112 are not eligible for transfer credit consideration. In most cases Mathematics courses are not eligible for consideration unless sufficient documentation is provided to show the course exams are proctored. Students interested in taking the online versions of any Mathematics courses that meet this requirement, or have questions regarding this policy, the Office of the Registrar via email: comments@registrar.gatech.edu.

Advanced Placement (AP) and International Baccalaureate (IB)

A. Follow the steps below to view AP or IB equivalencies.
   1. Go to https://oscar.gatech.edu
   2. Select the "Transfer Equivalencies" icon
   3. Select the asterisk (*) from the pull down menu
   4. Click "Continue" button
   5. Select your option from the pull down menu
   6. Click "Get Courses" button

B. Once enrolled at Georgia Tech, students are not allowed to take College Board (Advanced Placement and SAT II), International Baccalaureate or A-Level Examinations for credit. All examinations must be completed prior the student's enrollment date. Students who offer satisfactory evidence that they are qualified to do so may receive credit for a course by examination at Georgia Tech. Such an examination is called an "Examination for Advanced Standing (p. 103)."

More information:

Transfer Equivalency Catalog (https://oscar.gatech.edu/pls/bprod/wwsktrna.P_find_location)

Undergraduate Students Taking Graduate Courses

A senior with a grade-point average (GPA) of at least 2.7 may enroll in a graduate course if she/he obtains permission from the school or department offering the course.

1. Up to twelve credit hours earned as an undergraduate student may count toward earning a master's degree if the following conditions are satisfied.
   a. The student was in residence at Georgia Tech for at least two semesters before registering for the course(s).
   b. The student did not apply credit for the course toward a bachelor's degree. Special exceptions may apply in certain schools, as described below.
      i. If student pursues both a bachelor's and master's at Georgia Tech, and if both degrees are in the same discipline, she/he may apply up to six credit hours of graduate-level credit in the major discipline to satisfying the requirements for both degrees. Because some master's degree programs do not have any unique undergraduate counterpart program, and because some master's programs are offered by several schools, the definition of "discipline" will be broadly interpreted in such cases. To qualify for this option, a student must complete the bachelor's degree with a cumulative grade-point average (GPA) of 3.5 or higher, and she/he must complete the master's degree within a two-year period following the award date of the bachelor's degree.

Graduate Course Option

Students completing both a bachelor's and master's in the same discipline at Georgia Tech may use up to six credit hours of graduate-level coursework in the major discipline for both degrees. Recognizing that some master's degree programs do not have a unique undergraduate counterpart program and that some master's programs are offered by several schools, the term "discipline" in the prior sentence will be broadly interpreted in such cases. To qualify for this option, students must complete the undergraduate degree with a cumulative GPA of 3.5 or higher and complete the master's degree within a two-year period from the award date of the bachelor's degree.

See BS/MS Programs (http://catalog.gatech.edu/academics/special-academic-programs/bs-ms-programs) for more information.

New Sequence of Math Core Courses

Disclaimer: New Math Courses in Fall 2015

The School of Mathematics is announcing a new sequence of math core courses starting Fall 2015. The change involves two primary goals which are:

1. to separate the calculus and the linear algebra sequences and
2. to improve the cutting points in the calculus sequence.

The old core sequence of calculus and linear algebra involved MATH 1501, MATH 1502, MATH 1551, and MATH 1552. However, a large portion of MATH 1502 was material from linear algebra.

In the new math core, the calculus material will be covered in MATH 1551, and MATH 1552. The linear algebra material can be covered in one of three equivalent courses:

<table>
<thead>
<tr>
<th>Course Number</th>
<th>Title</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 1553</td>
<td>Intro to Linear Algebra</td>
<td>2</td>
</tr>
<tr>
<td>MATH 1554</td>
<td>Linear Algebra</td>
<td>4</td>
</tr>
<tr>
<td>MATH 1564</td>
<td>LinAlg w Abstract Vec Sp</td>
<td>4</td>
</tr>
</tbody>
</table>

A description of the new courses can be found at: http://www.math.gatech.edu/academics/undergraduate/new-core-courses-starting-fall-2015.

The Advanced Placement credit obtained from AP exams of the College Board, International Baccalaureate, and others can be found at: http://
Undergraduate Minors

An undergraduate minor is a defined program of study outside the student’s major field. Minors are intended to broaden the student’s education by encouraging and officially recognizing knowledge obtained by the student in fields other than their major.

Minors are typically offered by Schools which also offer a major. A program of study for the minor is outlined and it may include more than one option or “track”. Tracks allow students to focus on an aspect of the academic field that is of particular interest to them. It is expected that there will be depth of the program of study and that specific educational objectives will be met upon completion of the minor.

Other minors are offered where there is no undergraduate degree-granting program at Georgia Tech. These minors cover fields which are inherently multidisciplinary; i.e., ones that are covered in part by multiple degree granting academic programs. Multidisciplinary minors require particularly broad Programs of Study which include courses from multiple Schools and/or Colleges.

Program of Study

The program of study for each minor must satisfy the curricular requirements listed below. However, some minors, at the discretion of the offering academic unit(s), may be exempt from some of these requirements, may exceed some requirements, and/or add additional requirements. Consult the advisor for the minor program for the specific requirements of that minor.

Requirements for the Program of Study

1. A minor program of study must have at least 15 credit hours of coursework.
2. A minor program of study must include at least 9 credit hours of courses numbered 3000 or above.
3. Courses used to satisfy Core Areas A through E in a student’s major degree program cannot also be used to satisfy the course requirements for a minor.
4. Any free elective course used to satisfy the course requirements of the student’s major degree program may also be used to satisfy the course requirements for a minor.
5. All academic units may designate a block/blocks of courses outside of the student’s major field of study in which the same course can be used to satisfy the course requirements in the student’s major degree program and also be used to satisfy the course requirements for a minor.
6. A multidisciplinary or other minor may contain courses in a student’s major field of study. A maximum of 6 credit hours of such courses may be used to satisfy the course requirements for the minor, provided these courses are not also used to satisfy any course requirement in the student’s major degree program.
7. A maximum of 6 credit hours of Special Topics courses may be included in a minor program or the student may complete 3 credit hours of Special Topics and 3 credit hours of either Special Problems or Undergraduate Research. Students may not use 6 credit hours of either Special Problems or Undergraduate Research for a minor.
8. A maximum of 3 credit hours of transfer credit may be used to satisfy the course requirements for a minor. This includes courses taken at another institution or credit earned through the AP or IB program, assuming the scores meet Georgia Tech minimum standards.
9. A course may not be used to satisfy the requirements of more than one minor or certificate.
10. All courses counting toward the minor must be taken on a letter-grade basis.
11. All courses used to satisfy the course requirements for a minor must be completed with a grade of C (2.00) or better.

Other Guidelines

1. A student should select a minor in consultation with an advisor in their major field of study. The minor selected must be:
   a. outside of the student’s major, or
   b. a multidisciplinary minor that may include some courses in the student’s major field of study. (See requirement #6 above.)
2. The student should also consult with an advisor in the minor field of study who can inform and advise the student about the specific requirements of the minor. Some of these may be different than the requirements listed above.
3. Students can declare a minor at any time. However, it is recommended that students declare the minor as soon as they have made the decision so that they can monitor their progress using the online degree audit and with their advisor. Declaration of the minor also provides information to the relevant academic units that is helpful in planning courses. The minor declaration form is on the Registrar’s Office website at: http://www.registrar.gatech.edu/students/formlanding/changeminor.php.
4. The student must complete a minor program of study form at the same time the online application for graduation is completed, generally during the semester before the terminal one. Program of study forms for all minors can be found here (http://catalog.gatech.edu/academics/minors/#minorsofferedtext).
5. The minor is conferred at the same time the major degree is conferred. The major degree and minor will be recorded on the student’s transcript. The minor will not appear on the student’s diploma.
6. Minors will not be conferred retroactively upon students who have graduated.

Administrative Guidelines

1. All proposals for a minor must originate from the faculty of the academic unit(s) offering the minor. Minors may originate in several ways, such as:
   a. a minor in a field in which Georgia Tech offers a degree program through a single academic unit (College/School),
   b. a multidisciplinary minor, in which the subject matter is covered by multiple degree granting academic programs in multiple academic units (Colleges/Schools),
   c. a minor in a field in which there is no undergraduate degree-granting program at Georgia Tech. In this case, the proposed minor must be in a recognized academic field or discipline and
the offering academic unit(s) must have in place sufficient
courses, faculty, and facilities.

2. All proposals for a minor must include a statement of the educational
objectives of the minor and how the program of study is used to
satisfy these objectives.

3. The academic unit(s) offering the minor may choose to require an
admission process, set admission standards, and/or set enrollment
limits.

4. The academic units(s) offering the minor may request to be exempted
from some of the curricular requirements applied to the program of
study or add additional requirements if this is justified as essential to
meeting the stated educational objectives of the minor.

5. For a multidisciplinary or other minor, a maximum of 6 semester
hours of courses in the student’s major field of study may be used
to satisfy the course requirements for a minor when their inclusion
is justified as essential to meeting the stated educational objectives
of the minor. However, these courses cannot also be used to satisfy
any course requirement in the student’s major degree program unless
they belong to the special block of courses described in requirement
#5 of the Requirements for the Program of Study of the minor.

6. All proposals for a minor must include a plan for advising students
pursuing the minor and for approving a student’s completion of the
required program of study.

7. All proposals for a minor must be endorsed by the appropriate
College Dean(s) and by the Provost.

8. All undergraduate minors must be approved by the Institute
Undergraduate Curriculum Committee and by the Academic Senate.
Multidisciplinary minors must also be approved by the Chancellor of
the Board of Regents.

9. Information and relevant documents for proposing a new minor can
be found at http://www.icc.gatech.edu/submit/requirements.php?
type=101

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**Aerospace Engineering**
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Program of Study (https://registrar.gatech.edu/info/program-of-study-
form-minor-in-aerospace-engineering)

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Program of Study - Track for Industrial and Systems Engineering students (https://registrar.gatech.edu/info/program-of-study-form-minor-in-energy-systems-track-for-industrial-and-systems-engineering-students)
Program of Study - Track for Mechanical Engineering students (https://registrar.gatech.edu/info/program-of-study-form-minor-in-energy-systems-track-for-mechanical-engineering-students)
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Program of Study - Track for Chemistry and Biochemistry students (https://registrar.gatech.edu/info/program-of-study-form-minor-in-energy-systems-track-for-chemistry-and-biochemistry-students)
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Program of Study (https://registrar.gatech.edu/info/program-of-study-form-minor-in-music-technology)

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Program of Study (http://catalog.gatech.edu/programs/minor-naval-science/#requirementstext)

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**Russian Studies**
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Program of Study (https://registrar.gatech.edu/info/program-of-study-form-minor-in-russian-studies)

**Science, Technology, and Society**
Description (p. 588)
Program of Study (https://registrar.gatech.edu/info/program-of-study-form-minor-in-science-technology-and-society)

**Science Fiction Studies**
Description (p. 583)
Program of Study (https://registrar.gatech.edu/info/program-of-study-form-minor-in-science-fiction-studies)

**Scientific and Engineering Computing**
Description (p. 585)
Program of Study (https://registrar.gatech.edu/info/program-of-study-form-minor-in-scientific-and-engineering-computing)

**Social Justice**
Description (p. 586)
Program of Study (https://registrar.gatech.edu/info/program-of-study-form-minor-in-social-justice)

**Sociology**
Description (p. 587)
Program of Study (https://registrar.gatech.edu/info/program-of-study-form-minor-in-sociology)

**Sports, Society, and Technology**
Description (p. 588)
Program of Study (https://registrar.gatech.edu/info/program-of-study-form-minor-in-sports-society-and-technology)

**Spanish**
Description (p. 587)
Program of Study (https://registrar.gatech.edu/info/program-of-study-form-minor-in-spanish)

**Sustainable Cities**
Description (p. 589)
Program of Study (https://registrar.gatech.edu/info/program-of-study-form-minor-in-sustainable-cities)

**Technical Communication**
Description (p. 589)
Program of Study (https://registrar.gatech.edu/info/program-of-study-form-minor-in-technical-communication)

**Technology and Business**
Description (p. 590)
Program of Study (https://registrar.gatech.edu/info/program-of-study-form-minor-in-technology-and-business)

Women, Science, and Technology
Description (p. 590)

Program of Study (https://registrar.gatech.edu/info/program-of-study-form-minor-in-women-science-and-technology)
ADMISSIONS

- Graduate Admissions (p. 113)
- Undergraduate Admissions (p. 114)

Graduate Admissions

Prospective students may obtain information and apply for admission via the Graduate Studies website (http://www.grad.gatech.edu). The site provides information regarding minimum admission standards and relevant deadlines for individual programs.

Applicants for Georgia Tech’s graduate programs should hold a bachelor’s degree from a regionally accredited institution and be able to demonstrate academic excellence. Students should also be able to demonstrate experience with their selected field of graduate studies such as an undergraduate degree in the field or work experience in a related job.

- Admissions Information (p. 113)
- Graduate Record Exam (GRE) (p. 113)
- Orientation - New Students (p. 113)
- Reactivation of Application (p. 113)
- Readmission (p. 113)
- TOEFL for Int’l Students (p. 113)
- Transfer of Credit (p. 114)
- Types of Standing (p. 114)

Admissions Information

Anyone who is qualified is welcome to seek admission to Georgia Tech, and anyone who applies for and accepts admission can be confident that the policy and regular practice of the Institute will not discriminate against him or her on the basis of race, religion, sex, or national origin.

Verification of credentials and certification of compliance with Institute admissions policies shall be the responsibility of the Office of Graduate Studies. Policies and procedures that are approved by the Office of the President, Board of Regents of the University System of Georgia, and the Academic Faculty Senate of the Institute shall be applied in determining eligibility. From those eligible candidates, final admission decisions shall be the responsibility of the admitting department. Satisfying minimal standard does not guarantee admission, since the number of eligible applicants generally far exceeds the number of places available. As a result, many well-qualified applicants cannot be accommodated.

The criteria used in determining each applicant’s eligibility for consideration shall include:

1. Evidence of award of a bachelor’s degree, its equivalent, or higher degree (prior to matriculation) from a regionally accredited institution; demonstrated academic excellence; and evidence of experience in the selected field of graduate study.
2. For international applicants, satisfactory scores on the Test of English as a Foreign Language (TOEFL).

Departments make final admission decisions from the pool of eligible candidates based on a combination of factors, including academic degrees and records, the statement of purpose, letters of recommendation, test scores, and relevant work experience. Departments may also consider the appropriateness of the applicant’s goals to the degree program in which they are interested and to the research interests of the program’s faculty. In addition, consideration may be given to how the applicant’s background and life experience would contribute significantly to an educationally beneficial mix of students.

Graduate Record Examinations (GRE)

Official GRE general test scores are required by most graduate programs, except those in the Scheller College of Business, which require official Graduate Management Admission Test (GMAT) scores. GRE subject test scores are required for some programs. Check the Graduate Studies (http://www.gradadmiss.gatech.edu/degree-programs) website for test requirements in specific programs.

Orientation - New Students

Each new graduate student should plan to attend one of the Institute’s orientation sessions. Information on these sessions will be posted on the Graduate Studies website at www.grad.gatech.edu (http://www.grad.gatech.edu). In some cases, individual programs will also hold program orientations. New students should plan to attend both the Institute and the program orientation as the same information is not covered in these separate sessions.

Reactivation of Application

Applicants to a Georgia Tech graduate program who do not enter in the term for which they originally applied, and subsequently wish to be considered for a later term, must reactivate their applications for the new term by written request to the program to which they originally applied. Since the Graduate Studies office keeps files on never-entered students for one academic year only, students who delay more than one academic year in the reactivation request must reapply and provide a new set of application materials. The number of reactivations per applicant is limited.

Readmission

Students who interrupt the continuity of their graduate programs by not registering for two or more consecutive terms must seek readmission by filing a completed Request for Readmission form with the Registrar. Individuals who have received a graduate degree from Georgia Tech and who wish to reenter to receive an additional graduate degree (at the same level or higher) must also request readmission through this process. (It is not necessary to file a new application.) Readmission forms are available from the Office of the Registrar (http://www.registrar.gatech.edu/students/readmission.php). For more information, see the policy for withdrawal and readmission (p. 157).

Students who have been out two or more terms will be required to meet health, lawful presence, and other certification requirements in effect at the time of readmission.

TOEFL for International Students

All international students from countries in which English is not the primary native language must take the Test of English as a Foreign Language (TOEFL), except international students who have attended a college or university in the United States for at least one academic year (two semesters or three quarters). No other language test may be substituted. The TOEFL is the only test accepted by Georgia Tech.
The minimum score for graduate admission required by Georgia Tech is:

- 577 (paper based), or
- 90 (Internet based) and minimum section scores of 19

Some academic programs require higher scores. (See the program(s) of choice in the degree program listing found at www.grad.gatech.edu (http://www.grad.gatech.edu) to determine the minimum scores required by each program.) Since the results of this test constitute part of the material reviewed for admission to graduate study at Georgia Tech, students must arrange to have the Educational Testing Service send their official scores to the Graduate Studies office as early as possible.

**Transfer of Credit**

A student may not apply for transfer credit until after matriculation at Georgia Tech. The courses to be transferred would typically be those appearing on the approved program of study form for the masters degree. A doctoral student normally does not request transfer credit. The rules relative to and the process for obtaining transfer of credit for graduate-level courses are as follows:

1. Student’s in a master’s degree program requiring fewer than 33 semester credit hours may receive up to six hours of transfer credit for graduate-level courses taken at an institution accredited by a Canadian or U.S. regional accrediting board, or at a foreign school or university that has a signed partner agreement with Georgia Tech, and not used for credit toward another degree.

   A student in a master’s degree program requiring 33 semester credit hours or more may receive up to nine hours of transfer credit for graduate-level courses taken at an institution accredited by a Canadian or U.S. regional accrediting board, or at a foreign school or university that has a signed partner agreement with Georgia Tech, and not used for credit toward another degree. The student must supply a current transcript for this evaluation.

2. To obtain transfer of credit, the student must complete the following procedure:
   a. The student will confer with the graduate advisor to ascertain whether the courses to be transferred are a logical part of the student’s graduate program;
   b. If the courses are appropriate, the student will deliver to the school that teaches such courses a copy of the current transcript, necessary descriptive materials including catalog descriptions, and textbooks used for evaluation. The faculty of the appropriate school will determine the equivalent Georgia Tech course and the number of credit hours accepted. The faculty member who prepares the transfer credit form should have the school chair cosign it. The school should then send the form directly to the registrar with a copy of the student’s Approved Program of Study attached;
   c. If the student wishes to transfer more than the number of hours permitted in item one listed above, a petition must be submitted to the Institute Graduate Curriculum Committee that includes statements of possible justification for the granting of such a petition, transfer credit forms, and the recommendation of the student’s school chair.

3. A joint enrollment student may receive graduate credit for up to one-third of the hours required for the degree for graduate courses taken at Emory University or Georgia State University provided that the following is true:
   a. Georgia Tech does not offer such courses;
   b. The student’s advisor and school chair approve the courses in advance and in writing;
   c. The student passes the courses with a C or better. Advance approval is satisfied when the courses appear on the student’s proposed Program of Study.

4. A student may not receive transfer credit from universities outside the United States and Canada unless the courses were taken at a foreign institution or university that is accredited by a Canadian or U.S. regional accrediting board or has a signed partner agreement with Georgia Tech. In any other case, an international student can obtain credit for courses previously taken but not applied toward another degree by filling out an Examination for Advanced Standing Authorization Request Form, paying the appropriate fee at the Bursar’s Office, and passing the examination for advanced standing. The school or college that normally teaches the equivalent course will administer any necessary examinations.

**Types of Standing**

Applicants holding a bachelor's degree in an appropriate field from a regionally accredited institution will be given full graduate standing upon acceptance and matriculation, provided their previous work is of sufficient quality to indicate immediate success in advanced study.

If the work of an applicant holding an approved bachelor’s degree is deficient in content or quality so that supplemental study or demonstrated ability is necessary, the applicant may be given conditional graduate standing upon acceptance.

Applicants who do not wish to qualify for an advanced degree at Georgia Tech, but demonstrate the potential benefits of their participation in advanced study, may gain admission as special non-degree graduate students. Students who are admitted with special non-degree standing for failure to submit official transcripts or for other administrative reasons may apply not more than 16 semester credit hours taken on special non-degree standing toward a degree.

Graduate students in good standing at other U.S. universities may enroll at Georgia Tech as transient graduate students by filing an application for admission and by providing a letter of verification of good standing status from the registrar of the institution at which they are currently enrolled. Work undertaken in transient standing will not apply toward a Georgia Tech degree.

Undergraduate Admissions, not Graduate Studies, will admit students working toward a second bachelor’s degree.

In addition to full, conditional, and special non-degree graduate standing, graduate students will be classified by academic standing according to their GPAs: good standing, warning, probation, or drop. (The graduate GPA includes the grades on all courses scheduled by the student after admission to graduate study.) For specific information, see the scholastic regulations (p. 119).

**Undergraduate Admissions**

- Freshmen (p. 115)
- Transfer (p. 116)
- Readmission (p. 119)
Freshmen Admission

General Information for First-Year Admission

First-year students may only apply for the summer or fall terms. A completed application for first-year admission includes a non-refundable application fee, high school transcript (or equivalent), and SAT I and/or ACT scores sent directly to the Office of Undergraduate Admission. International applicants and applicants who have been homeschooled may be required to submit additional information. We accept both the Coalition Application (https://www.mycoalition.org/public/info/gatech) and Common Application (https://www.commonapp.org/school/georgia-institute-technology) for first-year admission. We do not have a preference, and there is no advantage in the admission process to using one application or the other. Students should select the application they are most comfortable submitting.

It is the applicant's responsibility to ensure that all required elements, including the application, non-refundable application fee, high school transcript, and SAT I and/or ACT scores are submitted by stipulated deadlines. All elements must be received prior to the first-year application deadlines. More information regarding first-year application deadlines can be found at www.admission.gatech.edu/apply/freshman-application/application-dates (http://www.admission.gatech.edu/apply/freshman-application/application-dates).

The Office of Undergraduate Admission will consider all completed applications on file by the stated deadlines. For more information regarding first-year admission to the Georgia Institute of Technology, visit www.admission.gatech.edu (http://www.admission.gatech.edu), call 404.894.4154, or email admission@gatech.edu.

Academic Advising

The appointed academic advisor is the key source of information about the college. All entering students are assigned an academic advisor depending on their declared majors at Georgia Tech. To find the assigned advisor, visit the advising Web page (http://advising.gatech.edu). Students will meet their assigned advisors at orientation and at regular intervals during their college careers. Advisors welcome questions about different programs and areas.

Academic advisors are the guides through the college experience. They will help to identify the correct major, curriculum, minor, certificates, study abroad, internships, campus resources, and much more.

While the degree requirements are posted on the Registrar's Office web page (http://registrar.gatech.edu), it is essential to check in with the assigned advisor at least once a year (if not more) to ensure that requirements are being met and communication lines are open. Also, regular contact with the advisor will enhance each student's college experience and help them reach their future goals.

Academic Advising (http://www.advising.gatech.edu)
Degree Requirements (http://catalog.gatech.edu/programs)

Policy on the Competitive Admission of Freshman Applicants

Georgia Tech is a top-ten public university determined to define the technological research university of the 21st century. Publicly funded and governed by the University System of Georgia, the Institute is committed to preparing students for global leadership, effectiveness, and innovation.

Consistent with its mission to improve the human condition in Georgia, the United States, and around the globe, Georgia Tech counts the diversity of its students among its greatest strengths and an integral component of its educational process and academic excellence.

The undergraduate admissions process, which reflects the Institute's educational mission and motto of "Progress and Service," seeks to identify those applicants, who as individuals and as a group, will benefit from the campus learning environment, and thus enrich the entire student body. The process is structured to build entering classes of students whose varied backgrounds and experiences provide substantial evidence of their potential to:

• Meet the Institute's requirements for academic success
• Embrace the diverse campus community
• Benefit substantially from the Institute's curriculum and scholarly pursuits
• Develop as leaders, innovators, global citizens, and engaged learners
• Contribute to the intellectual, cultural, social, and civic life of the Institute, state, and nation

Each year, Georgia Tech must make fine distinctions among large numbers of highly qualified applicants. The ability to assess consistently all information presented in the application becomes increasingly important. Therefore, the Office of Undergraduate Admission employs a rigorous review process in order to provide an individualized and holistic evaluation of every application. Each applicant is assessed on the basis of achievements and potential in a broad range of categories, viewed in the context of the opportunities and challenges the applicant faced. These categories include:

• Strength of educational performance, as measured by the nature and rigor of high school curriculum and academic achievements
• Potential for academic success, as evidenced by performance on nationally normed standardized tests
• Potential to contribute to the overall intellectual climate and make a positive contribution to campus and community life
• Demonstrated commitment to intellectual engagement

Appeals concerning individual admission decisions shall be addressed to the Director of the Office of Undergraduate Admission or the Vice Provost for Enrollment Services.

More information:

• Undergraduate Admission (http://admission.gatech.edu)

Required Computer Ownership

In an effort to foster equal access to computers and to make the most of the teaching and learning technology available at Georgia Tech, all undergraduate students entering Georgia Tech under this or subsequent catalogs are required to own or lease a computer. The minimum hardware and software requirements (as well as purchasing and financing options)
are sent each spring to students accepted for the summer and fall semesters, and in the fall to students accepted for spring semester.

Because computer ownership is mandatory, an average cost for the minimum hardware and software required can be included in computing a new student’s cost of education for the purpose of determining their eligibility for all forms of student financial aid. Students should contact the Office of Scholarships and Financial Aid for more information.

Student Computer Ownership Website (http://www.sco.gatech.edu)

International Students

International students should access further information regarding application policies and procedures and other basic information helpful to applicants from other countries by visiting www.admission.gatech.edu/international (http://www.admission.gatech.edu/international). International students will not receive financial aid or institutional scholarships.

For more information, email the Office of Undergraduate Admission at admission@gatech.edu.

Office of International Education (https://www.oie.gatech.edu)

Office of Undergraduate Admission (http://admission.gatech.edu)

FASET (New Student Orientation)

Familiarization and Adaptation to the Surroundings and Environ of Tech (FASET) is coordinated by The Office of New Student and Transition Programs.

FASET is Georgia Tech’s orientation program for incoming undergraduate students and their families.

• First-year students
• New transfer students
• New exchange students
• Parents, family members, and guests of these students

FASET has been a Georgia Tech tradition since 1972. Orientation sessions are offered at the start of each semester for transfer and exchange students and during the summer for incoming first-year students.

During FASET, new students receive academic advisement, register for their first semester of courses, and complete other business items. In addition, Georgia Tech faculty, staff, and administrators discuss important campus services, student organizations, the undergraduate curriculum, and academic programs. Most importantly, students, parents, and guests have the opportunity to meet and interact with current Georgia Tech students and to get to know other new students, parents, and guests.

For more information, call 404.894.6897 or visit www.transitionprograms.gatech.edu (http://www.nssp.gatech.edu).

Wreck Camp

Wreck Camp is facilitated by the Office of New Student and Sophomore Programs. It is an extended orientation experience for incoming students that brings together new and current students to jump-start the college experience in a fun “summer camp” setting. Wreck Camp assists students in their transitions to Georgia Tech by helping them develop diverse social networks and strengthening their ties to the Institute while introducing them to the Institute’s culture and traditions. For three days and two nights, incoming students go with current student leaders to an off-campus retreat center where they share experiences in which they learn more about Georgia Tech, its traditions, and one another.

The Office of New Student and Sophomore Programs (http://www.nssp.gatech.edu/content/611/wreck-camp) is part of the Division of Student Life.

Transfer Admissions

The Application for Transfer Admission is available online at www.admission.gatech.edu/apply (http://www.admission.gatech.edu/apply). To be eligible for admission, students must complete the application, submit the non-refundable application fee, and submit official transcripts from all United States colleges or universities ever attended. Students who have completed any coursework outside the United States will be required to submit additional information. All documents must be original and certified as appropriate.

The Office of Undergraduate Admission will consider all completed applications on file by the stated deadlines, provided spaces are available for the particular term or academic year for which the student applies. For more information including admission requirements and deadlines regarding transfer admission to the Georgia Tech, visit www.transfer.gatech.edu (http://www.transfer.gatech.edu) or call 404.894.4154.

More information:

• Undergraduate Admission | Transfer Admission (http://admission.gatech.edu/transfer)
• Office of the Registrar | Transfer Credit (http://www.registrar.gatech.edu/students/transfercredit.php)
• Office of the Registrar | Transfer Equivalency Catalog (https://oscar.gatech.edu/pls/bprod/wwsktrna.P_find_location)

Policy on the Competitive Admission of Transfer Applicants

All qualified persons are equally welcome to seek transfer admission to Georgia Tech, and all persons may apply for and accept admission confident that the policy and regular practice of the Institute will not discriminate against them on the basis of race, religion, sex, or national origin.

Projections of the number of transfer students to be admitted and enrolled in any year will be determined

1. by the capacity of the Institute and
2. by approved enrollment levels.
If the number of qualified applicants for admission exceeds the number of applicants who can be admitted and enrolled, those to be offered admission will be selected on the basis of

1. the Institute’s judgment of the applicant’s relative qualifications for satisfactory performance in the Institute and
2. recognition of the Institute’s special responsibilities to the residents of Georgia.

The policy of competitive admissions, set forth above, will not prevent the admission of selected applicants who give evidence of possessing special talents for the Institute’s programs requiring such special talents.

The admission of undergraduate students to pursue programs leading to a bachelor’s degree shall be the responsibility of the Office of Undergraduate Admission. That office will apply policies and procedures that are approved by the Office of the President and the Board of Regents of the University System of Georgia.

The criteria used in determining each transfer applicant’s qualifications for admission will include satisfactory evidence of scholastic promise based upon the applicant’s previous academic transfer record.

Appeals concerning individual admission decisions shall be addressed to the director of the Office of Undergraduate Admission.

More information:

• Catalog | Out-of-State Tuition Wavers (p. 134)
• Undergraduate Admission | Transfer Admission (http://admission.gatech.edu/transfer)

**Academic Advising**

The appointed academic advisor is the key source of information about the college. All entering students are assigned an academic advisor depending on their declared majors at Georgia Tech. To find the assigned advisor, visit the advising Web page (http://advising.gatech.edu). Students will meet their assigned advisors at orientation and at regular intervals during their college careers. Advisors welcome questions about different programs and areas.

Academic advisors are the guides through the college experience. They will help to identify the correct major, curriculum, minor, certificates, study abroad, internships, campus resources, and much more.

While the degree requirements are posted on the Registrar’s Office web page (http://registrar.gatech.edu), it is essential to check in with the assigned advisor at least once a year (if not more) to ensure that requirements are being met and communication lines are open. Also, regular contact with the advisor will enhance each student’s college experience and help them reach their future goals.

Academic Advising (http://www.advising.gatech.edu)

Degree Requirements (http://catalog.gatech.edu/programs)

**Required Computer Ownership**

In an effort to foster equal access to computers and to make the most of the teaching and learning technology available at Georgia Tech, all undergraduate students entering Georgia Tech under this or subsequent catalogs are required to own or lease a computer. The minimum hardware and software requirements (as well as purchasing and financing options) are sent each spring to students accepted for the summer and fall semesters, and in the fall to students accepted for spring semester.

Because computer ownership is mandatory, an average cost for the minimum hardware and software required can be included in computing a new student’s cost of education for the purpose of determining their eligibility for all forms of student financial aid. Students should contact the Office of Scholarships and Financial Aid for more information.

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For more information, call 404.894.6897 or visit www.transitionprograms.gatech.edu (http://www.nssp.gatech.edu).

**Regents’ Testing Program**

**Effective Spring 2010**

The Regents’ exam is no longer required at Georgia Tech as a result of a recent decision by The Board of Regents’.
Sophomore Programs

In collaboration with campus departments and academic units, the Office of New Student and Sophomore Programs provides programs and services to support sophomore success and meet the unique needs of students during this critical academic transition. The overall goals of these programs are to help sophomores in managing and succeeding with sophomore year courses, moving from exploration to decision-making about majors and careers, developing meaningful relationships on-campus and beyond, pursuing involvement and leadership opportunities, and creating a sophomore class identity. These goals are achieved through multiple programs, including:

- Sophomore Leadership Council
- Sophomore Leadership Forum
- Year 2 at Tech E-Newsletter (http://www.nssp.gatech.edu/content/737/year-2-at-tech)
- Sophomore Career Experience (http://www.nssp.gatech.edu/content/411/sophomore-career-experience)

More information is available from the Office of New Student and Sophomore Programs (http://nssp.gatech.edu).

Transfer Credit

The basic policy regarding the acceptance of courses by transfer is to allow credit for courses completed with satisfactory grades ("C" or better) at other accredited colleges and universities in the United States and Canada, provided the courses correspond in time and content to courses offered at Georgia Tech. The Institute will not accept credit for courses successfully completed at another institution but previously taken at Georgia Tech unless the final grade received at Georgia Tech is a "W." The student must request and file an official transcript from Georgia Tech does not award credit for professional certificate programs, courses offered at Georgia Tech. The Institute will not award credit for courses completed with satisfactory grades ("C" or better) at other accredited colleges and universities in the United States and Canada, provided the courses correspond in time and content to courses offered at Georgia Tech. Georgia Tech assumes responsibility for the academic quality of any work or credit recorded on the institution's transcript. Transfer credits will be accepted from newly-formed institutions of the University System of Georgia prior to accreditation.

B. The basic policy regarding the acceptance of the courses by transfer is to allow credit for courses completed with satisfactory grades ("C" or better) in other accredited colleges provided the courses correspond in time and content to courses offered at the Georgia Institute of Technology. Georgia Tech assumes responsibility for the academic quality of any work or credit recorded on the institution's transcript. Transfer credits will be accepted from newly-formed institutions of the University System of Georgia prior to accreditation.

C. Georgia Tech will not award credit for courses successfully completed at another institution which were previously taken at Georgia Tech.

D. A petition to the faculty must be approved to use course work more than ten years old.

E. Georgia Tech reserves the right to test the proficiency of any student in course work transferred from other institutions and to disallow credit in courses in which the student cannot demonstrate acceptable proficiency.

Transfer Credit for Online Courses

A. Currently, online versions of all Lab Science courses, International Affairs, Psychology, Economics and courses equivalent to HIST 2111 and HIST 2112 are not eligible for transfer credit consideration. In most cases Mathematics courses are not eligible for consideration unless sufficient documentation is provided to show the course exams are proctored. Students interested in taking the online versions of any Mathematics courses that meet this requirement, or have questions regarding this policy, the Office of the Registrar via email: comments@registrar.gatech.edu.

Requesting Transfer Credit for Courses Not Previously Evaluated

A. Check the online equivalency database (https://oscar.gatech.edu/pls/bprod/wvscktrna.P_find_location) for updates. New evaluations are posted daily.

B. Notify the Office of the Registrar’s Transfer Credit Department of any not-awarded credit. Send an email to comments@registrar.gatech.edu

C. Using the Transfer Credit web site (https://transfercredit.gatech.edu), submit courses for evaluation.

About Transfer Credit

A. Georgia Tech does not offer correspondence courses and does not grant credit for correspondence courses taken at other institutions. Academic units reserve the right to take such things as delivery method into consideration. For example, on-line courses and computer-instructed courses may not be accepted by some academic units for credit.

B. Georgia Tech does not grant credit for the College Level General Educational Development Tests, CLEP USAFI courses, or courses completed at any United States armed services, with the exception of the military academies and schools with full accreditation from a regional accrediting body.

C. Georgia Tech does not grant credit for professional certificate programs.
D. The following items are among other circumstances in which non-resident credit is not granted:
   - Courses previously completed at Georgia Tech.
   - College courses taken to meet freshman admissions requirements.
   - Remedial courses.
   - Courses basically secondary school or pre-college level.
   - Courses with essentially non-academic content.
   - Vocational courses.
   - Learning support courses.

E. Non-resident credit is not computed as a part of the student’s grade point average at Georgia Tech.

Transfer Credit for Online Courses

A. Currently, online versions of all Lab Science courses, International Affairs, Psychology, Economics and courses equivalent to HIST 2111 and HIST 2112 are not eligible for transfer credit consideration. In most cases Mathematics courses are not eligible for consideration unless sufficient documentation is provided to show the course exams are proctored. Students interested in taking the online versions of any Mathematics courses that meet this requirement, or have questions regarding this policy, the Office of the Registrar via email: comments@registrar.gatech.edu.

Advanced Placement (AP) and International Baccalaureate (IB)

A. Follow the steps below to view AP or IB equivalencies.
   1. Go to https://oscar.gatech.edu
   2. Select the "Transfer Equivalencies" icon
   3. Select the asterisk (*) from the pull down menu
   4. Click "Continue" button
   5. Select your option from the pull down menu
   6. Click "Get Courses" button

B. Once enrolled at Georgia Tech, students are not allowed to take College Board (Advanced Placement and SAT II), International Baccalaureate or A-Level Examinations for credit. All examinations must be completed prior the student’s enrollment date. Students who offer satisfactory evidence that they are qualified to do so may receive credit for a course by examination at Georgia Tech. Such an examination is called an "Examination for Advanced Standing (p. 103)."

More information:
Transfer Equivalency Catalog (https://oscar.gatech.edu/pls/bprod/wwsktrna.P_find_location)

Readmission

Any student who is not enrolled for two or more consecutive terms (counting Summer Session) must apply for readmission. The Application for Readmission, with all pertinent supporting information, must be submitted to the Office of the Registrar before the deadline for the term for which readmission is requested as listed below:

<table>
<thead>
<tr>
<th>Term Deadline 1</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall</td>
<td>July 1st</td>
</tr>
</tbody>
</table>

Spring December 1st
Summer April 1st

1 Former students on drop or review status should apply at least two months prior to these deadlines in order to ensure sufficient time for the review process.

The "Rules and Regulations" section in this Catalog contains additional information on readmission.

Students who withdraw from the Institute (receiving all grades of "W") will not ordinarily be permitted to enroll the next succeeding term. If an exception is requested due to unusual circumstances, a Petition to the Faculty must be filed.

Students who have been out two or more terms will be required to meet health, lawful presence, and other certification requirements in effect at the time of readmission.

More information:
   - Withdrawal / Readmission Policies (p. 157)
   - Medical Regulations (p. 165)
   - Lawful Presence Requirement (https://registrar.gatech.edu/info/lawful-presence)

Academic Advising

The appointed academic advisor is the key source of information about the college. All entering students are assigned an academic advisor depending on their declared majors at Georgia Tech. To find the assigned advisor, visit the advising Web page (http://advising.gatech.edu). Students will meet their assigned advisors at orientation and at regular intervals during their college careers. Advisors welcome questions about different programs and areas.

Academic advisors are the guides through the college experience. They will help to identify the correct major, curriculum, minor, certificates, study abroad, internships, campus resources, and much more.

While the degree requirements are posted on the Registrar’s Office web page (http://registrar.gatech.edu), it is essential to check in with the assigned advisor at least once a year (if not more) to ensure that requirements are being met and communication lines are open. Also, regular contact with the advisor will enhance each student’s college experience and help them reach their future goals.

Academic Advising (http://www.advising.gatech.edu)

Degree Requirements (http://catalog.gatech.edu/programs)

Readmission Immunization Requirements

Any student who is not enrolled for two or more consecutive terms (counting Summer Session) must apply for readmission. Students seeking readmission be required to meet health, lawful presence, and other certification requirements in effect at the time of readmission.
Transfer Credit Policy

Policy on Transfer Credit

A. Only official transcripts from other schools may be used to evaluate and/or award credit.
   - **New students** must request that an official transcript from all previously attended colleges and universities be mailed to the Admissions Office.
   - Georgia Institute of Technology Undergraduate Admissions Office
     Atlanta, GA 30332-0320
   - **Current or previously enrolled Georgia Tech students** must have an official transcript from all other colleges and universities mailed to:
     - Georgia Institute of Technology
     - Office of the Registrar
     - Transfer Credit
     - Atlanta, GA 30332-0320

B. The basic policy regarding the acceptance of the courses by transfer is to allow credit for courses completed with satisfactory grades (C or better) in other accredited colleges provided the courses correspond in time and content to courses offered at the Georgia Institute of Technology. Georgia Tech assumes responsibility for the academic quality of any work or credit recorded on the institution's transcript. Transfer credits will be accepted from newly-formed institutions of the University System of Georgia prior to accreditation.

C. Georgia Tech will **not** award credit for courses successfully completed at another institution which were previously taken at Georgia Tech.

D. A petition to the faculty must be approved to use course work more than ten years old.

E. Georgia Tech reserves the right to test the proficiency of any student in course work transferred from other institutions and to disallow credit in courses in which the student cannot demonstrate acceptable proficiency.

Transfer Credit for Online Courses

A. Currently, online versions of all Lab Science courses, International Affairs, Psychology, Economics and courses equivalent to HIST 2111 and HIST 2112 are not eligible for transfer credit consideration. In most cases Mathematics courses are not eligible for consideration unless sufficient documentation is provided to show the course exams are proctored. Students interested in taking the online versions of any Mathematics courses that meet this requirement, or have questions regarding this policy, the Office of the Registrar via email: comments@registrar.gatech.edu.

Requesting Transfer Credit for Courses Not Previously Evaluated

A. Check the online equivalency database (https://oscar.gatech.edu/pls/bprod/wwwsktna.P_find_location) for updates. New evaluations are posted daily.

B. Notify the Office of the Registrar’s Transfer Credit Department of any not-awarded credit. Send an email to comments@registrar.gatech.edu

C. Using the Transfer Credit web site (https://transfercredit.gatech.edu), submit courses for evaluation.

About Transfer Credit

A. Georgia Tech does not offer correspondence courses and does not grant credit for correspondence courses taken at other institutions. Academic units reserve the right to take such things as delivery method into consideration. For example, on-line courses and computer-instructed courses may not be accepted by some academic units for credit.

B. Georgia Tech does not grant credit for the College Level General Educational Development Tests, CLEP, USAFI courses, or courses completed at any United States armed services, with the exception of the military academies and schools with full accreditation by a regional accrediting body.

C. Georgia Tech does not grant credit for professional certificate programs.

D. The following items are among other circumstances in which non-resident credit is **not** granted:
   - Courses previously completed at Georgia Tech.
   - College courses taken to meet freshman admissions requirements.
   - Remedial courses.
   - Courses basically secondary school or pre-college level.
   - Courses with essentially non-academic content.
   - Vocational courses.
E. Non-resident credit is not computed as a part of the student's grade point average at Georgia Tech.

Transfer Credit for Online Courses

A. Currently, online versions of all Lab Science courses, International Affairs, Psychology, Economics and courses equivalent to HIST 2111 and HIST 2112 are not eligible for transfer credit consideration. In most cases Mathematics courses are not eligible for consideration unless sufficient documentation is provided to show the course exams are proctored. Students interested in taking the online versions of any Mathematics courses that meet this requirement, or have questions regarding this policy, the Office of the Registrar via email: comments@registrar.gatech.edu.

Advanced Placement (AP) and International Baccalaureated (IB)

A. Follow the steps below to view AP or IB equivalencies.
1. Go to https://oscar.gatech.edu
2. Select the "Transfer Equivalencies" icon
3. Select the asterisk (*) from the pull down menu
4. Click "Continue" button
5. Select your option from the pull down menu
6. Click "Get Courses" button

B. Once enrolled at Georgia Tech, students are not allowed to take College Board (Advanced Placement and SAT II), International Baccalaureate or A-Level Examinations for credit. All examinations must be completed prior the student's enrollment date. Students who offer satisfactory evidence that they are qualified to do so may receive credit for a course by examination at Georgia Tech. Such an examination is called an "Examination for Advanced Standing (p. 103)."

More information:
Transfer Equivalency Catalog (https://oscar.gatech.edu/pls/bprod/wwsktrna.P_find_location)
FINANCIAL

- Assistance (p. 122)
- Billing (p. 131)
- Cancellation of Registration (p. 131)
- Fees (p. 132)
- Payment (p. 132)
- Refunds (p. 133)
- Student Financial Agreement (p. 133)
- Tuition (p. 134)
- Verification of Participation (p. 137)

Assistance

- Graduate Financial Assistance (p. 122)
- Undergraduate Financial Assistance (p. 127)

Graduate Financial Assistance

The Institute offers financial aid from a variety of sources to assist students with the pursuit and completion of their degrees as rapidly as circumstances permit.

Students should address inquiries for financial assistance to the financial aid office of the school in which they plan to study. Graduate school applicants should also investigate national fellowships offered by various foundations, professional organizations, and government agencies; many are listed with the Fellowships Office (http://fellowships.gatech.edu). Educational loans are available for qualified applicants through the Office of Scholarships and Financial Aid. More information about Federal Loan programs and various alternative loan programs may be found at www.finaid.gatech.edu (http://www.finaid.gatech.edu).

- Assistantships (p. 122)
- Fellowships (p. 122)
- Out-of-State Tuition Waivers (p. 123)
- Outside Sponsorships (p. 124)
- Veterans Services (p. 125)

Assistantships

Graduate Research Assistantships

Students receiving Graduate Research Assistantships must be registered for at least twelve total graduate credits with at least nine hours attempted for a letter grade or on a Pass/Fail basis and be employed at least one-third of the time by the Institute. Students receiving Graduate Research Assistantships are also eligible for a tuition waiver.

Graduate Teaching Assistantships

Students receiving Graduate Teaching Assistantships must be registered for at least twelve total graduate credits with at least nine hours attempted for a letter grade or on a Pass/Fail basis and be employed at least one-third of the time by the Institute. Students receiving Graduate Teaching Assistantships are also eligible for a tuition waiver.

Graduate Assistantship Schedule and Flexibility Policy

Source: Georgia Tech Policy Library (http://www.policylibrary.gatech.edu/personal-services-reporting-using-plan-confirmation-system)

Policy Statement: The work duties of Graduate Research Assistants (GRAs) and Graduate Teaching Assistants (GTAs) encompass 4.5 calendar months for fall and spring terms and three calendar months for summer term. The fall term work period consists of half of August and all of September through December. The spring term work period consists of January through April and half of May. Summer term consists of half of May, all of June and July, and half of August. Supervisors are generally expected to employ a GRA or GTA for the full work period, providing continuous employment and pay throughout the year.

GRAs and GTAs are not required to work on official Institute holidays, which appear on the Human Resources web site. In addition, at the discretion of the student’s supervisor, a GRA or GTA may be permitted to average effort over several weeks or cluster research or teaching activities in order to spend one or more weeks away from campus during the semester or, more frequently, during periods when classes are not in session. Any time away requires the approval of the supervisor. This flexibility may be used to allow later start dates for students new to campus. Some work assignments may not permit this flexibility.

GRAs or GTAs appointed to sponsored research projects should monitor their appointments monthly in the Electronic Workload Assignment Form (EWAF), because they will be required to sign an Annual Statement of Reasonableness indicating that the effort they put into projects was correctly recorded. For more information, read the policy on Personal Services Reporting Using the Plan Confirmation System (http://www.policylibrary.gatech.edu/personal-services-reporting-using-plan-confirmation-system) in the Georgia Tech Policy Library (http://www.policylibrary.gatech.edu/personal-services-reporting-using-plan-confirmation-system).

Fee Payment through Payroll Deduction

The Office of the Bursar maintains information regarding the GRA/GTA-Fee Payment Program which facilitates the payment of tuition and fees through payroll deductions for students who are employed at Georgia Tech as Graduate Research Assistants (GRAs) or Graduate Teaching Assistants (GTAs) and who are paid on a monthly basis. For more information, read the policy on Payroll Deduction for Tuition and Fees (http://www.bursar.gatech.edu/content/grahgtapayroll-deduction) on the Office of the Bursar’s web site (http://www.bursar.gatech.edu/content/gra-gta-payroll-deduction).

Fellowships

Georgia Tech awards a large number of individual fellowships. They vary in value from a few hundred dollars to $30,000 per year or more. Most of them are awarded by schools, not by the Office of Graduate Studies or the Office of Financial Aid. Even for programs where several schools are eligible, nominations come from within the programs, not directly from individual students.

The only Institute-level fellowship programs (http://www.finaid.gatech.edu/fellowships) are President’s Fellowships ($5,500 per year) and Institute Fellowships ($11,000 per year). These supplement assistantships or other fellowships. Programs nominate incoming students for these programs, and the Office of Graduate
Out-of-State Tuition Waivers

Georgia Tech has permission from the Board of Regents to award out-of-state tuition differential waivers and assess in-state tuition for certain nonresidents of Georgia for the following reasons and under the following conditions. The waivers processed in the Office of the Registrar are listed below.

- **University System Employees and Dependents**
  Full-time employees of the University System, their spouses, and their dependent children.
  [Download Application for USG Employess and Dependents](registrar.gatech.edu/docs/pdf/residency/usg.pdf)

- **Full-time School Employees**
  Full-time employees in the public schools of Georgia or the Technical College System of Georgia, their spouses, and their dependent children. Teachers employed full-time on military bases in Georgia shall also qualify for this waiver (BR Minutes, 1988-89, p. 43).
  [Download Application for Full-Time School Employees](registrar.gatech.edu/docs/pdf/residency/full_time_school_employees_waiver.pdf)

- **Career Consular Officials**
  Career consular officers, their spouses, and their dependent children who are citizens of the foreign nation that their Consulate office represents and who are stationed and living in Georgia under orders of their respective governments.
  [Download Application for Career Consular Officials](registrar.gatech.edu/docs/pdf/residency/career_consular_waiver.pdf)

- **Military**
  1. Active duty military personnel, their spouses, and their dependent children who meet one of the following:
     a. The military sponsor is currently stationed in or assigned to Georgia; or,
     b. The military sponsor previously stationed in or assigned to Georgia is reassigned outside of Georgia, and the student(s) remain (s) continuously enrolled in a Georgia school, Technical College System of Georgia institution, and/or a University System of Georgia institution; or,
     c. The military sponsor is reassigned outside of Georgia and the spouse and/or dependent children remain in Georgia; or,
     d. The military sponsor is stationed in a state contiguous to the Georgia border and resides in Georgia; or,
     e. Dependent children of a military sponsor, previously stationed in or assigned to Georgia within the previous five years, or the child completed at least one year of high school in Georgia; or,
     f. Any student utilizing VA educational benefits transferred from a currently serving military member is also eligible, even if the student is no longer a dependent of the transferor.
     g. Individuals stationed in or assigned to Georgia due to a NATO assignment (in the U.S. on a NATO visa and part of a NATO exchange program). Students must present their current U.S. military ID card showing they are active duty and a copy of their NATO orders showing they are assigned to Georgia. Dependent students and spouses are also eligible provided they submit documentation of their relationship to the individual assigned to Georgia on NATO orders in addition to the other documentation.
        - Download Application for Active Duty Military Personnel

  2. Active members of the Georgia National Guard stationed or assigned to Georgia or active members of a unit of the U.S. Military Reserves based in Georgia, and their spouses and their dependent children (BoR Minutes, October 2008).
     - Download Application for GA National Guard and Reservists

  3. Separated military members from a uniformed military service of the United States who meet one of the following (BoR Minutes, June 2004; October 2008; October 2013; March 2016; May 2017):
     a. Individuals who within thirty-six (36) months of separation from such service, enroll in an academic program and demonstrate intent to become domiciled in Georgia. This waiver may also be granted to their spouses and dependent children.
     b. Any separated service member or any student utilizing transferred VA educational benefits, and physically residing in the state, who enrolls within one hundred-twenty (120) months of separation is also eligible.
     d. Anyone using benefits under the Marine Gunnery Sergeant John David Fry Scholarship who lives in the state in which the institution is located (regardless of formal state residence).
        - Except...
          - Surviving spouses can use the Fry Scholarship for 15 years from the anniversary of the service member’s death or until they remarry.
          - Eligible children can use the Fry Scholarship between the ages of 18 and 33.
        - Download Application for Those Separated from the Military

- **Economic Advantage**
  As of the first day of classes for the term, an economic advantage waiver may be granted to a U.S. citizen or U.S. legal permanent resident who is a dependent or independent student and can provide clear evidence that the student or the student’s parent, spouse, or U.S. court-appointed legal guardian has relocated to the State of Georgia to accept full-time, self-sustaining employment and has established domicile in the State of Georgia. Relocation to the state must be for reasons other than enrolling in an institution of higher education. For U.S. citizens or U.S. legal permanent residents, this waiver will expire 12 months from the date the waiver was granted. As of the first day of classes for the term, an economic advantage waiver may be granted to an independent non-citizen possessing a valid employment-related visa status who can provide clear evidence of having relocated to the State of Georgia to accept full-

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Graduate Financial Aid ([http://www.gradadmiss.gatech.edu/paying-for-grad-school](http://www.gradadmiss.gatech.edu/paying-for-grad-school))
time, self-sustaining employment. Relocation to the state must be for employment reasons and not for the purpose of enrolling in an institution of higher education. These individuals must be able to show clear evidence of having taken legally permissible steps toward establishing legal permanent residence in the United States and the establishment of legal domicile in the State of Georgia. Independent non-citizen students may continue to receive this waiver as long as they maintain a valid employment-related visa status and can demonstrate continued efforts to establish U.S. legal permanent residence and legal domicile in the State of Georgia. A dependent non-citizen student who can provide clear evidence that the student’s parent, spouse, or U.S. court-appointed legal guardian possesses a valid employment-related visa status and can provide clear evidence of having relocated to the State of Georgia to accept full-time, self-sustaining employment is also eligible to receive this waiver. Relocation to the state must be for employment reasons and not for the purpose of enrolling in an institution of higher education. These individuals must be able to show clear evidence of having taken legally permissible steps toward establishing legal permanent residence in the United States and the establishment of legal domicile in the State of Georgia. Non-citizen students currently receiving a waiver who are dependents of a parent, spouse, or U.S. court-appointed legal guardian possessing a valid employment-related visa status may continue to receive this waiver as long as they can demonstrate that their parent, spouse, or U.S. court-appointed legal guardian is maintaining full-time, self-sustaining employment in Georgia and is continuing efforts to pursue an adjustment of status to U.S. legal permanent resident and the establishment of legal domicile in the State of Georgia. (BR Minutes, October 2008.)

Download Application for Economic Advantage (http://registrar.gatech.edu/docs/pdf/residency/economic_advantage_waiver.pdf)

• Non-Resident Students

As of the first day of classes for the term, a non-resident student can be considered for this waiver under the following conditions:

• Students under 24

  • If the parent, or United States court-appointed legal guardian has maintained domicile in Georgia for at least twelve (12) consecutive months and the student can provide clear and legal evidence showing the relationship to the parent or United States court-appointed legal guardian has existed for at least twelve (12) consecutive months immediately preceding the first day of classes for the term. Under Georgia code, legal guardianship must be established prior to the student’s 18th birthday (BoR Minutes, October 2008, title amended February 2010); or
  
  • If the student can provide clear and legal evidence showing a familial relationship to the spouse and the spouse has maintained domicile in Georgia for at least twelve (12) consecutive months immediately preceding the first day of classes for the term (BoR Minutes, February 2010).

• Students 24 and Older

  • If the student can provide clear and legal evidence showing a familial relationship to the spouse and the spouse has maintained domicile in Georgia for at least twelve (12) consecutive months immediately preceding the first day of classes for the term. This waiver can remain in effect as long as the student remains continuously enrolled (BoR Minutes, October 2008, title amended February 2010).

This waiver can remain in effect as long as the student remains continuously enrolled (BoR Minutes, October 2008).

Download Application for Non-Resident Students (http://registrar.gatech.edu/docs/pdf/residency/non-residents_student.pdf)

• Senior Citizen Waiver

A student of the first day of classes for the term, a waiver of in-state tuition and fees may be granted to a legal resident of Georgia aged 62 and over. This waiver can remain in effect as long as the student is continuously enrolled.

Download Application for Senior Citizens (http://registrar.gatech.edu/docs/pdf/residency/senior_waiver.pdf)

Students who come to Georgia Tech from another state and work for companies in Georgia remain ineligible for in-state tuition in the absence of compelling evidence of intent to remain in Georgia permanently. Having Georgia voter registration, having employment in any position normally filled by a student (such as co-op, graduate research assistant, or graduate teaching assistant), having a lease of living quarters, having a Georgia automobile registration, and having Georgia driver’s license do not constitute sufficient evidence of domicile to affect classification as an in-state student under the Board of Regents’ policy.

For further information concerning residency, students should contact the Residency Office in Room 112 of TechTower, write to the Office of the Registrar, Residency, Georgia Tech, Atlanta, GA 30332-0315, or email (http://www.registrar.gatech.edu/residencyclassification). The Residency Office must receive an application for classification as a legal resident for fee payment purposes no later than one month prior to the academic registration date for the term in which the student seeks to pay fees as a resident of Georgia. Requests for tuition waivers must be received by the Office of the Registrar no later than the first day of classes for the term for which the out-of-state tuition is to be waived. See the official Academic Calendar (http://www.registrar.gatech.edu/students/calendar.php) for dates.

Outside Sponsorships

A student whose tuition and fees are to be paid by a corporate or government sponsor must notify the Bursar’s Office by submitting an authorization or voucher from the sponsor on original letterhead and signed by an official authorized to obligate payment by the organization per the specifics outlined here (http://www.bursar.gatech.edu/content/third-party-billing). Authorizations must be received before the fee payment deadline of each semester. Fee payment deadlines for upcoming terms are published on the Bursar’s Calendar (http://bursar.gatech.edu/content/bursar-calendar). As a courtesy to students, the Bursar’s Office will send a billing statement to the sponsor after the Registration Period ends. Students whose sponsor fails to pay the authorized charges will have their conditional credit reversed and will be responsible for the unpaid charges. A financial hold will be placed on the student’s account until the balance is paid in full. Students are encouraged to remain in contact with their sponsor until the terms of the billing authorization have been met.

Important links:

• The Office of the Bursar | Third-Party Biling (http://www.bursar.gatech.edu/content/third-party-billing)
Veterans Services

Veterans Services at Georgia Tech is not a division of the US Department of Veterans Affairs (DVA) but part of the Office of the Registrar. It serves as a liaison between veteran students and the DVA. Its primary purposes are to assist veteran students with the processing of forms for educational benefits, to advise veteran students about certain procedural requirements, and to certify enrollment of Georgia Tech veteran students to the Department of Veterans Affairs.

Because the US Department of Veterans Affairs (DVA) must receive certification of enrollment before issuing benefit payments, any student planning to enroll under any of the DVA’s programs should initiate the certification procedure through the Office of the Registrar as early as possible.

Veterans must apply to Georgia Tech through the regular admissions procedure. Eligibility for DVA benefits does not guarantee acceptance into the Institute, nor does acceptance signify eligibility for DVA benefits. The Institute serves only as a source of certification and information to the DVA; the student must carry out all financial transactions with the US Department of Veterans Affairs directly.

- Contact Information (p. 125)
- Starting Benefits (p. 125)
- Types of Benefits (p. 126)
- Certification Process (p. 126)
- Frequently Used Forms (p. 126)
- Additional Information (p. 126)

Contact Information

GT School Certifying Official (SCO):
Eugenia Snead
GT Veterans Benefit Coordinator
veterans@registrar.gatech.edu
phone: 404.894.4953
fax: 404.894.0167

VA Regional Office:
Department of Veterans Affairs
Atlanta Regional Office
P.O. Box 100026
Decatur, GA 30037-7026
atlrpo@vba.va.gov

US Department of Veterans Affairs:
Online Queries (https://gibill.custhelp.com/app/utils/login_form/redirect/ask)
1.888.GIBILL.1
1.888.422.4551

Starting Benefits

Before a student can use GI Bill education benefits, she/he must be formally admitted to Georgia Tech. Prospective students who need information about applying should see the Undergraduate Admissions web site. Individuals who intend to utilize GI Bill education benefits are admitted by the same standards as any other students.

Those who intend to utilize GI Bill education benefits for the first time should apply for these benefits least two months before the start of the first academic term in which they will be enrolled as students at Georgia Tech.

First-Time GI Bill Applicants

If the student has already applied for GI Bill Education Benefits

- After a student applies for education benefits, the US Department of Veterans Affairs (DVA) sends a Certificate of Eligibility (COE) letter indicating the type of benefit awarded and the terms of eligibility under that benefit. A copy of this letter must be submitted to Eugenia Snead, the School Certifying Official (SCO) at Georgia Tech, via fax at 404.894.0167 or e-mail at veterans@registrar.gatech.edu.

If the student need to apply for GI Bill Education Benefits

- If the student is the veteran herself/himself
  - Veterans enrolling at Georgia Tech must apply for benefits through the GI Bill web site.
  - After a student applies for education benefits, the US Department of Veterans Affairs (DVA) sends a Certificate of Eligibility (COE) letter indicating the type of benefit awarded and the terms of eligibility under that benefit. A copy of this letter must be submitted to Eugenia Snead, the School Certifying Official (SCO) at Georgia Tech, via fax at 404.894.0167 or e-mail at veterans@registrar.gatech.edu.

- If the student is the dependent or spouse of the veteran
  - A veteran may transfer Ch 33 Post 9/11 GI Bill benefits to a family member with the approval of the US Department of Defence (DoD). Information regarding transfer of benefits is available on the GI Bill web site (http://www.benefits.va.gov/gibill/post911_gibill.asp). Once the DoD approves transfer of benefits, the family member must submit Form 22-1990e, “Application for Family Member to Use Transferred Benefits,” online (https://www.ebenefits.va.gov/ebenefits/homepage) or by mailing the printable form (http://www.vba.va.gov/pubs/forms/VBA-22-1990e-ARE.pdf) to the address below:
    Department of Veterans Affairs
    Atlanta Regional Office
    P.O. Box 100026
    Decatur, GA 30037-7026

  - After family member applies for education benefits, the Department of Veterans Affairs (DVA) sends a Certificate of Eligibility (COE) letter indicating the type of benefit awarded and the terms of eligibility under that benefit. A copy of this letter must be submitted to Eugenia Snead, the School Certifying Official (SCO) at Georgia Tech, via fax at 404.894.0167 or e-mail at veterans@registrar.gatech.edu.

Transferring GI Bill Education Benefits to Georgia Tech

- A student who has used GI Bill Education Benefits at another college or university must complete Form 22-1995, “Request for Change of Program or Place of Training.” This form may be submitted online (https://www.ebenefits.va.gov/ebenefits/homepage) or by mailing the printable form (http://www.vba.va.gov/pubs/forms/VBA-22-1995-ARE.pdf) to the address below:
  Department of Veterans Affairs

Signing Up for Yellow Ribbon

- A formally admitted student who is eligible and who has already sent a copy of her/his Certificate of Eligibility (COE) letter to the School Certifying Official (SCO) may be added to either the Yellow Ribbon participant list or the waiting list. Yellow Ribbon is given on a first-come, first-served basis. If all 40 participant slots are taken when a student completes the Yellow Ribbon Participation Request Form (http://www.registrar.gatech.edu/docs/pdf/Yellow_Ribbon_Participation_Request_Form.pdf), the student will be placed on a waiting list until a slot becomes available.
- The Yellow Ribbon Participation Request Form is submitted only once. After student is given a participant slot for the Yellow Ribbon program, she/he is eligible to receive this benefit until she/he exhausts her/his Ch 33 benefits, graduates, or stops attending Georgia Tech (e.g., loses registration eligibility by absence or failure to participate in scheduled classes).

Types of Benefits

The Department of Veterans Affairs (DVA) administers a variety of education benefit programs. Many veterans and active duty personnel can qualify for education benefits. Currently, Georgia Tech participates in the following programs:

- Chapter 33 (http://www.benefits.va.gov/gibill/post911_gibill.asp), The Post-9/11 GI Bill (Yellow Ribbon)
- Chapter 30 (http://www.benefits.va.gov/gibill/montgomery_bill.asp), Montgomery GI Bill - Active Duty (MGIB-AD)
- Chapter 35 (http://www.benefits.va.gov/gibill/#DEA), Survivors' and Dependents' Educational Assistance Program (DEA)
- Chapter 35 (http://www.benefits.va.gov/gibill/#DEA), Survivors' and Dependents' Educational Assistance Program (DEA)
- Chapter 31 (http://www.benefits.va.gov/vocarehab), Vocational Rehabilitation Program

Certification Process

The School Certifying Official (SCO) releases an email to notify veteran students that initial enrollment certifications will be submitted 45 days before the start of the academic term. At this time, students may ask any questions or request to not be certified. Submitting the initial enrollment certification 45 days prior to the start of the semester ensures that students' first monthly stipend will be issued on time.

For students under Chapter 33 Post-9/11 GI Bill (Yellow Ribbon), this is the first of two certifications. The first certification reports a student's enrollment for her/his monthly stipend. The second certification reports tuition and mandatory student fees (and Yellow Ribbon funding if applicable) after the Phase 2 Registration Period ends.

The Office of the Bursar places a deferral on each Chapter 33 student’s account for the amount expected from the DVA. This deferral prevents the assessment of late fees or schedule cancellation due to the student’s account balance. Students should make plans to pay whatever balance is not covered by Chapter 33 (e.g., housing, parking, meal plan) before the regular payment deadlines.

Students' Responsibilities

Veteran students at Georgia Tech have ongoing responsibilities to the Department of Veterans Affairs. The DVA and the Veterans Services office at Georgia Tech closely monitor each veteran student's enrollment status and academic program. The student’s entitlement is based upon the number of credit hours for which a student is enrolled and any changes in academic program. To ensure that a student's enrollment is certified to the DVA accurately, the student must abide by the following requirements:

- Check the Georgia Tech Veterans Services web page for current news
- Read all notification emails from the School Certifying Official (SCO)
- Email the SCO if adjustments are made to class schedule during the Phase 2 Registration Period
- Email the SCO if adjustments need to be made to schedule after the Phase 2 Registration Period ends
- Email the SCO if changing address or academic major

Frequently Used Forms

Many of the US Department of Veterans Affairs’ forms can be submitted online (http://www.gibill.va.gov/resources/student_handouts). Below are the most frequently used printable forms. All other printable forms may be found in the Forms Library (http://www.va.gov/vaforms/search_action.asp) the DVA web site.

- Printable forms should be mailed to the DVA regional office in Atlanta. Department of Veterans Affairs
- Form 22-1990e (http://www.vba.va.gov/pubs/forms/VBA-22-1990e-ARE.pdf), Application for Family Member to Use Transferred Benefits
- Form 22-1995 (http://www.vba.va.gov/pubs/forms/VBA-22-1995-ARE.pdf), Request for Change of Program or Place of Training
- Form 22-5495 (http://www.vba.va.gov/pubs/forms/VBA-22-5495-ARE.pdf), Dependents' Request for Change of Program or Place of Training
- VA Course Withdrawal Form (http://www.registrar.gatech.edu/docs/pdf/Veterans_Drop.pdf)
- Tuition Assistance Withdrawal Form (http://www.registrar.gatech.edu/docs/pdf/TA_withdrawal.pdf)
- Yellow Ribbon Participation Request Form (http://www.registrar.gatech.edu/docs/pdf/Yellow_Ribbon_Participation_Request_Form.pdf)
- Mandatory Student Fee Waiver Form for Active Duty Military and Veterans (http://www.registrar.gatech.edu/docs/pdf/studentfeewaiver.pdf)

Additional Information

More information is available on the Office of the Registrar’s web site on the Veterans Services’ Frequently Asked Questions (http://www.registrar.gatech.edu/students/veterans) (FAQ) page.
Undergraduate Financial Assistance

The Office of Scholarships and Financial Aid (OSFA) is dedicated to helping current and prospective students and parents apply for financial aid and understand the options for meeting the cost of a college education at Georgia Tech. The OSFA awards federal, state, and Institute funds to students and directs students to other sources of aid. Additionally, the OSFA serves as the disbursement and delivery agent for all sources of assistance for students, including awards for Georgia Tech students from outside agencies.

All US Citizen and Permanent Resident undergraduate students, including transfer students, who are interested in scholarships, grants, loans, and/or work opportunities must submit the "Georgia Tech Application for Scholarships and Financial Aid" and the "Free Application for Federal Student Aid" (FAFSA). The priority application deadline for entering freshman students, returning undergraduate students, and transfer students is January 31st.

Additional information is available for the Office of Scholarships and Financial Aid (http://www.finaid.gatech.edu).

Office of Scholarships and Financial Aid
Georgia Institute of Technology
Atlanta, Georgia 30332-0460.

- Out-of-State Tuition Waivers (p. 127)
- Outside Sponsorships (p. 129)
- President’s Scholarship Program (p. 129)
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Out-of-State Tuition Waivers

Georgia Tech has permission from the Board of Regents to award out-of-state tuition differential waivers and assess in-state tuition for certain nonresidents of Georgia for the following reasons and under the following conditions. The waivers processed in the Office of the Registrar are listed below.

- University System Employees and Dependents
  Full-time employees of the University System, their spouses, and their dependent children.
  Download Application for USG Employees and Dependents (http://registrar.gatech.edu/docs/pdf/residency/usg.pdf)

- Full-time School Employees
  Full-time employees in the public schools of Georgia or the Technical College System of Georgia, their spouses, and their dependent children. Teachers employed full-time on military bases in Georgia shall also qualify for this waiver (BR Minutes, 1988-89, p.43).
  Download Application for Full-Time School Employees (http://registrar.gatech.edu/docs/pdf/residency/full_time_school_employees waiver.pdf)

- Career Consular Officials
  Career consular officers, their spouses, and their dependent children who are citizens of the foreign nation that their Consulate office represents and who are stationed and living in Georgia under orders of their respective governments.
  Download Application for Career Consular Officials (http://registrar.gatech.edu/docs/pdf/residency/career_consular waiver.pdf)

- Military

1. Active duty military personnel, their spouses, and their dependent children who meet one of the following:
   a. The military sponsor is currently stationed in or assigned to Georgia; or,
   b. The military sponsor previously stationed in or assigned to Georgia is reassigned outside of Georgia, and the student(s) remain(s) continuously enrolled in a Georgia school, Technical College System of Georgia institution, and/or a University System of Georgia institution; or,
   c. The military sponsor is reassigned outside of Georgia and the spouse and/or dependent children remain in Georgia; or,
   d. The military sponsor is stationed in a state contiguous to the Georgia border and resides in Georgia; or,
   e. Dependent children of a military sponsor, previously stationed in or assigned to Georgia within the previous five years, or the child completed at least one year of high school in Georgia; or,
   f. Any student utilizing VA educational benefits transferred from a currently serving military member is also eligible, even if the student is no longer a dependent of the transferor.

g. Individuals stationed in or assigned to Georgia due to a NATO assignment (in the U.S. on a NATO visa and part of a NATO exchange program). Students must present their current U.S. military ID card showing they are active duty and a copy of their NATO orders showing they are assigned to Georgia. Dependent students and spouses are also eligible provided they submit documentation of their relationship to the individual assigned to Georgia on NATO orders in addition to the other documentation.
   - Download Application for Active Duty Military Personnel (http://registrar.gatech.edu/docs/pdf/residency/Military-Personnel.pdf)

2. Active members of the Georgia National Guard stationed or assigned to Georgia or active members of a unit of the U.S. Military Reserves based in Georgia, and their spouses and their dependent children (BoR Minutes, October 2008).
   - Download Application for GA National Guard and Reservists (http://registrar.gatech.edu/docs/pdf/residency/GA-National-Guard-and-Reservists.pdf)

3. Separated military members from a uniformed military service of the United States who meet one of the following (BoR Minutes, June 2004; October 2008; October 2013: March 2016; May 2017):
   a. Individuals who within thirty-six (36) months of separation from such service, enroll in an academic program and demonstrate intent to become domiciled in Georgia. This waiver may also be granted to their spouses and dependent children.
   b. Any separated service member or any student utilizing transferred VA educational benefits, and physically residing in the state, who enrolls within one hundred-twenty (120) months of separation is also eligible.
   d. Anyone using benefits under the Marine Gunnery Sergeant John David Fry Scholarship who lives in the state in which the institution is located (regardless of formal state residence).
   • Except...
• Surviving spouses can use the Fry Scholarship for 15 years from the anniversary of the service member’s death or until they remarry.

• Eligible children can use the Fry Scholarship between the ages of 18 and 33.

• Download Application for Those Separated from the Military (http://registrar.gatech.edu/docs/pdf/residency/Recently-Separated-Military.pdf)

**Economic Advantage**

As of the first day of classes for the term, an economic advantage waiver may be granted to a U.S. citizen or U.S. legal permanent resident who is a dependent or independent student and can provide clear evidence that the student or the student’s parent, spouse, or U.S. court-appointed legal guardian has relocated to the State of Georgia to accept full-time, self-sustaining employment and has established domicile in the State of Georgia. Relocation to the state must be for reasons other than enrolling in an institution of higher education. For U.S. citizens or U.S. legal permanent residents, this waiver will expire 12 months from the date the waiver was granted. As of the first day of classes for the term, an economic advantage waiver may be granted to an independent non-citizen possessing a valid employment-related visa status who can provide clear evidence of having relocated to the State of Georgia to accept full-time, self-sustaining employment. Relocation to the state must be for employment reasons and not for the purpose of enrolling in an institution of higher education. These individuals must be able to show clear evidence of having taken legally permissible steps toward establishing legal permanent residence in the United States and the establishment of legal domicile in the State of Georgia. Independent non-citizen students may continue to receive this waiver as long as they maintain a valid employment-related visa status and can demonstrate continued efforts to establish U.S. legal permanent residence and legal domicile in the State of Georgia.

A dependent non-citizen student who can provide clear evidence that the student’s parent, spouse, or U.S. court-appointed legal guardian possesses a valid employment-related visa status and can provide clear evidence of having relocated to the State of Georgia to accept full-time, self-sustaining employment is also eligible to receive this waiver. Relocation to the state must be for employment reasons and not for the purpose of enrolling in an institution of higher education. These individuals must be able to show clear evidence of having taken legally permissible steps toward establishing legal permanent residence in the United States and the establishment of legal domicile in the State of Georgia. Non-citizen students currently receiving a waiver who are dependents of a parent, spouse, or U.S. court-appointed legal guardian possessing a valid employment-related visa status may continue to receive this waiver as long as they can demonstrate that their parent, spouse, or U.S. court-appointed legal guardian is maintaining full-time, self-sustaining employment in Georgia and is continuing efforts to pursue an adjustment of status to U.S. legal permanent resident and the establishment of legal domicile in the State of Georgia. (BR Minutes, October 2008.)

Download Application for Economic Advantage (http://registrar.gatech.edu/docs/pdf/residency/economic_advantage_waiver.pdf)

**Non-Resident Students**

As of the first day of classes for the term, a non-resident student can be considered for this waiver under the following conditions:

• Students under 24.

  • If the parent, or United States court-appointed legal guardian has maintained domicile in Georgia for at least twelve (12) consecutive months and the student can provide clear and legal evidence showing the relationship to the parent or United States court-appointed legal guardian has existed for at least twelve (12) consecutive months immediately preceding the first day of classes for the term. Under Georgia code, legal guardianship must be established prior to the student’s 18th birthday (BoR Minutes, October 2008, title amended February 2010); or

  • If the student can provide clear and legal evidence showing a familial relationship to the spouse and the spouse has maintained domicile in Georgia for at least twelve (12) consecutive months immediately preceding the first day of classes for the term (BoR Minutes, February 2010).

• Students 24 and Older.

  • If the student can provide clear and legal evidence showing a familial relationship to the spouse and the spouse has maintained domicile in Georgia for at least twelve (12) consecutive months immediately preceding the first day of classes for the term. This waiver can remain in effect as long as the student remains continuously enrolled (BoR Minutes, October 2008, title amended February 2010).

This waiver can remain in effect as long as the student remains continuously enrolled (BoR Minutes, October 2008).

Download Application for Non-Resident Students (http://registrar.gatech.edu/docs/pdf/residency/non-residents_student.pdf)

**Senior Citizen Waiver**

A waiver of in-state tuition and fees may be granted to a legal resident of Georgia aged 62 and over. This waiver can remain in effect as long as the student is continuously enrolled.

Download Application for Senior Citizens (http://registrar.gatech.edu/docs/pdf/residency/senior_waiver.pdf)

Students who come to Georgia Tech from another state and work for companies in Georgia remain ineligible for in-state tuition in the absence of compelling evidence of intent to remain in Georgia permanently. Having Georgia voter registration, having employment in any position normally filled by a student (such as co-op, graduate research assistant, or graduate teaching assistant), having a lease of living quarters, having a Georgia automobile registration, and having Georgia driver’s license do not constitute sufficient evidence of domicile to affect classification as an in-state student under the Board of Regents’ policy.

For further information concerning residency, students should contact the Residency Office in Room 112 of TechTower, write to the Office of the Registrar, Residency, Georgia Tech, Atlanta, GA 30332-0315, or email (http://www.registrar.gatech.edu/tuitionclassification). The Residency Office must receive an application for classification as a legal resident for fee payment purposes no later than one month prior to the academic registration date for the term in which the student seeks to pay fees as a resident of Georgia. Requests for tuition waivers must be received by the Office of the Registrar no later than the first day of classes for
the term for which the out-of-state tuition is to be waived. See the official Academic Calendar (http://www.registrar.gatech.edu/students/calendar.php) for dates.

**Outside Sponsorships**

A student whose tuition and fees are to be paid by a corporate or government sponsor must notify the Bursar’s Office by submitting an authorization or voucher from the sponsor on original letterhead and signed by an official authorized to obligate payment by the organization per the specifics outlined here (http://www.bursar.gatech.edu/content/third-party-billing). Authorizations must be received before the fee payment deadline of each semester. Fee payment deadlines for upcoming terms are published on the Bursar’s Calendar (http://bursar.gatech.edu/content/bursar-calendar). As a courtesy to students, the Bursar’s Office will send a billing statement to the sponsor after the Registration Period ends. Students whose sponsor fails to pay the authorized charges will have their conditional credit reversed and will be responsible for the unpaid charges. A financial hold will be placed on the student’s account until the balance is paid in full. Students are encouraged to remain in contact with their sponsor until the terms of the billing authorization have been met.

Important links:

- The Office of the Bursar | Third-Party Billing (http://www.bursar.gatech.edu/content/third-party-billing)
- The Office of the Bursar | Bursar's Calendar (http://bursar.gatech.edu/content/bursar-calendar)

**President’s Scholarship Program**

The Stamps President’s Scholars Program is Georgia Tech's premier merit-based scholarship. Recipients are selected from the top applicants for admission to Georgia Tech based on demonstrated excellence in scholarship, leadership, progress, and service as described on the Stamps President’s Scholars Program (http://stampsps.gatech.edu) webpage. From the applicant pool, students selected as semi-finalists submit a one-page resume before being interviewed. The top semi-finalists are named finalists and invited, with their parents, to campus for additional interviews and an information weekend in March.

Transfer students are not eligible for the four-year award. Recipients must be US Citizens, US Permanent Residents, or UK Citizens.

Each year, 40 incoming freshmen receive the Stamps President’s Scholarship, which is renewable for up to four academic years or eight semesters, contingent upon honors-level performance and continued leadership development as evidenced by involvement in program, campus, and community activities. Scholarships are “full ride,” including tuition and mandatory fees, room and board, books, and personal expenses. See the website below for more information on stipends.

To ensure consideration, a student must apply as an incoming freshman, and submit the Georgia Tech Application for Freshman Admission, along with the application fee by the early action deadline of October 15th.

More information:

- Stamps President’s Scholars Program (http://stampsps.gatech.edu)

**Veterans Services**

Veterans Services at Georgia Tech is not a division of the US Department of Veterans Affairs (DVA) but part of the Office of the Registrar. It serves as a liaison between veteran students and the DVA. Its primary purposes are to assist veteran students with the processing of forms for educational benefits, to advise veteran students about certain procedural requirements, and to certify enrollment of Georgia Tech veteran students to the Department of Veterans Affairs.

Because the US Department of Veterans Affairs (DVA) must receive certification of enrollment before issuing benefit payments, any student planning to enroll under any of the DVA’s programs should initiate the certification procedure through the Office of the Registrar as early as possible.

Veterans must apply to Georgia Tech through the regular admissions procedure. Eligibility for DVA benefits does not guarantee acceptance into the Institute, nor does acceptance signify eligibility for DVA benefits. The Institute serves only as a source of certification and information to the DVA; the student must carry out all financial transactions with the US Department of Veterans Affairs directly.

- Contact Information (p. 129)
- Starting Benefits (p. 129)
- Types of Benefits (p. 130)
- Certification Process (p. 130)
- Frequently Used Forms (p. 131)
- Additional Information (p. 131)

**Contact Information**

GT School Certifying Official (SCO):
Eugenia Snead
GT Veterans Benefit Coordinator
veterans@registrar.gatech.edu
phone: 404.894.4953
fax: 404.894.0167

VA Regional Office:
Department of Veterans Affairs
Atlanta Regional Office
PO. Box 100026
Decatur, GA 30031-7026
atlipo@vba.va.gov

US Department of Veterans Affairs:
Online Queries (https://gibill.custhelp.com/app/utils/login_form/redirect/ask)
1.888.GIBILL.1
1.888.422.4551

**Starting Benefits**

Before a student can use GI Bill education benefits, she/he must be formally admitted to Georgia Tech. Prospective students who need information about applying should see the Undergraduate Admissions web site. Individuals who intend to utilize GI Bill education benefits are admitted by the same standards as any other students.

Those who intend to utilize GI Bill education benefits for the first time should apply for these benefits least two months before the start of the
first academic term in which they will be enrolled as students at Georgia Tech.

First-Time GI Bill Applicants
If the student has already applied for GI Bill Education Benefits

- If the student is the veteran herself/himself
  - Veterans enrolling at Georgia Tech must apply for benefits through the GI Bill web site.
  - A veteran may transfer Ch 33 Post 9/11 GI Bill benefits to a family member with the approval of the US Department of Defence (DoD). Information regarding transfer of benefits is available on the GI Bill web site (http://www.benefits.va.gov/gibill/post911_gibill.asp). Once the DoD approves transfer of benefits, the family member must submit Form 22-1990e, “Application for Family Member to Use Transferred Benefits,” or by mailing the printable form (http://www.vba.va.gov/pubs/forms/VBA-22-1990e-ARE.pdf) to the address below:
    Department of Veterans Affairs
    Atlanta Regional Office
    P.O. Box 100026
    Decatur, GA 30037-7026

- If the student is the dependent or spouse of the veteran
  - A formally admitted student who is eligible and who has already sent a copy of her/his Certificate of Eligibility (COE) letter to the School Certifying Official (SCO) may be added to either the Yellow Ribbon participant list or the waiting list. Yellow Ribbon is given on a first-come, first-served basis. If all 40 participant slots are taken when a student completes the Yellow Ribbon Participation Request Form (http://www.registrar.gatech.edu/docs/pdf/Yellow_Ribbon_Participation_Request_Form.pdf), the student will be placed on a waiting list until a slot becomes available.
  - If the student is the dependent or spouse of the veteran
  - After family members apply for education benefits, the US Department of Veterans Affairs (DVA) sends a Certificate of Eligibility (COE) letter indicating the type of benefit awarded and the terms of eligibility under that benefit. A copy of this letter must be submitted to Eugenia Snead, the School Certifying Official (SCO) at Georgia Tech, via fax at 404.894.0167 or e-mail at veterans@registrar.gatech.edu.

Sign up for Yellow Ribbon

- The Yellow Ribbon Participation Request Form is submitted only once. If student is given a participant or a waiting list, Yellow Ribbon is given on a first-come, first-served basis. If all 40 participant slots are taken when a student completes the Yellow Ribbon Participation Request Form (http://www.registrar.gatech.edu/docs/pdf/Yellow_Ribbon_Participation_Request_Form.pdf), the student will be placed on a waiting list until a slot becomes available.

Types of Benefits

The Department of Veterans Affairs (DVA) administers a variety of education benefit programs. Many veterans and active duty personnel can qualify for education benefits. Currently, Georgia Tech participates in the following programs:

- Chapter 33 (http://www.benefits.va.gov/gibill/post911_gibill.asp), The Post-9/11 GI Bill (Yellow Ribbon)
- Chapter 30 (http://www.benefits.va.gov/gibill/montgomery_bill.asp), Montgomery GI Bill - Active Duty (MGIB-AD)
- Chapter 35 (http://www.benefits.va.gov/gibill/#DEA), Survivors’ and Dependents’ Educational Assistance Program (DEA)
- 1606 (http://www.benefits.va.gov/gibill/montgomery_bill.asp) - Montgomery GI Bill - Selected Reserve (MGIB-SR)
- 1607 (http://www.benefits.va.gov/gibill/#REAP) - Reserve Educational Assistance Program (REAP)
- Chapter 31 (http://www.benefits.va.gov/vocrehab), Vocational Rehabilitation Program

Certification Process

The School Certifying Official (SCO) releases an email to notify veteran students that initial enrollment certifications will be submitted 45 days before the start of the academic term. At this time, students may ask any questions or request to not be certified. Submitting the initial enrollment certification 45 days prior to the start of the semester ensures that students’ monthly stipend will be issued on time.

For students under Chapter 33 Post-9/11 GI Bill (Yellow Ribbon), this is the first of two certifications. The first certification reports a student’s enrollment for her/his monthly stipend. The second certification reports tuition and mandatory student fees (and Yellow Ribbon funding if applicable) after the Phase 2 Registration Period ends.

The Office of the Bursar places a deferral on each Chapter 33 student’s account for the amount expected from the DVA. This deferral prevents the assessment of late fees or schedule cancellation due to the student’s account balance. Students should make plans to pay whatever balance is not covered by Chapter 33 (e.g., housing, parking, meal plan) before the regular payment deadlines.

Students’ Responsibilities

Veteran students at Georgia Tech have ongoing responsibilities to the Department of Veterans Affairs. The DVA and the Veterans Services office at Georgia Tech closely monitor each veteran student’s enrollment
status and academic program. The student’s entitlement is based upon the number of credit hours for which a student is enrolled and any changes in academic program. To ensure that a student’s enrollment is certified to the DVA accurately, the student must abide by the following requirements:

- Check the Georgia Tech Veterans Services web page for current news
- Read all notification emails from the School Certifying Official (SCO)
- Email the SCO if adjustments are made to class schedule during the Phase 2 Registration Period
- Email the SCO if adjustments need to be made to schedule after the Phase 2 Registration Period ends
- Email the SCO if changing address or academic major

**Frequently Used Forms**

Many of the US Department of Veterans Affairs’ forms can be submitted online ([http://www.gibill.va.gov/resources/student_handouts](http://www.gibill.va.gov/resources/student_handouts)). Below are the most frequently used printable forms. All other printable forms may be found in the Forms Library ([http://www.va.gov/vaforms/search_action.asp](http://www.va.gov/vaforms/search_action.asp)) the DVA web site.

- Printable forms should be mailed to the DVA regional office in Atlanta.
  Department of Veterans Affairs
  Atlanta Regional Office
  P.O. Box 100026
  Decatur, GA 30037-7026

  - Form 22-5495 ([http://www.vba.va.gov/pubs/forms/VBA-22-5495-ARE.pdf](http://www.vba.va.gov/pubs/forms/VBA-22-5495-ARE.pdf), Dependents’ Request for Change of Program or Place of Training
  - VA Course Withdrawal Form ([http://www.registrar.gatech.edu/docs/pdf/Veterans_Drop.pdf](http://www.registrar.gatech.edu/docs/pdf/Veterans_Drop.pdf))
  - Yellow Ribbon Participation Request Form ([http://www.registrar.gatech.edu/docs/pdf/Yellow_Ribbon_Participation_Request_Form.pdf](http://www.registrar.gatech.edu/docs/pdf/Yellow_Ribbon_Participation_Request_Form.pdf))
  - Mandatory Student Fee Waiver Form for Active Duty Military and Veterans ([http://www.registrar.gatech.edu/docs/pdf/studentfeewaiver.pdf](http://www.registrar.gatech.edu/docs/pdf/studentfeewaiver.pdf))

**Additional Information**

More information is available on the Office of the Registrar’s web site on the Veterans Services’ Frequently Asked Questions ([http://www.registrar.gatech.edu/students/veterans](http://www.registrar.gatech.edu/students/veterans)) (FAQ) page.

**Billing**

A complete itemized statement of the student account is available to students and authorized users by logging into the Bill Payment portal. This portal can be accessed either through Buzzport or via the Student/Parent Pay Now links on the Bursar’s Office website. Registration changes impacting tuition and fee charges as well as online payments are updated in real time to show the most current information on the account. Parking/Meal Plan changes are uploaded daily to the student account. Please note that the Bursar’s Office does not mail invoices to students.

It is the student’s responsibility to make sure all requirements of his or her account are satisfied by the fee payment deadline for the term. Questions concerning charges on the student account or refunds should be directed to the Bursar’s Office. Verbal misinformation is not grounds for a waiver of a regulation. All tuition and other charges are subject to change without notice.

To access your student account, go to Buzzport or the Pay Now links on the Bursar’s website, bursar.gatech.edu ([http://bursar.gatech.edu](http://bursar.gatech.edu)), to log into Bill+Payment. You will need your student or authorized user credentials to log in to Bill+Payment. Please keep in mind that all notices from the Bursar’s Office concerning your account will be sent to the student’s Georgia Tech e-mail account, which is the Institute’s official means of communication with students.

Additional details are available on the Bursar’s web site ([http://www.bursar.gatech.edu](http://www.bursar.gatech.edu)).

- Student Payment Instructions ([http://www.bursar.gatech.edu/content/student-payment-instructions](http://www.bursar.gatech.edu/content/student-payment-instructions))
- Parent Payment Instructions ([http://www.bursar.gatech.edu/content/parent-payment-instructions](http://www.bursar.gatech.edu/content/parent-payment-instructions))
- Cost of Attendance ([http://www.finaid.gatech.edu/content/cost-attendance-2015-2016](http://www.finaid.gatech.edu/content/cost-attendance-2015-2016))

Official policies are available in the Georgia Tech Policy Library ([http://policylibrary.gatech.edu/student-affairs/financial-aid-and-bursar-policies](http://policylibrary.gatech.edu/student-affairs/financial-aid-and-bursar-policies)).

- Grade Substitution Policy ([http://policylibrary.gatech.edu/student-affairs/grade-substitution-policy](http://policylibrary.gatech.edu/student-affairs/grade-substitution-policy))
- Institute Policy for Scholarship/Fellowship Payments and the Payment of Prizes/Awards to Students ([http://policylibrary.gatech.edu/student-affairs/institute-policy-scholarshipfellowship-payments-and-payment-prizesawards-students](http://policylibrary.gatech.edu/student-affairs/institute-policy-scholarshipfellowship-payments-and-payment-prizesawards-students))
- Refunds ([http://policylibrary.gatech.edu/student-affairs/refunds](http://policylibrary.gatech.edu/student-affairs/refunds))
- Satisfactory Academic Progress ([http://policylibrary.gatech.edu/student-affairs/satisfactory-academic-progress](http://policylibrary.gatech.edu/student-affairs/satisfactory-academic-progress))
- Voluntary Student Fees ([http://policylibrary.gatech.edu/student-affairs/voluntary-student-fees](http://policylibrary.gatech.edu/student-affairs/voluntary-student-fees))

**Cancellation of Registration**

Students who register for classes and do not attend must cancel classes online. Failure to do so will result in awarded financial aid being applied to the student’s account. Non-attendance then results in the student receiving a grade of “F” in each course.
All students must be aware of Georgia Tech’s policies and processes regarding Verification of Participation (p. 137).

Fees

Paying Tuition and Fees

Tuition and fees are payable by the deadline published on the official Academic Calendar (http://www.registrar.gatech.edu/home/calendar.php) and on the Bursar’s Office (http://www.bursar.gatech.edu/content/bursar-calendar) web page for each academic term. Registration is not complete until all charges are paid. The Institute reserves the right at any time during the semester to drop any student from classes for failure to pay his/her balance in full. In no case is a regulation waived or an exception granted because a student pleads ignorance of the regulation or asserts that he or she was not informed of it by an adviser or other authority. Students who owe the Institute money and have been placed on "hold" because of failure to pay may have their account forwarded to a professional collection agency.

Payment may be made by cash with U.S. dollars, a check payable in U.S. currency and drawn on a financial institution located in the United States (made payable to "Georgia Institute of Technology" and with an encoded account number), or a cashier’s check. Credit card payments (MasterCard, American Express, and Discover) and WebChecks are accepted online through the Bill Payment portal. Credit card payments are processed by a third party vendor which charges a service fee of 2.85 percent for this service. A fee is not charged for WebCheck transactions. Credit or debit card payments cannot be made by mail, phone, fax, or in person.

Tuition and Fee Rates

The tuition and fees listed are estimates and are subject to change. These amounts should be used only as a planning guide for future payments. Tuition charges can vary based on state residency status and degree program of study. Residency status is determined by the Office of Admission at the time of acceptance. Students are either classified as a resident or nonresident of Georgia for tuition purposes in accordance with the regulations of the Board of Regents of the University System of Georgia. The most current information on tuition and fees is available at http://www.bursar.gatech.edu/content/tuition-fees.

Mandatory Student Fees

Published student fees are subject to change and should be considered estimates for use in planning future payments. Students registered for four or more credit hours in one academic term are charged all mandatory student fees which are due at the same time as tuition charges. Mandatory student fees are considered part of the registration process and must be paid in full for the student to be considered enrolled. The Student Activity Fee, Athletic Fee, CRC Operations Fee, Health Fee, Recreation Fee, Student Center Operations Fee, Special Institutional Fee, Technology Fee, and Transportation Fee are mandatory student fees used to provide cultural, social, and athletic programs for the entire student body. In addition, these fees provide financial support for student facilities at the Institute, guest speakers and lecturers, student publications, and many special events that are available exclusively for Georgia Tech students. These fees also assist in defraying shuttle costs for transporting students around campus. The Technology Fee supports the infrastructure necessary to provide students with the latest online computing services technology. Students registering for fewer than four credit hours in one academic term are required to pay the Technology Fee, Transportation Fee, and Special Institutional Fee. See http://www.bursar.gatech.edu/content/tuition-fees for current information.

Late Registration Fees

Students who do not meet payment deadlines may incur penalty fees. If a student does not pay all required fees by the published fee deadlines (http://www.bursar.gatech.edu/content/bursar-calendar) registration may be cancelled. The late payment fee is currently $100. If registration is cancelled, the reinstatement fee is $200. Reinstatement is not guaranteed.

Payment

Fee Payment

All fees are payable by the deadline published on the official Academic Calendar (http://www.registrar.gatech.edu/home/calendar.php) and on the Bursar’s Office (http://www.bursar.gatech.edu/content/bursar-calendar) web page for each academic term. Registration is not complete until all fees are paid. The Institute reserves the right at any time during the semester to drop any student from classes for failure to pay fees. In no case is a regulation waived or an exception granted because a student pleads ignorance of the regulation or asserts that he or she was not informed of it by an advisor or other authority. Students who owe the Institute money and have been placed on "Hold" because of failure to pay may have their account forwarded to a professional collection agency.

Payment may be made with cash (U.S. dollars); a check payable in U.S. currency and drawn on a financial institution located in the United States (checks must be made payable to “Georgia Institute of Technology” and have the checking account number encoded); or a cashier’s check. Georgia Tech does not accept credit card payments directly for payment of tuition, fees, and room and board that appear on the student’s account summary. Credit card payments can only be made via the Student Information System (http://www.buzzport.gatech.edu) and are processed by Georgia Tech’s vendor. Credit card users are charged a service fee by the vendor for this service. A fee is not charged for WebCheck transactions. MasterCard, American Express, and Discover (credit and debit), and WebChecks are accepted for online payments. Credit and debit card payments cannot be made by mail, phone, fax, or in person.

Choosing a Payment Option

Online Webcheck (ACH) or Credit Card

The Bursar's Office accepts ACH and credit card (AMEX, Visa, MasterCard & Discover) payments on-line. To make a payment for an account, go to Buzzport (https://buzzport.gatech.edu) and select the PayNow–Bursar icon on the Home or Student tab.

Mail In

Make all checks or money orders payable to Georgia Institute of Technology. The student’s ID number must be clearly printed on all checks or money orders. Payments must be received (not postmarked) by 4:00 PM, Eastern Standard Time, on the fee deadline date. Mail payments to the following address:

Georgia Institute of Technology
Office of the Bursar
Suite 111 Lyman Hall
225 North Avenue
Atlanta, Georgia 30332-0255
On Campus

Students who pay in person should bring their cash or check to the Bursar’s Office Cashier Window; First Floor, Lyman Hall. Payment by check or money order may be deposited in the drop box, located in the entry vestibule to Lyman Hall, at any hour of the day before the fee deadline. Do not put cash in the drop box. Checks should be made out to “Georgia Institute of Technology” and should contain the student id in the memo line.

Prepayments

Prepayment of fees is accepted. However, prepayment does not guarantee the student will successfully register for any or all classes needed. It is the student’s responsibility to properly register for classes by the registration deadline.

Fee Payment Using Financial Aid

All tuition waivers, financial aid, scholarships, and fellowships awarded are disbursed to the student’s account and applied to any outstanding balances. Financial aid is initially estimated before it is actually disbursed. The "Balance Due" for a student is reduced by this estimated amount. Actual disbursements begin approximately one week prior to the fee deadline. It is the student’s responsibility to ensure all funds are properly credited by the fee deadline date by reviewing his or her student Web invoice. If funds are not/will not be disbursed or credited by the fee deadline, the student may be eligible to request a deferment from the Office of Scholarships and Financial Aid. Deferments must be requested and will be granted only for the lesser of the amount of the financial aid award or the amount due to the Institute.

Disbursement of Financial Aid Checks

Financial aid processed by the Office of Scholarships and Financial Aid is applied directly to the student’s account in the Office of the Bursar. If a credit balance exists after all charges are posted and paid, the Office of the Bursar will deposit the credit amount into the student’s bank account. Many financial aid programs – including the HOPE scholarship, Federal Pell Grant, and Stafford Loan – do not require the student be enrolled full time in order for disbursement to occur. However, because some scholarships and grants do require full-time study, and some aid programs require registration for at least six hours of courses for disbursement, students who are planning to enroll for fewer than twelve hours and who are unsure of the requirements are advised to seek clarification from the Office of Scholarships and Financial Aid.

Important links:

- The Office of Scholarships and Financial Aid (http://www.finaid.gatech.edu)
- The Office of the Bursar | Policy on Returned Checks (http://www.bursar.gatech.edu/content/returned-check-policy)

Returned Checks

If a check is returned from the bank (e.g., for insufficient funds, stop payment), the student is required to redeem the returned check with cash or a cashier’s check in the Office of the Bursar. A returned check fee will be added to the amount of the check. Returned checks remaining unredeemed after a reasonable period of time may be forwarded to a collection agency. Students who have three checks returned against their Georgia Tech accounts will be denied future check-writing privileges.

If the student intends to withdraw from Georgia Tech, it remains the student’s responsibility to formally withdraw by following the Procedures for Withdrawal and Dropping Courses (http://www.registrar.gatech.edu/students/withdrawal.php) on the Office of the Registrar’s website.

Important links:

- The Office of the Registrar | Procedures for Withdrawal and Dropping Courses (http://www.registrar.gatech.edu/students/withdrawal.php)
- The Office of the Bursar | Policy on Returned Checks (http://www.bursar.gatech.edu/content/returned-check-policy)

Refunds

Refunds for Students with Financial Aid

For students withdrawing from school, a calculation is made on any financial aid received to determine whether a student who completely withdraws during a term has "earned" the monies disbursed. Students "earn" their aid based on the period of time they were enrolled. During the first 60 percent of the term, a student earns financial aid funds in direct proportion to the length of time the student was enrolled. Beyond the 60 percentage point, all aid is considered earned. The responsibility to repay "unearned" aid is shared by the Institute and the student in proportion to the aid each is assumed to possess. The most current refund schedule can be found at http://www.bursar.gatech.edu/content/refund-calendars.

If a student intends to withdraw from Georgia Tech, it is the student’s responsibility to formally withdraw by following the Withdrawal From School Procedures (http://www.registrar.gatech.edu/students/withdrawal.php) on the Registrar’s website.

Refund Policy

The refund amount for students withdrawing from the Institute shall be based on a pro rata percentage determined by dividing the number of calendar days in the semester that the student completed by the total number of calendar days in the semester. The total number of calendar days in a semester is calculated by using the first day of class through the last day of final exams for the Institute and excludes scheduled breaks of five or more consecutive days. Institutional charges are refunded up to the point in time that the percentage equals 60 percent. Students who withdraw from the Institute when the calculated percentage of completion is greater than 60 percent are not entitled to a refund of any portion of institutional charges. A full refund (100 percent) is available to students who fully withdraw from the Institute or to students who drop individual courses by the end of late registration, if the reduction in hours changes their tuition tier under the flat rate tuition model or they cease to be enrolled at least twelve hours under the fixed rate tuition model. No further refunds are given for individual classes dropped after the end of late registration.

Students suspended or expelled from the Institute for any reason forfeit their right to a refund of any credit balance on their student account.

Refund Information (http://www.bursar.gatech.edu/content/refunds)
Withdrawal Information (http://www.registrar.gatech.edu/students/withdrawal.php)

Student Financial Agreement

By registering for classes at the Georgia Institute of Technology (Georgia Tech), I agree to the following terms and conditions:
1. I accept full responsibility for payment of all tuition, fees and other associated costs assessed as a result of my class registration and/or receipt of services at Georgia Tech. I understand Georgia Tech uses electronic billing as the official billing method and does not mail invoices. I am responsible for reviewing and paying my student account balance by the scheduled due date. I further understand failure to review my account does not constitute a valid reason for non-payment by the scheduled due date.

2. If I drop or withdraw from some or all classes for which I register, I accept responsibility for paying all tuition and mandatory fees in accordance with the published tuition refund schedule at http://www.registrar.gatech.edu/students/formlanding/address.php. I further understand non-attendance does not absolve me of this responsibility.

3. I agree my financial aid is to be used to pay charges assessed to my account at Georgia Tech such as tuition, fees, campus housing and meal plans, student health insurance, parking permits, service fees, fines, bookstore charges, or any other charge, in accordance with the terms of the aid. If any portion of my financial aid is revoked, I agree to repay all revoked aid that was disbursed to my account and either applied to charges or refunded to me.

4. I understand if I fail to pay my student account bill or any monies owed to Georgia Tech by the scheduled due date, Georgia Tech will place a financial hold on my student account, preventing me from registering for future classes, requesting transcripts, or receiving my diploma. Georgia Tech may also assess late payment fees and/or cancel my class registration.

5. I understand if I fail to pay my student account bill or any monies owed to Georgia Tech by the scheduled due date, and also fail to make acceptable payment arrangements to bring my account current, Georgia Tech may refer my delinquent account to a collection agency. I further understand I am responsible for paying the collection agency fees which may be based on a percentage at a maximum of fifteen (15) percent of my delinquent account, together with all costs and expenses, including reasonable attorney’s fees necessary for the collection of my delinquent account. Further, I understand that my delinquent account may be reported to one or more of the national credit bureaus.

6. I understand Georgia Tech and its agents and contractors may contact me at my current and any future cellular phone number(s), email address(es) or wireless device(s) regarding my delinquent student account(s)/loan(s), any other debt I owe to Georgia Tech, or to receive general information. I authorize Georgia Tech and its agents and contractors to use automated telephone dialing equipment, artificial, pre-recorded voice or text messages, and personal calls and emails, in their efforts to contact me. I may withdraw my consent to call my cellular phone by submitting a request in writing to the Georgia Tech Bursar’s Office or in writing to the applicable contractor or agent contacting me on behalf of Georgia Tech.

7. I understand I am responsible for complying with all applicable Georgia Tech policies and procedures.

8. I understand Georgia Tech uses the e-mail account provided by Georgia Tech as the official method of communication with me and I am responsible for reading Georgia Tech e-mails on a timely basis.

9. I understand I am responsible for keeping Georgia Tech records up to date with my current physical addresses, email addresses, and phone numbers by following the procedure at http://www.registrar.gatech.edu/students/formlanding/address.php. The linked procedure is incorporated herein by reference. Upon leaving Georgia Tech for any reason, it is my responsibility to provide Georgia Tech with updated contact information for purposes of continued communication regarding any amounts owed to Georgia Tech.

10. I understand that this Agreement shall be governed by the laws of the State of Georgia without regard to choice of law provisions and that all actions arising under this agreement will be filed and litigated exclusively in the state or federal courts in Atlanta, Georgia, and I expressly agree to the jurisdiction of such courts.

**Tuition and Fee Rates**

Published tuition and fees listed are subject to change. These amounts should be used only as a planning guide for future payments. Tuition charges can vary based on state residency status and degree program of study. Residency status is determined by the Office of Admission at the time of acceptance. Students are either classified as a “resident” or “nonresident” of Georgia for tuition purposes in accordance with the regulations of the Board of Regents of the University System of Georgia. The most current information on tuition and fees is available from the Bursar’s Office (http://www.bursar.gatech.edu/content/tuition-fees).

More information:
- Out-of-State Tuition Waivers (p. 134)
- Tuition Classification (p. 136)

**Out-of-State Tuition Waivers**

Georgia Tech has permission from the Board of Regents to award out-of-state tuition differential waivers and assess in-state tuition for certain nonresidents of Georgia for the following reasons and under the following conditions. The waivers processed in the Office of the Registrar are listed below.

- University System Employees and Dependents
  - Full-time employees of the University System, their spouses, and their dependent children.
  - Download Application for USG Employees and Dependents (http://registrar.gatech.edu/docs/pdf/residency/usg.pdf)

- Full-time School Employees
  - Full-time employees in the public schools of Georgia or the Technical College System of Georgia, their spouses, and their dependent children. Teachers employed full-time on military bases in Georgia shall also qualify for this waiver (BR Minutes, 1988-89, p.43).
  - Download Application for Full-Time School Employees (http://registrar.gatech.edu/docs/pdf/residency/full_time_school_employees_waiver.pdf)

- Career Consular Officials
  - Career consular officers, their spouses, and their dependent children who are citizens of the foreign nation that their Consulate office represents and who are stationed and living in Georgia under orders of their respective governments.
  - Download Application for Career Consular Officials (http://registrar.gatech.edu/docs/pdf/residency/career_consular_waiver.pdf)

- Military
  - Active duty military personnel, their spouses, and their dependent children who meet one of the following:
a. The military sponsor is currently stationed in or assigned to Georgia; or,
b. The military sponsor previously stationed in or assigned to Georgia is reassigned outside of Georgia, and the student(s) remain (s) continuously enrolled in a Georgia school, Technical College System of Georgia institution, and/or a University System of Georgia institution; or,
c. The military sponsor is reassigned outside of Georgia and the spouse and/or dependent children remain in Georgia; or,
d. The military sponsor is stationed in a state contiguous to the Georgia border and resides in Georgia; or,
e. Dependent children of a military sponsor, previously stationed in or assigned to Georgia within the previous five years, or the child completed at least one year of high school in Georgia; or,
f. Any student utilizing VA educational benefits transferred from a currently serving military member is also eligible, even if the student is no longer a dependent of the transferor.
g. Individuals stationed in or assigned to Georgia due to a NATO assignment (in the U.S. on a NATO visa and part of a NATO exchange program). Students must present their current U.S. military ID card showing they are active duty and a copy of their NATO orders showing they are assigned to Georgia. Dependent students and spouses are also eligible provided they submit documentation of their relationship to the individual assigned to Georgia on NATO orders in addition to the other documentation.
   • Download Application for Active Duty Military Personnel (http://registrar.gatech.edu/docs/pdf/residency/Military-Personnel.pdf)

2. Active members of the Georgia National Guard stationed or assigned to Georgia or active members of a unit of the U.S. Military Reserves based in Georgia, and their spouses and their dependent children (BoR Minutes, October 2008).
   • Download Application for GA National Guard and Reservists (http://registrar.gatech.edu/docs/pdf/residency/GA-National-Guard-and-Reservists.pdf)

3. Separated military members from a unified military service of the United States who meet one of the following (BoR Minutes, June 2004; October 2008; October 2013: March 2016; May 2017):
a. Individuals who within thirty-six (36) months of separation from such service, enroll in an academic program and demonstrate intent to become domiciled in Georgia. This waiver may also be granted to their spouses and dependent children.
b. Any separated service member or any student utilizing transferred VA educational benefits, and physically residing in the state, who enrolls within one hundred-twenty (120) months of separation is also eligible.
d. Anyone using benefits under the Marine Gunnery Sergeant John David Fry Scholarship who lives in the state in which the institution is located (regardless of formal state residence).
   • Except...
      • Surviving spouses can use the Fry Scholarship for 15 years from the anniversary of the service member’s death or until they remarry.

   • Download Application for Those Separated from the Military (http://registrar.gatech.edu/docs/pdf/residency/Recently-Separated-Military.pdf)

• Economic Advantage
As of the first day of classes for the term, an economic advantage waiver may be granted to a U.S. citizen or U.S. legal permanent resident who is a dependent or independent student and can provide clear evidence that the student or the student’s parent, spouse, or U.S. court-appointed legal guardian has relocated to the State of Georgia to accept full-time, self-sustaining employment and has established domicile in the State of Georgia. Relocation to the state must be for reasons other than enrolling in an institution of higher education. For U.S. citizens or U.S. legal permanent residents, this waiver will expire 12 months from the date the waiver was granted.

As of the first day of classes for the term, an economic advantage waiver may be granted to an independent non-citizen possessing a valid employment-related visa status who can provide clear evidence of having relocated to the State of Georgia to accept full-time, self-sustaining employment. Relocation to the state must be for employment reasons and not for the purpose of enrolling in an institution of higher education. These individuals must be able to show clear evidence of having taken legally permissible steps toward establishing legal permanent residence in the United States and the establishment of legal domicile in the State of Georgia. Independent non-citizen students may continue to receive this waiver as long as they maintain a valid employment-related visa status and can demonstrate continued efforts to establish U.S. legal permanent residence and legal domicile in the State of Georgia.

A dependent non-citizen student who can provide clear evidence that the student’s parent, spouse, or U.S. court-appointed legal guardian possesses a valid employment-related visa status and can provide clear evidence of having relocated to the State of Georgia to accept full-time, self-sustaining employment is also eligible to receive this waiver. Relocation to the state must be for employment reasons and not for the purpose of enrolling in an institution of higher education. These individuals must be able to show clear evidence of having taken legally permissible steps toward establishing legal permanent residence in the United States and the establishment of legal domicile in the State of Georgia. Non-citizen students currently receiving a waiver who are dependents of a parent, spouse, or U.S. court-appointed legal guardian possessing a valid employment-related visa status may continue to receive this waiver as long as they can demonstrate that their parent, spouse, or U.S. court-appointed legal guardian is maintaining full-time, self-sustaining employment in Georgia and is continuing efforts to pursue an adjustment of status to U.S. legal permanent resident and the establishment of legal domicile in the State of Georgia. (BR Minutes, October 2008.)

Download Application for Economic Advantage (http://registrar.gatech.edu/docs/pdf/residency/economic_advantage_waiver.pdf)

• Non-Resident Students
As of the first day of classes for the term, a non-resident student can be considered for this waiver under the following conditions:
   • Students under 24.
Tuition Classification

Classification of Students for Tuition Purposes

Under the Constitution and laws of Georgia, the Board of Regents of the University System of Georgia was created to govern, control, and manage a system of public institutions providing quality higher education for the benefit of Georgia citizens. The state, in turn, receives substantial benefit from individuals who attend or have attended these institutions through their significant contributions to the civic, political, economic, and social advancement of the citizens of Georgia.

Because the overwhelming proportion of financial support for the operation of the public institutions of higher education in Georgia comes from the citizens through the payment of taxes, the determination of whether a student is classified as a resident or a nonresident of the state for tuition purposes becomes a significant matter. The tuition paid by in-state students covers only about one-fourth of the total cost of their education in the University System. Therefore, Georgia taxpayers are contributing three-fourths of the necessary funds to provide quality education for the citizens of the state.

The practice followed by state colleges and universities of assessing out-of-state students a higher tuition rate is a rational attempt by states to achieve a partial cost equalization between those who have and those who have not recently contributed to the state’s economy, even though no precise way exists to determine the degree to which higher tuition charges equalize the cost of educating in-state and out-of-state students.

Courts that have been faced with challenges to residency classification procedures have consistently recognized the right of public institutions of higher education to charge higher rates to out-of-state students and to adopt reasonable criteria for determining the establishment of in-state status.

For the purpose of these regulations, the question to be answered is not primarily whether a student is a resident or nonresident of Georgia, but whether the student should pay University System fees on an in-state basis. The term “resident” is confusing because it may have several definitions as it relates to voter registration, driver’s licenses, automobile registration, deeds, contracts, wills, income taxes, and other matters. A student may be a resident of Georgia for some purposes, but not entitled to in-state status for tuition purposes.

The Board of Regents has adopted certain policies governing the classification of students as residents and nonresidents for tuition purposes in keeping with its responsibilities to the citizens of Georgia for an appropriate assessment of fees and reasonable share of the cost of their education. The taxpayers of Georgia are thereby assured that they are not assuming the financial burden of educating persons whose presence in the state is not intended to be permanent.

With these considerations in mind, the Board of Regents has adopted the following policies governing the classification of students for fee payment purposes:

http://www.usg.edu/policymanual/section4/policy/4.3_student_residency/

1. United States Citizens
   a. An independent student who has established and maintained a domicile in the State of Georgia for a period of at least twelve...
consecutive months immediately preceding the first day of classes for the term shall be classified as "in-state" for tuition purposes.

It is presumed that no student shall have gained or acquired in-state classification while attending any postsecondary educational institution in this state without clear evidence of having established domicile in Georgia for purposes other than attending a postsecondary educational institution in this state.

b. A dependent student shall be classified as "in-state" for tuition purposes if either:
   
   i. the dependent student's parent has established and maintained domicile in the State of Georgia for at least twelve consecutive months immediately preceding the first day of classes for the term and the student has graduated from a Georgia high school or

   ii. the dependent student's parent has established and maintained domicile in the State of Georgia for at least twelve consecutive months immediately preceding the first day of classes for the term and the parent claimed the student as a dependent on the parent's most recent federal income tax return.

c. A dependent student shall be classified as "in-state" for tuition purposes if a U.S. court-appointed legal guardian has established and maintained domicile in the State of Georgia for at least twelve consecutive months immediately preceding the first day of classes for the term, provided that appointment was not made to avoid payment of out-of-state tuition and the U.S. court-appointed legal guardian can provide clear evidence of having established and maintained domicile in the State of Georgia for a period of at least twelve consecutive months immediately preceding the first day of classes for the term.

d. If an independent student classified as "in-state" relocates temporarily but returns to the state of Georgia within 12 months, the student shall be entitled to retain in-state tuition classification.

e. If the parent or U.S. court-appointed legal guardian of a dependent student currently classified as "in-state" for tuition purposes establishes domicile outside of Georgia after having established and maintained domicile in the State of Georgia, the student may retain in-state tuition classification as long as the student remains continuously enrolled in a public postsecondary educational institution in the state, regardless of the domicile of the parent or U.S. court-appointed legal guardian.

2. Noncitizens

Noncitizens initially shall not be classified as "in-state" for tuition purposes unless there is evidence to warrant consideration of in-state classification. Lawful permanent residents, refugees, asylees, or other eligible noncitizens as defined by federal Title IV regulations may be extended the same consideration as citizens of the United States in determining whether they qualify for in-state classification. International students who reside in the United States under nonimmigrant status conditioned at least in part upon intent not to abandon a foreign domicile are not eligible for in-state classification.

Form:

Out-of-State Tuition Waivers-Residency (http://registrar.gatech.edu/docs/catalog/tuition_waiver_undergrad.pdf)

Verification of Participation

Verification of participation is a process whereby instructional faculty report to the Office of the Registrar and the Office of Scholarships and Financial Aid whether they have students enrolled in their classes who are not engaged with the course.

Verification of participation is a Federal Title IV requirement. The rule requires students who are receiving Federal Title IV financial aid to participate in all courses (credit hours) for which they have been funded. For example if a student is enrolled in twelve credit hours and her/his financial aid award has been based on a twelve-credit-hour course load, participation must be verified for all twelve credit hours.

Any student who is reported as "not participating" in the courses for which financial aid was awarded will see her/his amount of aid recalculated and revoked as appropriate. The student will be required to pay back the remaining amount. Lack of participation results in a financial impact for the student. Students cannot accept Federal Title IV aid and then neglect to engage in the study that it is funding.

Participation must be verified for all undergraduate and graduate classes that earn credit, are billable, and are gradable. For example, 7000- and 9000-level thesis courses for graduate students must be reported. Courses that are graded on a Pass/Fail basis must also be reported. Classes that are delivered online or at a distance must be reported.

Participation in a course can be indicated in a variety of ways. As instructional faculty are reporting their findings at the beginning of each term, the following examples might be helpful.

- Attending the class
- Handing in homework
- Taking a quiz or exam
- Posting information or accessing information on a website
- Posting blog entries or comments in a chat room
- Participation in group projects
- Meeting with or communicating with the thesis advisor on research progress
- Any other activity that demonstrates engagement in the course

The tool for reporting the verification of participation is available at http://verifyparticipation.gatech.edu.
POLICIES

The Rules and Regulations (p. 151) section of this catalog contains detailed information regarding the academic regulations of the Institute. Students who have questions concerning these regulations should consult either their major school or the Registrar’s Office (http://www.registrar.gatech.edu).

- Academic Honor Code (p. 138)
- Alcohol and Drug Policy (p. 138)
- Certificate Guidelines (p. 140)
- Disabled Persons Assistance (p. 142)
- Discrimination (p. 142)
- Family Educational Rights and Privacy Act (FERPA) and Applicant Records (p. 142)
- Grading GPA (p. 144)
- Health Policies (p. 147)
- Institute Commitment to Diversity, Equity, and Inclusion (p. 148)
- Intellectual Property Policy (p. 148)
- Required Computer Ownership (p. 149)
- Sexual Misconduct Policy (p. 149)
- Student Absence from Class Due to Illness or Personal Emergencies (p. 149)

Academic Honor Code

The Academic Honor Code is a student initiative that became an official Institute policy in 1996. The objective of the Academic Honor Code is to increase academic integrity and strengthen trust in the Georgia Tech community. All students are required to sign an agreement acknowledging their awareness of the Academic Honor Code. They are strongly encouraged to seek a full understanding of their instructors’ expectations regarding academic honor.


Alcohol and Drug Policy

The Student/Student Organization Alcohol Policy (http://www.policylibrary.gatech.edu/student-affairs/student-student-organization-alcohol-policy) is maintained by the Office of Student Integrity (http://osi.gatech.edu) and published in the Georgia Tech Policy Library (http://www.policylibrary.gatech.edu/student-affairs/student-student-organization-alcohol-policy). In the event of any conflict, the most current policy shown on the OSI web site and/or the Policy Library shall govern.

Student/Student Organization Alcohol Policy

Last Revised: August 2015

Review Date: August 2018

Policy Owner: Student Life

Contact Name: Peter Paquette

Contact Title: Director of the Office of Student Integrity

Contact Email: peter.paquette@vpss.gatech.edu

The purpose of this policy is to promote and educate about the lawful and responsible use of alcohol by students, and to educate about illegal drugs in order to maintain an environment that is consistent with the educational focus of Georgia Tech. Georgia Tech will comply with all federal, state, and local laws and policies, including the policies of the Board of Regents of the University System of Georgia, on the abuse of alcohol and other drugs by its students. The legal drinking age in the State of Georgia is 21.

Each member of the Georgia Tech community should be involved in the implementation of, and compliance with this policy. Unless otherwise stated by law, each individual retains responsibility for his or her actions at all times regardless of his or her mental state, even if altered by alcohol or other drugs.

Campus organizations may develop and enforce additional group/individual standards which are more restrictive than those established in this policy.

Standards of Conduct and Sanctions

In accordance with federal and state laws and because of the potential detriment to the health and well-being of its students, all students are prohibited from engaging in the unlawful use, possession, manufacture, distribution, dispensation, and sale of alcoholic beverages, controlled substances (including marijuana), and other drugs. The term “dangerous drug” is defined in the Official Code of Georgia Section 16-13-71.

A. Alcohol

The sale, distribution, and consumption of alcoholic beverages in or on all Georgia Tech owned or leased (by) property, or on sidewalks/streets are specifically prohibited, with the exception of those approved by the Office of the President or designee. This policy does not prohibit the lawful use of alcohol in institute-owned residences.

Individual possession and/or consumption of alcohol is acceptable, provided individuals DO NOT:

a. Possess or consume alcohol if under 21 years of age.

b. Furnish, or cause to be furnished, any alcohol to persons under 21 years of age.

c. Conspicuously display open containers of alcohol in any public location, including, but not limited to, grounds, sidewalks, and streets within campus boundaries (but not the public sidewalks and streets, or privately owned or leased property).

d. Sell alcoholic beverages.

e. Misrepresent one’s age or identity in any manner for the purpose of obtaining or possessing alcohol.

f. Serve or make available alcohol to intoxicated persons.

Alcoholic beverages may be served and/or consumed by individuals 21 and older at advertised events and activities that are promoted, sponsored, or supervised by a chartered Georgia Tech organization, providing the organization shall:

a. Be responsible for enforcing the entire Student Policy on Alcohol and Illegal Drugs.

b. Completed and confirmed review of the “Acknowledgement of Alcohol and Illegal Drugs Policy.” This form will remain on file in
Promotional activities regarding alcohol are as follows:

b. Provide non-alcoholic beverages and food in reasonable quantity, in the same general area, and for the same time period, as the alcoholic beverages are accessible.

c. Ensure that alcohol is not the focal point, the reason for, or the drawing card for an event.

d. Submit, and have approved, a completed Alcohol Event Planning Form. Alcohol Event Planning Forms are available in the Office of Leadership and Civic Engagement.

e. Not advertise the service or availability of alcoholic beverages at functions.

f. Ensure that alcoholic beverages are not consumed by any individual under the legal drinking age of 21.

g. Seek or accept sponsorship or support from companies/vendors.

h. Control access to the alcoholic beverages through a central point of distribution by a designated server within a designated area at the event (e.g., beer garden) and through the use of sober monitors. Only students who have shown proper proof of age may enter the designated area where alcohol is being served. All alcohol must be distributed and consumed within the designated area. Control is for the purpose of restricting use by those under 21 and/or who are obviously intoxicated.

i. Not use organizational funds to purchase alcohol. Any funds used to pay for alcohol must be taken from personal/private sources and paid to a properly licensed third party vendor. Alcohol may not be paid for by the student organization via a sale at the activity or by charging an admission fee either in advance or at the door (as stated in the Georgia Code of Law, 1981 Section 3-3-21).

j. Not use kegs, champagne/punch fountains, or other common usage containers (such as punch bowls or frozen drink machines) for alcoholic beverages.

k. In the absence of a third-party vendor, designate or hire a TIPS (Training Intervention Procedures for Servers) trained server to monitor the service and consumption of alcohol. It is unlawful to serve or make available alcohol to intoxicated persons (as stated in the Georgia Code of Law, Section 3-3-22).

l. Require a full-time Institute employee, who must not be a minor, to be present for the duration of functions hosted by student organizations where alcohol is served or made available. Advisers are encouraged to attend such functions.

Promotional activities regarding alcohol are as follows:

a. The posted advertisement of alcoholic beverages on campus is not permitted. This includes, but is not limited to: chalking, electronic communications, bulletins, flyers, and social media sites.

b. Campus publications are encouraged to minimize/eliminate all advertisement of alcoholic beverages.

c. No promotion or advertising on campus of incentive drinking ("happy hours", "2-for-1 specials", unlimited quantities of alcohol available at reduced prices or free, events focusing on the consumption of alcohol, etc.) is permitted.

d. Chartered student organizations and student groups may not seek or accept sponsorship or support from companies/vendors whose main focus of business is the manufacture, distribution, or sale of alcohol, other drugs or related paraphernalia.

Participants in Study Abroad programs are bound by the legal drinking age of the respective countries in which they are traveling and in all other aspects this policy applies.

Sanctions for Violation of Standards:
Students who violate this policy will be subject to disciplinary action and penalties in accordance with the Georgia Tech Student Code of Conduct.

Attempts to circumvent the provisions in this policy in any way are an infraction of this policy.

B. Possession and/or Use of Illegal Drugs

Georgia Tech does not permit or condone the illegal possession and/or use of controlled substances. Controlled substances means any drug, substance, or immediate precursor included in the definition of controlled substance in the Official Code of Georgia Section 16-13-21 (4) or Schedule I through V of Section 202 of the Federal Controlled Substance Act [21 United States Code 812]. The term “dangerous drug” is defined in the Official Code of Georgia Section 16-13-71.

Sanctions for Violation of Standards:

Any student who violates this policy may be subject to disciplinary actions and penalties in accordance with the Georgia Tech Student Code of Conduct.

Additionally, in accordance with Georgia law, any student convicted of a felony that involves the manufacture, distribution, sale, possession, or use of controlled substances or other dangerous drugs shall be subject to disciplinary actions and penalties in accordance with the Georgia Tech Student Code of Conduct.

Further information regarding the effects of drug abuse and penalties for manufacture, distribution, sale, possession, or use of controlled substances or other illegal drug, or chartered student organizations and student groups involved in these activities may be subject to specific penalties required by state law.

Participants in Study Abroad programs are bound by the policies of the Georgia Institute of Technology regarding the possession and/or use of controlled substances or other illegal drugs.

Drug and Alcohol Counseling, Treatment, and Rehabilitation Programs

Students with alcohol- or drug-related concerns may be referred to, or seek assistance from the Division of Student Affairs. The Division of Student Affairs provides trained professional and paraprofessional counselors in the Counseling Center for drug and alcohol abuse prevention, education, and counseling.

Policy Review

This policy shall be reviewed by a Task Force which includes student representation and is appointed by the Vice President for Student Life and Dean of Students or their designee, to determine its effectiveness, to ensure that policies are enforced and the disciplinary sanctions are consistently applied, to evaluate the effectiveness of the implementation process, and recommend changes to the policy as needed.
of the educational component of the policy, and to recommend and implement changes as appropriate.

Policy Distribution
The Vice President for Student Life and Dean of Students, or their designee, shall oversee the annual distribution of this Policy to every Georgia Tech student. Additional copies of the Policy on Student Alcohol and Illegal Drugs may be obtained from the Office of the Vice President for Student Life and Dean of Students.

Parental Notification Policy
Parents or legal guardians of students under the age of 21 may be notified when a student is found responsible for violating the Student/Student Organization Alcohol Policy when any of the following occur:

- A student endangers himself/herself or others while under the influence of alcohol or other substances. Specific instances include driving under the influence, fighting, alcohol poisoning, and hospitalization.
- When the Vice President for Student Life and Dean of Students determines that any future violation of Institute Policy will most likely result in suspension from Georgia Tech.
- When a student conduct administrator determines that any future violation of Institute policy will likely result in removal from housing.

Certificate Guidelines

- Graduate Certificate Guidelines (p. 140)
- Undergraduate Certificate Guidelines (p. 141)

Graduate Certificate Guidelines

Georgia Institute of Technology offers two types of graduate certificates: embedded certificates and stand-alone certificates.

Embedded Graduate Certificates Guidelines

Embedded certificates are intended to encourage students to use the elective requirements in their degree program to form a coherent concentration of coursework in a specified area.

1. Embedded certificates will be granted only to students who, in addition to the certificate program requirements, have satisfied requirements for a graduate degree. The offering unit is responsible for verifying satisfaction of all certificate requirements, as well as completion of a graduate degree. Embedded certificates are not recorded on the student’s transcript or diploma. Arrangements must be made for awarding embedded certificates within colleges or offering units. Embedded certificates will not be awarded at the Institute level.
2. All graduate embedded certificate programs must be approved by the Graduate Curriculum Committee and by the Academic Senate.
3. Departments, schools, and colleges are eligible to offer graduate certificate programs in well-defined and coherent subject areas. Certificate programs sponsored jointly by more than one academic unit may be designated as multi-disciplinary certificates, subject to the special requirements listed below.
4. A certificate program generally will be available to all graduate students, subject to the restrictions below. Exceptions must be clearly justified in the certificate proposal.
5. All proposals for a certificate must originate from the faculty of the academic unit offering the certificate or, in the case of a multi-disciplinary certificate, from the faculty of each participating academic unit. Proposals must be endorsed by the appropriate College Dean(s) and by the Provost.
6. In addition to the academic requirements for the certificate, the proposal must define the procedures for management of the program and for awarding certificates. The offering unit must record and maintain enrollment and completion for certificates. The design and working of certificates must be approved by the Provost and a draft must be submitted with the proposal.
7. The embedded certificate program must comprise at least 12 semester hours in a coherent program of which at least three semester hours are foundational to provide a broad overview of that discipline. A multi-disciplinary certificate program will additionally require that courses be taken from more than one academic unit and that at least three semester hours be taken outside the student’s major field. Cross-listed courses may be counted as being outside the student’s major field.
8. No more than a total of 4 semester hours of Special Problems courses may be included in an embedded certificate program.
9. Courses used in a certificate also may be used to fulfill elective requirements in the student’s major degree program.
10. A course may not be counted toward more than one certificate.
11. All courses counting toward the embedded certificate must be taken on a letter-grade basis, and be completed with a grade of B or higher.
12. The availability of a certificate should be noted in the catalog, at least by title, under the appropriate academic unit(s). The academic unit(s) offering the certificate shall publish and make available to students the requirements for the certificate – the courses and total number of hours required, along with the enumeration of any particular courses that are mandated or excluded, and any grade requirements that differ from the general grade requirements of this policy.
13. All certificate programs are to be reviewed during the scheduled academic program review in the sponsoring unit(s).

Stand-Alone Graduate Certificates Guidelines

Stand-alone certificates may be completed independent of students being enrolled as Master’s or Doctoral student. These certificates represent a cohesive program of study of a smaller size than a Master’s program and provide more flexibility to professionals for pursuing graduate education, including a means for professionals to renew and retrain due to a fast-changing work force. When completed, these certificates appear on the student’s academic record (transcript), and the student receives a certificate of completion.

Curricular Requirements and Approvals

1. Departments, schools, and colleges are eligible to offer graduate certificate programs in well-defined and coherent subject areas. Certificate programs sponsored jointly by more than one academic unit may be designated as multi-disciplinary certificates, subject to the special requirements listed below.
2. All proposals for a certificate must originate from the faculty of the academic unit offering the certificate or, in the case of a multi-disciplinary certificate, from the faculty of each participating academic unit. Proposals must be endorsed by the appropriate College Dean(s) and by the Provost.

3. All Graduate Certificate programs must be approved by the Institute Graduate Curriculum Committee and by the Academic Faculty Senate.

4. In addition to the academic requirements for the certificate, the proposal must define the procedures for management of the program.

5. The certificate program must comprise at least 12 semester hours in a coherent program of which at least six semester hours are required and the remaining hours may be selected from a set of elective courses. A multi-disciplinary certificate program will additionally require that courses be taken from more than one academic unit. No Special Problems courses may be included in a certificate program.

6. A course may not be counted towards more than one certificate.

7. For students enrolled as a Master's or a Doctoral student, courses used in a certificate also may be used to satisfy requirements in the student's major degree program, unless otherwise designated by the academic unit(s) offering the certificates.

8. All courses counting toward the certificate must be taken on a letter-grade basis, and be completed with a grade of C or higher with a minimum GPA of 2.7 for the certificate.

Admissions

1. Students must be admitted to the Institute as either Graduate Certificate-seeking students or degree-seeking graduate students.

2. Admission requirements for Graduate Certificate-seeking students are listed in the description of the Certificate in the Catalog. A minimum requirement is a Bachelor's Degree.

Completion

1. Certificates will be granted only to students who have satisfied the requirements as listed in the Catalog. Students must complete the certificate requirements within a four-year time-frame.

2. The offering unit is responsible for verifying satisfaction of all Certificate requirements with the final audit being conducted by the Registrar's Office.

3. Upon completion of the required courses, the student must apply for the stand-alone certificate online through the on-line application for graduation. Stand-alone certificates will be awarded three times per year, in May, December, and August. The award of the Certificates coincides with the award of degrees.

4. Award of the Certificate will be posted by the Registrar to the academic record (transcript), and the Registrar's Office will issue a certificate of completion. The design of the certificate of completion will be uniform across the Institute and will be managed in a fashion similar to diplomas.

Management of the Program

1. The availability of a stand-alone certificate should be noted in the Catalog, at least by title, under the appropriate academic unit(s). The academic unit(s) offering the certificate shall publish and make available to students the requirements for the certificate – the courses and total number of hours required, along with the enumeration of any particular courses that are mandated or excluded, any grade requirements that differ from the general grade requirements of this policy, and whether the courses taken for the certificate can be counted towards an MS Degree in that unit.

2. The offering unit must record and maintain data related to student learning and professional opportunities enhanced related to Gainful Employment requirements. Data related to Gainful Employment is required if the Certificate is approved as eligible under Federal Title IV financial aid rules.

3. All certificate programs are to be reviewed during the scheduled academic program review in the sponsoring unit(s).

4. Costs may vary by program

Undergraduate Certificate Guidelines

Certificates are intended to encourage students to use the elective course requirements in their degree program to form a coherent package of coursework in a specified area.

1. Certificates will be granted only to students who, in addition to the certificate program requirements, have satisfied requirements for an undergraduate degree. The offering unit is responsible for verifying satisfaction of all certificate requirements, as well as completion of an undergraduate degree. Certificates are not recorded on the student's transcript or diploma. Arrangements must be made for awarding certificates within colleges or offering units. Certificates will not be awarded at the Institute level.

2. All undergraduate certificate programs must be approved by the Undergraduate Curriculum Committee and by the Academic Senate.

3. Departments, schools, and colleges are eligible to offer undergraduate certificate programs in well-defined and coherent subject areas. Certificate programs sponsored jointly by more than one academic unit may be designated as multi-disciplinary certificates, subject to the special requirements listed below.

4. A certificate program generally will be available to all undergraduate students, subject to the restrictions below. Exceptions must be clearly justified in the certificate proposal.

5. All proposals for a certificate must originate from the faculty of the academic unit offering the certificate or, in the case of a multi-disciplinary certificate, from the faculty of each participating academic unit. Proposals must be endorsed by the appropriate College dean(s) and by the Provost.

6. In addition to the academic requirements for the certificate, the proposal must define the procedures for management of the program and for awarding certificates. The design and wording of certificates must be approved by the Provost and a draft must be submitted with the proposal.

7. A certificate program must comprise at least twelve semester hours in a coherent program, of which at least nine semester hours are upper-division coursework (numbered 3000 or above). A multi-disciplinary certificate program will additionally require that courses be taken from more than one academic unit and that at least three semester hours be taken outside the student's major field. Cross-listed courses may be counted as being outside the student's major field.

8. No more than 6 semester hours of Special Topics courses may be included in a certificate program. No more than a total of 4 semester hours of Special Problems or Undergraduate Research courses may be included in a certificate program.

9. Courses required by name and number in a student’s major degree program can not be used in satisfying the course requirements for a certificate.
10. Courses used to satisfy Core Areas A through E in a student’s major degree program cannot also be used to satisfy the course requirements for a certificate.
11. Any free elective course used to satisfy the course requirements of the student’s major degree program may also be used to satisfy the course requirements for a certificate.
12. All academic units may designate a block or blocks of courses outside of the student’s major field of study in which the same course can be used to satisfy the course requirements in the student’s major degree program and also be used to satisfy the course requirements for a certificate.
13. A course may not be counted toward more than one certificate and/or minor.
14. All courses counting toward the certificate must be taken on a letter-grade basis, and be completed with a grade of C or better.
15. The availability of a certificate should be noted in the catalog, at least by title, under the appropriate academic unit(s). The academic unit(s) offering the certificate shall publish and make available to students the requirements for the certificate – the courses and total number of hours required, along with the enumeration of any particular courses that are mandated or excluded, and any grade requirements that differ from the general grade requirements of this policy.
16. All certificate programs are to be reviewed during the scheduled academic program review in the sponsoring unit(s).

Disabled Persons Assistance

Assistance for Individuals with Disabilities

The Office of Disability Services provides accessible programs, services, activities, and reasonable accommodations for students with a disability as defined by section 504 of the Rehabilitation Act of 1973, as amended, and by the Americans with Disabilities Act of 1990 and 2008. Services are available to ensure that individuals with disabilities have an equal opportunity to pursue education, employment, or other campus programs, activities, or services.

The Office of Disability Services offers self-identified students with permanent or temporary disabilities assistance with registration, accessibility, transportation, parking, housing, counseling, note taking, recorded textbooks, advocacy, test proctoring, referral services, and other needs. Disability Services promotes disability awareness programs for departmental faculty and staff, as well as the Georgia Tech community.

Students and prospective students who wish to learn more about accommodations for students with disabilities should contact:

Office of Disability Services
Suite 221 Smithgall
Student Services Building
Georgia Institute of Technology
Atlanta, Georgia 30332-0285

call 404.894.2563 (voice) or 404.894.1664 (TTY)
visit http://disabilityservices.gatech.edu
email dsinfo@gatech.edu

Faculty, staff, and visitors should contact Disability Services in the Office of Human Resources at 404.894.3344 (voice) or 404.894.9411 (TDD).

Office of Disability Services Website (http://www.adapts.gatech.edu)

Academic Accommodations for Students with Disabilities

Reasonable accommodations are provided to self-identified students with disabilities who meet the academic and technical standards requisite to admission or participation in the program of study.

Consideration may be given to the substitution or modification of certain course requirements as long as such changes do not detract from the quality of the educational experience and the changes remain within the accreditation criteria for the degree program. Such substitutions or modifications must be approved by the school chair, department head, or college dean, and the Undergraduate Curriculum Committee and/or the Graduate Committee.

Office of Disability Services Website (http://www.adapts.gatech.edu)

Discrimination

This institution is in compliance with Title VI of the Civil Rights Act of 1964 (http://www.justice.gov/crt/about/cor/coord/titlevi.php) and does not discriminate on the basis of race, creed, color, or national origin and is also in compliance with the provisions of Title IX of the Educational Amendments of 1972 (http://www.dol.gov/oasam/regs/statutes/titleix.htm), which prohibit discrimination on the basis of sex.

Family Educational Rights and Privacy Act (FERPA) and Applicant Records

Notification of Student Rights Under FERPA

The Family Educational Rights and Privacy Act (FERPA) affords students certain rights with respect to their education records. They are:

• The Family Educational Rights and Privacy Act (FERPA) affords students certain rights with respect to their education records. They are:

• The right to inspect and review the student’s education records within forty-five days of the day that the Institute receives the request for access.

Students should submit written requests to the Registrar’s office in order to identify the record(s) they wish to inspect. The Registrar will make arrangements for access and notify the student of the time and place where the records may be inspected.

Students should specify the specific records being requested as stated below when making such written request:

• Transcripts (Office of the Registrar)
• Student Disciplinary Records (Office of Student Integrity)
• Title IX records (Title IX Coordinator)
• Student Housing (Department of Housing)
• Financial Aid Records (Office of Scholarships and Financial Aid)
For education records that are not specified above, please include a sufficient description and, if possible, the location for the requested records as these records are transient in nature and are not routinely maintained as part of a student’s FERPA records.

Please note that fees may be assessed solely to remove other student information that is protected by FERPA and that may be contained within these transient records. You will not be charged to review your student records except as stated herein and we will notify you first if fees may be assessed.

- The right to request the amendment of the student’s education records that the student believes are inaccurate or misleading.

Students may ask the Institute to amend a record that they believe is inaccurate or misleading. They should write the registrar, clearly identifying the part of the record they want changed, and specify why it is inaccurate or misleading.

If the Institute decides not to amend the record as requested by the student, the Institute will notify the student of the decision and advise the student of his or her right to a hearing regarding the request for amendment. Additional information regarding the hearing procedures will be provided to the student when notified of the right to a hearing.

- The right to consent to disclosures of personally identifiable information contained in the student’s education records, except to the extent that FERPA authorizes disclosure without consent.

One exception which permits disclosure without consent is disclosure to school officials with legitimate educational interests. A school official is

- a person whether volunteering for or employed by the Institute in an administrative, supervisory, academic or research, or support staff position (including law enforcement unit personnel and health staff);
- a person or company with whom the Institute has contracted (such as an attorney, auditor, or collection agent);
- a person serving on the Board of Regents;
- a staff member in the office of the Board of Regents;
- staff in the Office of the Attorney General; or
- a student serving on an official committee, such as a disciplinary or grievance committee, or assisting another school official in performing his or her tasks.

A school official has a legitimate educational interest if the official needs to review an education record in order to fulfill his or her professional responsibility.

- The right to file a complaint with the United States Department of Education concerning alleged failures by the Georgia Institute of Technology to comply with the requirements of FERPA.

The name and address of the Office that administers FERPA is:

Family Policy Compliance Office  
U.S. Department of Education  
400 Maryland Avenue, SW  
Washington, DC 20202-4605

Applicant Records

Access to applicant records is strictly controlled and governed by Institute policy. To the extent permitted by law, these records are treated as confidential.

Annual Notice of Directory Information Contents

"Directory Information" is information not generally considered harmful or an invasion of privacy if disclosed. Effective November 12, 2016, the Georgia Institute of Technology considers the following information to be directory information:

- Name, address (including GT email address), and telephone listing
- Level (graduate or undergraduate)
- Field of study
- Enrollment status (full-time, part-time, less than part-time)
- Dates of attendance
- Degrees with associated honors and designations, and date(s) awarded
- Anticipated date of graduation
- Participation in NCAA Division I sports, including terms of team membership

Directory information cannot include social security numbers.

Students who wish to prohibit the release of Directory Information can view information on the registrar's confidentiality Web page (http://www.registrar.gatech.edu/students/formlanding/confid.php).

Possible Federal and State Data Collection and Use

As of January 3, 2012, the U.S. Department of Education’s FERPA regulations expand the circumstances under which your education records and personally identifiable information (PII) contained in such records — including your Social Security Number, grades, or other private information — may be accessed without your consent. First, the U.S. Comptroller General, the U.S. Attorney General, the U.S. Secretary of Education, or state and local education authorities ("Federal and State Authorities") may allow access to your records and PII without your consent to any third party designated by a Federal or State Authority to evaluate a federal- or state-supported education program. The evaluation may relate to any program that is "principally engaged in the provision of education," such as early childhood education and job training, as well as any program that is administered by an education agency or institution. Second, Federal and State Authorities may allow access to your education records and PII without your consent to researchers performing certain types of studies, in certain cases even when we object to or do not request such research. Federal and State Authorities must obtain certain use-restriction and data security promises from the entities that they authorize to receive your PII, but the Authorities need not maintain direct control over such entities. In addition, in connection with Statewide Longitudinal Data Systems, State Authorities may collect, compile, permanently retain, and share without your consent PII from your education records, and they may track your participation in education and other programs by linking such PII to other personal information about you that they obtain from other Federal or State data sources, including workforce development, unemployment insurance,
child welfare, juvenile justice, military service, and migrant student records systems.

Additional Information
Additional information on Georgia Tech's FERPA policies is available from the Registrar's Office.

Grading & GPA

- Academic Average (p. 144)
- Auditing (p. 144)
- Final Examinations (p. 144)
- Grade Substitution (p. 145)
- Grading System (p. 146)
- Pass/Fail Grading (p. 147)
- Progress Reports (p. 147)

Academic Average
The "academic average," or grade-point average (GPA), is the ratio of total quality points earned to total credit hours attempted.

When a student passes a course, she/he receives the designated number of credit hours; at the same time, she/he receives a certain number of quality points, based on the letter grade earned. Multiply the number of credit hours designated to the specific course by the numerical value of the letter grade earned to determine the number of quality points earned. Letter grades carry the following numerical values:

- "A" = 4
- "B" = 3
- "C" = 2
- "D" = 1

For example, when a student earns a letter grade of "C" in a 3-credit-hour course, she/he receives 6 quality points.

Grade-point averages are truncated after two decimal places.

If a student takes the same course more than once, any later grade does not replace any earlier one. The academic average includes both attempts, unless a grade substitution has been approved and processed.

If a student takes a course on a Pass/Fail basis, the course is not included in her/his academic average.

For undergraduate students, the academic average is calculated by summing the number of quality points earned by the student for all courses in which she/he has enrolled as an undergraduate and dividing this sum by the number of credit hours designated to all courses in which she/he has enrolled as an undergraduate.

For graduate students, the academic average includes only the courses in which the student has enrolled after her/his entrance into the graduate division.

Auditing
1. The auditing of a course will be permitted to regularly a enrolled student who has obtained the approval of her/his advisor and the departments concerned. Such a course counts at full value in computing the student’s course load for an academic term.

2. The grade of "V" (i.e., "Visitor") is earned when a student audits a course. The "V" grade has no effect on a student’s grade-point average (GPA).

3. No academic credit is granted for auditing a course.

4. Students are not permitted to change to or from an auditing status except through the regular procedures for schedule change or withdrawal. Any student who does not meet the instructor’s requirements for a successful audit will be withdrawn with a grade of "W" assigned at the end of the academic term.

Final Examinations
Final Instructional Class Days and Reading Periods
The following applies to the standard academic terms, including the Fall Semester, Spring Semester, and Full Summer Session. It does not apply to the Early Short Summer Session and Late Short Summer Session. Given the variability in the exact timing of the Full Summer Session, the Office of the Registrar will adjust the final instructional class days and reading periods for this semester only in order to meet required instructional time. This policy replaces the former Dead Week (Week Preceding Final Examinations) policy.

Final Instructional Class Days
a. Final Instructional Class Days are scheduled during each standard academic term including the Full Summer Session, and are the last two days a course officially meets.

b. No tests or quizzes are to be administered on these days. Lab quizzes and/or practicums may be given in courses comprised of both a lecture and a scheduled lab, wherein the lecture carries at least two credits.

c. For all courses, graded homework or assignments, lab reports, course projects, demonstrations, studio reviews, and presentations may be due during these two days, provided that they are listed on the syllabus at the start of the semester.

d. All quizzes and tests should be graded and reported to students on or before the last Final Instructional Class Day.

Reading Periods
a. Reading Periods will be designated to provide time for students to prepare for final examinations.

b. No classes meet. This includes labs, recitations, projects, design/capstone courses, and studios.

c. No assignments, projects, presentations, or other graded activities are allowed.

d. Instructors may schedule optional study review sessions for students during reading periods, but no credit or extra credit may be attached to these optional sessions. New content may not be covered, and any materials (e.g., handouts, slides, practice problems, etc.) that are provided at these optional review sessions must be made available to all students. This provision does not require that such optional sessions be audio or video recorded.

e. Requests for exceptions to the Final Instructional Class Day and Reading Period policies may be made in writing by the Dean of the College (or her/his designee) to the Student Rules and Regulations Committee (SRR). The SRR will then make a recommendation to the Undergraduate Institute Curriculum Committee or Graduate Institute Curriculum Committee, as appropriate, for approval or denial.
Requests must be made no later than the academic term prior to the desired term of implementation and will be regularly reviewed.

f. Student concerns may be discussed with the faculty member and/or reported to the Chief Academic Officer of the department of instruction, or with the Assistant Provost for Academic Advocacy and Conflict Resolution. For more information, see the Student Academic Grievance Policy.

**Final Examinations**

1. In regularly scheduled lecture courses of the Institute, a final examination shall be administered at the time specified in the official Final Examination Schedule as distributed by the Office of the Registrar. In courses such as seminars, senior design, capstone, writing courses, and laboratories, final examinations may be waived and may be replaced with appropriate assessment. The decision to give a final examination in these courses shall be made by the instructor of record. An announcement of the course's final examination policy shall be made to the class at its first meeting and included in the syllabus.

2. No assessment other than a final examination or its replacement may be due during the Final Examination Period.

3. Requests to change a class's final examination time within the Final Examination Period must be submitted to the Chief Academic Officer of the department of instruction for approval no later than one week before the beginning of the Final Examination Period. Any such request must have the unanimous approval of the class as shown by secret ballot, as well as approval by the instructor of the class.

4. A change in the scheduling of a final examination for an individual student ordinarily will not be permitted; however, such a change may be allowed for hardship cases at the discretion of the instructor. The request for a change must be justified in writing by the student and shall be submitted to the instructor prior to Final Examination Period and may be rescheduled to an appropriate time.

5. In the event a student has two final examinations scheduled for at the same time, the course having the lower number shall be considered in conflict and the student shall notify the instructor no later than two weeks before the Thursday of the Final Examination Period. In such case, the final examination in that course shall be given during the Conflict Examination Period or, by agreement of the instructor and the student, at a mutually satisfactory time.

   a. If the student notifies the instructor after the above deadline but before the Thursday of the Final Examination Period, the student shall, at the discretion of the instructor:
      i. receive a course grade of "I" (Incomplete), with an opportunity to take a makeup final examination the following academic term (and have the course grade changed as warranted by the results of the test), or
      ii. be given the final examination during the Conflict Examination Period or at an alternative time during the Final Examination Period.

   b. A student who fails to notify the instructor of the conflict before the Thursday of the Final Examination Period shall, at the discretion of the instructor:
      i. receive a score of zero on the final examination, or
      ii. be given the final examination during the Conflict Examination Period or at an alternative time during the Final Examination Period, or
      iii. be given the final examination at the time scheduled for the course.

**Grade Substitution**

This policy is known as “freshman forgiveness” or “academic forgiveness” at some institutions. No assumptions based on experiences at other institutions should be made about the grade substitution policy at Georgia Tech. Students requesting grade substitutions must follow all steps outlined below.

1. First-time freshman students who receive a grade of "D" or "F" in a course within their first two academic terms of enrollment (first three academic terms for those who begin in the Summer Session for Freshmen) are eligible to repeat the course and have the original grade excluded from the calculation of the academic average. Grade substitution may be used only once per course, with a maximum of two courses in total.

2. The course must be repeated at Georgia Tech within the student’s first four academic terms of enrollment (first five academic terms for those who begin in the Freshman Summer Session).

3. The application for grade substitution must be filed with the Registrar’s Office no later than the deadline for withdrawing from a course during the student’s next term of enrollment after the course is repeated.

4. The original course and grade will continue to appear on the student’s transcript, with a notation that the course was repeated and that the original grade is not included in calculation of the academic average. Credit for the course will be counted only once.

5. If the revised academic average results in a change in academic standing for any term, then the revised standing will be reflected on the student’s transcript. If standing is changed from "Dismissal" to a higher standing, it will be recorded as "standing from Dismissal" and
Grading System

Grades

• The letter grades used in the calculation of grade-point average (GPA) are as follows:

<table>
<thead>
<tr>
<th>Letter Grade</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Excellent. Four quality points.</td>
</tr>
<tr>
<td>B</td>
<td>Good. Three quality points.</td>
</tr>
<tr>
<td>C</td>
<td>Satisfactory. Two quality points.</td>
</tr>
<tr>
<td>D</td>
<td>Passing. One quality point.</td>
</tr>
<tr>
<td>F</td>
<td>Failure. No quality points. If the course is required, the student must repeat it.</td>
</tr>
</tbody>
</table>

• The following grades are used under special conditions and are not included in the calculation of grade-point average (GPA):

<table>
<thead>
<tr>
<th>Letter Grade</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>S</td>
<td>Satisfactory</td>
</tr>
<tr>
<td>U</td>
<td>Unsatisfactory</td>
</tr>
<tr>
<td>V</td>
<td>No credit earned. The &quot;V&quot; grade is used when a student audits a course.</td>
</tr>
</tbody>
</table>

• The following grades are used in the cases indicated and are not be included in the calculation of grade-point average (GPA):

<table>
<thead>
<tr>
<th>Letter Grade</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Incomplete. The &quot;I&quot; grade is used when, for reasons beyond her/his control and deemed acceptable by the instructor, a student whose academic performance had been satisfactory becomes unable to fulfill a course's requirements. If the student's academic performance had been so poor as to preclude her/his passing, the instructor shall assign the grade of &quot;F&quot; Regulation VII. &quot;Deficiencies,&quot; outlines the removal of the &quot;I&quot; grade. See the Registrar's Office website for more guidance on the use of the Incomplete grade under Incomplete grade page under the Faculty section.</td>
</tr>
<tr>
<td>NR</td>
<td>Not Reported. The &quot;NR&quot; grade is used when, by no fault of the student, the instructors fails to submit grades before the deadline.</td>
</tr>
<tr>
<td>IJ</td>
<td>Incomplete Judicial. The &quot;IJ&quot; is used when academic misconduct has been reported in a class and the investigation is being conducted. It is a placeholder grade that is changed to a permanent grade as determined by the outcome of the investigation. It remains in place until the charges are adjudicated and a proper final grade is determined and assigned.</td>
</tr>
</tbody>
</table>

• Final grades are reported to the Office of the Registrar at the end of each academic term.
• Progress report grades are submitted to the Office of the Registrar for all classes numbered 1000 and 2000 in the Fall Semester and Spring Semester. These grades are used for advising students, not for calculating any grade-point average (GPA) at Georgia Tech. Progress
report grades are "S" or "U." A grade of "U" indicates that, based on the work completed to that point in the academic term, the student's standing is in the "D" or lower range. Progress report grades must be submitted once 40 percent of the academic term has passed, as specified by the official Academic Calendar. The due date for reporting will be noon on Monday and the grades will be available to students that afternoon.

- If a final course grade is believed to be erroneous, the student should contact the professor as soon as possible. In general, no change of grade will be made after the end of the student's next academic term in residence.

**Academic Average**

The "academic average," or grade-point average (GPA), is the ratio of total quality points earned to total credit hours attempted.

When a student passes a course, she/he receives the designated number of credit hours; at the same time, she/he receives a certain number of quality points, based on the letter grade earned. Multiply the number of credit hours designated to the specific course by the numerical value of the letter grade earned to determine the number of quality points earned. Letter grades carry the following numerical values:

- "A" = 4
- "B" = 3
- "C" = 2
- "D" = 1

For example, when a student earns a letter grade of "C" in a 3-credit-hour course, she/he receives 6 quality points.

Grade-point averages are truncated after two decimal places.

If a student takes the same course more than once, any later grade does not replace any earlier one. The academic average includes both attempts, unless a grade substitution has been approved and processed. If a student takes a course on a Pass/Fail basis, the course is not included in her/his academic average.

For undergraduate students, the academic average is calculated by summing the number of quality points earned by the student for all courses in which she/he has enrolled as an undergraduate. The maximum number of credit hours that a student may earn on a pass/fail basis is related to the number of credit hours required for the program of study in which the student is enrolled.

<table>
<thead>
<tr>
<th>Hours included in program of study</th>
<th>Hours allowed on pass/fail basis</th>
</tr>
</thead>
<tbody>
<tr>
<td>45 to 70 credit hours</td>
<td>3 credit hours</td>
</tr>
<tr>
<td>71 to 90 credit hours</td>
<td>6 credit hours</td>
</tr>
<tr>
<td>91 or more credit hours</td>
<td>9 credit hours</td>
</tr>
</tbody>
</table>

2. For a second undergraduate degree, these limits apply to the credit hours included in the program of study for that second degree.

3. A master's degree program of study may include up to three semester credit hours on a pass/fail basis.

**Pass/Fail Grading**

**A. General**

1. At the option of the student's major school, credit toward a bachelor's degree may be allowed for courses taken under the pass/fail system and completed with a grade of "Pass."

2. The major school must approve all pass/fail courses included in the final program of study, and students should be aware of school requirements.

3. In graduate programs, thesis research hours will be evaluated on a pass/fail basis.

4. Pass/fail enrollment in any course may be restricted by the school or department offering the course.

5. Students who are permitted to register under the pass/fail system will be so designated on the official class rolls. The grades recorded will be "S" for "Satisfactory" or "U" for "Unsatisfactory." These grades will not be included in the calculation of the grade-point average and cannot be changed to a grade that will count in the average.

6. Withdrawals from courses taken on a pass/fail basis will follow the same rules that govern withdrawals from courses included in the grade-point average.

7. The deadline to change the grade mode from letter grade to pass/fail (and vice versa) is the same day as the Last Day to Withdraw from Individual Courses without a Penalty.

Grade mode changes are allowed online during the Registration Period. After the Registration Period ends, the following form must be completed and submitted to the Office of the Registrar.

Download Form ([http://www.registrar.gatech.edu/docs/catalog/grade_mode.pdf](http://www.registrar.gatech.edu/docs/catalog/grade_mode.pdf))

**B. Credit Hours Permitted**

Progress Report grades of "S" or "U" are issued for all students enrolled in 1000 and 2000 level courses in the Fall Semester and Spring Semester prior to midterm. A Progress Report grade of "U" indicates a performance level of "D" or lower. These are not permanent grades and never appear on a transcript, but are issued to help students assess where they stand in the class and obtain academic help from the faculty and the many academic resource services available on campus.

For more information, see Regulation V, "Grades/Average," Section A, "Grades." (p. 153)

**Health Policies**

A Medical Entrance Form and proof of required immunizations and tuberculosis screening must be on file with Stamps Health Services ([http://www.health.gatech.edu](http://www.health.gatech.edu)). Failure to provide this information may result in a health hold and delay of registration. All international students (F1 and J1 visas) are required to have health insurance coverage. Students may elect to purchase the health insurance made available by the health insurance provider contracted by Georgia Tech or may have their own comparable medical insurance.
Student Health Insurance

Source: Georgia Tech Policy Library (http://www.policylibrary.gatech.edu/student-affairs/health-insurance-information)

The Georgia Board of Regents (BOR) offers student health insurance for eligible students and their dependents. Two groups of students may purchase student health insurance: Mandatory and Voluntary. Mandatory students are required by the BOR to have student health insurance and the charge is applied automatically to the student’s account along with tuition. Mandatory Graduates: Teaching Assistant, F1 or J1 visa holder, Research Assistant, Fellowship or Full tuition waiver. Mandatory Undergraduates: F1 or J1 visa holders. Mandatory students who already have health insurance may apply to waive the Board of Regents (BOR) student health insurance coverage.

There is a 30 day open enrollment period at the start of each semester to enroll for student insurance coverage, to enroll for the voluntary plan, or for mandatory students to add spouse/dependents coverage. For students and spouses with Board of Regents (BOR) student health insurance, Stamps Health Services (SHS) is the primary care provider. SHS renders care to students, spouses, and domestic partners. Dependent children are not eligible to be treated at SHS.

More information is available at www.health.gatech.edu (http://www.health.gatech.edu)

Immunizations

Source: Georgia Tech Policy Library (http://www.policylibrary.gatech.edu/student-affairs/immunizations)

All incoming students must comply with the Board of Regents of the University System of Georgia’s immunization requirements. It is strongly recommended that immunization requirements are met as soon as possible to avoid a registration hold. A registration hold keeps students from registering for classes.

Incoming students must use Stamps Health Services Immunizations Form.

More information is available at www.health.gatech.edu (http://www.health.gatech.edu)

Special Health Considerations

Source: Georgia Tech Policy Library (http://www.policylibrary.gatech.edu/student-affairs/special-health-considerations)

It is the responsibility of all students to notify the Health Center, the School of Applied Physiology, and the Office of Disabled Student Services of any disability that would make participation in swimming, competitive sports, and aerobic training hazardous to their well-being. Any student requesting special consideration because of mental or physical disability should have his or her physician write an explanatory letter, giving full details of the disability and consequent limitations on physical activity, to the medical director of Health Services. This letter must accompany the Medical Entrance Form.

Treatment

Source: Georgia Tech Policy Library (http://www.policylibrary.gatech.edu/student-affairs/treatment)

Stamps Health Services (SHS) offers comprehensive health care to students, spouses, and/or domestic partners of Georgia Tech students. Eligibility status is determined before an appointment is scheduled for services. Services are provided through payment of the Health Fee or on a pay-per-visit basis. The Health Fee Coverage Period begins one business week before the first day of class of the upcoming term. The coverage period ends the last business day prior to the first day of class of the upcoming term.

More information about the Health Fee is available on the Stamps Health Services (http://health.gatech.edu/finance/Pages/Health-Fee.aspx) website.

Institute Commitment to Diversity, Equity, and Inclusion

Diversity is one of Georgia Tech’s greatest strengths and one of the major priorities identified in our twenty-five-year strategic plan.

“We will recruit, develop, retain, and engage a diverse cadre of students, faculty, and staff with a wide variety of background, perspectives, interests, and talents, creating a campus community that exemplifies the best in all of us—in our intellectual pursuits, our diversity of thought, our personal integrity, and our inclusive excellence.” — Georgia Tech Strategic Plan

At Tech, we embrace and leverage diversity in all its manifestations. We are proud that we are one of the most diverse universities in the world with students who represent every state in the nation and more than 100 countries. In the years ahead, our goal is to continue to build a campus culture of collegiality, close collaboration, global perspective, intercultural sensitivity, respect, and thoughtful interaction among a diverse community of students, employees, and alumni.

We realize that, in order to achieve our vision for Georgia Tech as a leader in influencing the major technological, social, and policy decisions in the twenty-first century, we must recruit and retain faculty, staff, and students from a wide array of backgrounds, perspectives, interests, and talents. In doing so, we will create a community that exemplifies the best in all of us — our intellectual pursuits, our diversity of thought, and our personal integrity. Our mission to achieve inclusive excellence means unleashing the full potential of Tech’s human capacity to create a better, sustainable future for us all.

You are invited to join us on the journey of creating and sustaining a future that builds upon the talents of all members of our community in addressing the major challenges of this and future generations.

The Office of the President
Georgia Institute of Technology

Intellectual Property Policy

The Institute’s Intellectual Property Policy, concerning inventions, copyright, and computer software, applies to students as well as to faculty and staff. Adherence thereto is a condition of continued enrollment at the Institute. The Intellectual Property Policy can be found in section 50 of the Faculty Handbook (http://www.academic.gatech.edu/handbook).

Faculty Handbook (http://www.academic.gatech.edu/handbook)
Office of Technology Licensing (http://otl.gtrc.gatech.edu)
Required Computer Ownership

In an effort to foster equal access to computers and to make the most of the teaching and learning technology available at Georgia Tech, all undergraduate students entering Georgia Tech under this or subsequent catalogs are required to own or lease a computer. The minimum hardware and software requirements (as well as purchasing and financing options) are sent each spring to students accepted for the summer and fall semesters, and in the fall to students accepted for spring semester.

Because computer ownership is mandatory, an average cost for the minimum hardware and software required can be included in computing a new student’s cost of education for the purpose of determining their eligibility for all forms of student financial aid. Students should contact the Office of Scholarships and Financial Aid for more information.

Student Computer Ownership Website (http://www.sco.gatech.edu)

Sexual Misconduct Policy

The official and most current version of the Sexual Misconduct Policy is available in the Georgia Tech Policy Library.


Sexual Misconduct Policy

Student Absence from Class Due to Illness or Personal Emergencies

Expectations, Rights, and Responsibilities

A. A student may miss class on occasion due to medical issues. The following statement intends to describe the expectations, rights, and responsibilities of all involved including students, Office of Student Life, instructors, and health care providers. The information is intended to give students better direction as to how they should proceed to notify instructors when they are ill and need to miss class and what kind of documentation they should provide and to whom. The information is intended to provide faculty, instructors, information that will be more useful to them in determining the student's options for making up the work, or understanding the implications on their grade in the class. The information is intended to provide some guidance to the on-campus health services staff and off-campus health care providers in terms of what kinds of documentation is needed and how it will be handled once provided.

Students who need to miss class due to illness should be aware of the following:

a. If ill, and possibly contagious, students are expected to take appropriate action including not coming to class and seeking medical treatment.

b. Students have the right to expect that their privacy will be protected under HIPAA but they must follow proper procedures in order to ensure that health care information is kept private.

c. Students are responsible for seeking medical attention and for obtaining some type of documentation that would include the following minimal information:

   i. Date of the visit
   ii. Name of medical facility where treatment occurred
   iii. Diagnosis or indication of whether class absence is recommended or required
   iv. Expected duration of the recovery

d. Students are responsible for providing the documentation to the Office of Student Life where it will be treated and handled confidentially with necessary information being submitted to the student’s instructors for that term.

2. Office of Student Life: Expectations, Rights, and Responsibilities

In regard to supporting students who need to miss class due to illness the Office of Student Life is expected to remain aware of the following:

a. It will serve as the collection point for medical documentation and treat it in a confidential manner.

b. It will share the medical documentation with appropriate instructional faculty. Sufficient information from the medical documentation to ensure that the dates of illness or of treatment for the illness occurred will be shared with the instructional faculty.

c. It will share sufficient information as to help determine whether the illness was of sufficient concern that missing class was recommended or required.

d. It will answer questions that instructional faculty may have if they are unclear about what to do with the information.

3. Instructors of Classes: Expectations, Rights, and Responsibilities

In regard to supporting students who need to miss class due to illness, instructors are expected to remain aware of the following:

a. It is the responsibility of the instructors to respect the student’s right to confidentiality and understand that medical documentation will be handled by the Office of Student Life in an appropriate manner.

b. It is expected that instructors will not ask the student directly for medical documentation. If it is provided without being requested, the instructors should return it to the student or destroy it.

c. Instructors are expected to:

   i. Work with the student to make up the missed assignments, when possible.
   ii. Work with the student to find alternatives, if possible, if the assignments missed cannot be made up.
   iii. Do so within a reasonable timeframe.

4. Medical Professionals: Expectations, Rights, and Responsibilities
In regard to supporting students who need to miss class due to illness, medical professionals are expected to remain aware of the following:

a. At the request of the student (patient), it is expected that some type of document be provided that indicates at minimum the date of the visit or treatment. If the student is to miss class, it is expected that the student would have sufficient information from the medical facility to support that need.

b. It is expected that the medical professional will provide sufficient information to the student so that the student can then provide it to the Office of Student Life.

c. The medical professional can expect the information to be handled in a confidential manner.

d. The medical documentation must be on official letterhead of the facility and contain a date.

B. A student may miss class on occasion due to personal emergencies. Whatever the type of personal that exists, there are expectations on part of the students, the Office of Student Life, and the instructional faculty.

1. **Students: Expectations, Rights, and Responsibilities**

   Students who need to miss class due to personal emergencies should remain aware of the following:

   a. Some type of documentation is required by the Office of Student Life. This could take the form of an obituary, travel itinerary, or other type of document that would include a date and possibly some type of explanation for the absence.

   b. The length of the absence needs to be clear as part of the documentation.

   c. Student have the right to expect that their privacy will be protected under FERPA.

2. **Office of Student Life: Expectations, Rights, and Responsibilities**

   In regard to supporting students who need to miss class due to personal emergencies, the Office of Student Life will remain aware of the following:

   a. It will serve as the collection point for documentation and treat it in a confidential manner.

   b. It will share with appropriate instructors sufficient information from the documentation to ensure that the dates of the incident or event are clear and that it was a severe enough life interruption to cause absence from class.

   c. It will answer questions that instructional faculty may have if they are unclear about what to do with the information.

3. **Faculty/Instructors of Classes: Expectations, Rights, and Responsibilities**

   In regard to supporting students who need to miss class due to personal emergencies, instructors are expected to remain aware of the following:

   a. It is the responsibility of the instructors to respect the student’s right to confidentiality and understand that the documentation will be handled by the Office of Student Life in an appropriate manner.

   b. It is expected that instructors will not ask the student directly for documentation. If it is provided without being requested, the instructors should return it to the student or destroy it. Depending upon the kind of documentation it is, there could be other information in it that could compromise the privacy of others, including other family members.

   c. Instructors are expected to:

   i. Work with the student to make up the missed assignments, when possible.

   ii. Work with the student to find alternatives, if possible, if the assignments missed cannot be made up.

   iii. Do so within a reasonable timeframe.

Forms:

RULES AND REGULATIONS

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• II. Academic Calendar (p. 151)
• III. Notices (p. 152)
• IV. Attendance (p. 152)
• V. Grades / Average (p. 153)
• VI. Scholastic Regulations (p. 154)
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• VIII. Withdrawal/Readmission (p. 157)
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• XII. Examinations (p. 160)
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• XVIII. Academic Honor Code (p. 166)
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• XXI. Exceptions (p. 176)
• XXII. Student-Faculty Expectations (p. 176)

I. Purpose

These regulations are intended to set forth the requirements of the faculty to the end that a large student body may live and work together harmoniously with a minimum of friction and misunderstanding. Each student is expected to be a law-abiding citizen and to obey the laws of the city of Atlanta, Fulton County, the state of Georgia, and the United States.

II. Academic Calendar

A. Standard Calendar

Georgia Tech’s standard Academic Calendar consists of a Fall Semester, a Spring Semester, and an accelerated Summer Session. Each Fall Semester and each Spring Semester normally includes approximately fifteen weeks of instruction plus one week of final examinations. A normal Summer Session includes approximately eleven weeks of instruction plus one week of final examinations. Each Academic Year consists of one sequence of a Fall Semester followed by a Spring Semester. The word “term” may refer to a Fall Semester, a Spring Semester, or a Summer Session. The Office of the Registrar publishes the official Academic Calendar for each term. Due to variations in the yearly calendar and the need to balance the dates of campus events, particularly in the Fall Semester, the Registrar uses discretion, as appropriate, to set dates on the Academic Calendar, such as Fall Recess, the Last Day to Withdraw from Individual Courses without a Penalty, and the Progress Report Grade Due Date. See Catalog Regulation V. Grades and Scholastic Average (http://catalog.gatech.edu/rules/5) for more information.

B. Other Academic Terms

In addition to the standard Academic Calendar, some programs may be offered on other schedules. All such offerings are subject to the approval of the Institute Undergraduate Curriculum Committee, Institute Graduate Committee, and/or the Registrar, as appropriate. With approval, such programs may operate under different academic rules, such as credit hour limits or withdrawal dates, than those specified for standard academic terms.

C. Curriculum Year

1. Requirements for degrees and minors shall be specified for each Curriculum Year, which is comprised of a Summer Session plus the immediately following Fall Semester and Spring Semester. This designation shall be independent of any schedule for publication of such requirements in printed or electronic form.

2. All changes in degree and minor requirements shall become effective at the beginning of the next Curriculum Year following final approval by the Institute Undergraduate Curriculum Committee, Institute Graduate Committee, Academic Senate, and/or University System, as appropriate.

3. The Office of the Registrar shall maintain an archival record of all degree and minor requirements associated with each curriculum year.

D. Unit of Credit Defined

The current Academic Calendar is semester-based, consisting of with 15 weeks of instruction in which 50 minutes of class attendance are considered one contact hour and one unit of credit. The working unit of credit definition is as follows:

One unit of credit represents how much time a typical student is expected to devote to learning per week of study. Each course is evaluated by a system of credits related to time spent in class, lab, research, or field study. One credit is expected to require at least three hours of scholarly activity per week.

For lecture-based course work, one 50-minute hour of class attendance is scheduled for each credit awarded, but any combination of class attendance, lab, research, or field study experience may be arranged. Additional time is expected out-of-class for preparation and homework.

• The amount of time that students should expect to spend out-of-class on homework and other assignments should be commensurate with the credit hours granted for the course. For example, a 3 credit lecture-based class requires nine (9) hours of scholarly activity per week which, considering three (3) hours of lecture per week, indicates a requirement for an additional six (6) hours of scholarly activity in the form of homework assignments, project assignments, guided study and self-guided study of the course materials.

Studio and laboratory classes earn one credit for each three hours of attendance. Exceptions to this policy for undergraduate courses must be approved by the Institute Undergraduate Curriculum Committee. Exceptions for graduate courses must be approved by the Institute Graduate Curriculum Committee.

During our current 15-week fall or spring terms, most 3-hour classes have the following amounts of instruction time.
• Classes meet three times per week for 50-minute periods, for a total of 2250 minutes (3x50x15); or
• Classes meet two times per week for 80-minute periods, for a total of 2400 minutes (2x80x15).

The following class scheduling protocols are intended to ensure sufficient meeting times to account for the credit assigned the course. At present, the average amount of class attendance is 750 minutes for each credit in a 15-week semester.

This policy is consistent with specifications in the University System of Georgia Academic and Student Affairs Handbook, Section 2.1 Semester System, Uniform Academic Calendar, Cancellation of Classes and Religious Holidays. This policy is also consistent with the Southern Association of Colleges and Schools policy statement on credit hours.

III. Notices

A. Notices

All enrolled students have an e-mail account provided by Georgia Tech. This account is a student’s official point of contact with the Institute, and she/he is expected to check it each school day. Students are also expected to be aware of notices that appear on the Student Access System and of general notices that are in the Technique. It is the student’s responsibility to check the Student Access System, both during the Drop/Add Period and during the academic term, in order to verify the accuracy of her/his course schedule and to become aware of important notices. A student should verify her/his course schedule at least once during the first five weeks of the academic term and once after Mid-term.

B. Change of Address

When a student’s address changes, the student is responsible for updating her/his record in the Student Access System within one week of the change.

C. Unclaimed Mail

Students are responsible for returning to the front window of the Post Office all mail in their Post Office boxes that is unclaimed after three days.

IV. Attendance

A. General

1. Each term, a course listing is published showing the time period for each class.
2. If an instructor should be late in meeting the class, the students shall wait twenty minutes after the published starting time. If the instructor has not arrived by that time, the students may leave unless specifically notified to await the instructor’s arrival.

B. Class Attendance

1. There are no formal institutional regulations regarding class attendance at Georgia Tech. The resources of the Institute are provided for the intellectual growth and development of the students who attend. A schedule of courses is provided for the students and faculty to facilitate an orderly arrangement of the program of instruction. The fact that classes are scheduled is evidence that attendance is important; students should, therefore, maintain regular attendance if they are to attain maximum success in the pursuit of their studies.

2. All students are responsible for obtaining an understanding of each instructor’s policy regarding absences; all students are expected to attend announced quizzes, laboratory periods, and final examinations. Although it is recognized that occasionally it may be necessary for students to be absent from scheduled classes or laboratories for personal reasons, students are responsible for all material covered in their absences, and they are responsible for the academic consequences of their absences. Students should discuss planned absences with their instructors as soon as possible after the beginning of an academic term. Work missed may be made up at the discretion of the instructors.

3. In the event of a medical emergency or an illness that is severe enough to require medical attention, students are responsible for contacting the Office of the Vice President for Student Life and Dean of Students as soon as possible to report the medical issue or emergency, providing dated documentation from a medical professional and requesting assistance in notifying their instructors. The medical documentation will be handled confidentially within the Office of the Vice President for Student Life and Dean of Students and will inform a decision as to whether communication with instructional faculty is appropriate. It is the expectation of the Institute that instructional faculty will honor a request from the Office of the Vice President for Student Life and Dean of Students to excuse a medical emergency or illness and allow make-up of the work missed, including homeworks, quizzes, presentations, examinations, or other class assignments.

4. Students who are absent because of participation in approved Institute activities (such as field trips, professional conferences, and athletic events) will be permitted to make up the work missed during their absences. Approval of such activities will be granted by the Student Academic and Financial Affairs Committee of the Academic Senate, and statements of the approved absence may be obtained from the Office of the Registrar. Course instructors are responsible for establishing reasonable deadlines and/or make-up materials for the missed work, and for clearly communicating this information to the relevant student(s), when absences for Institute activities are approved.

a. Student Responsibilities
i. Individual students requesting approval from the Student Academic and Financial Affairs Committee are expected to do so at least two weeks before their requested absences; ii. Students are expected to inform their instructors about their approved absence by the end of the class meeting immediately following receipt of their approval notice.

b. Course Instructor Responsibilities
i. Course instructors receiving timely notification of student absence (as outlined above) are expected to establish reasonable deadlines and/or make-up materials for missed work, and for clearly communicating this information to the relevant student(s).


c. Faculty/Staff Sponsor Responsibilities
i. Faculty/staff sponsors of student organizations are expected to submit requests for absence approval, to the Office of the Registrar, at least one week before the date of the expected absence(s); ii. Faculty/staff sponsors are expected to provide the Office of the Registrar with roster changes in as timely a fashion as
possible, to reduce negative impact on the ability of students and instructors to coordinate their plans;

iii Faculty/staff sponsors are expected to notify students of approved absences, along with instructions for notifying their instructors, within two business days of receipt of approval from the Office of the Registrar.

5. Students who are absent because of participation in a particular religious observance will be permitted to make up the work missed during their absence with no late penalty, provided the student informs the course instructor of the upcoming absence, in writing, within the first two weeks of class, and provided the student makes up the missed material within the time frame established by the course instructor. Exercising one's rights under this policy is subject to the Georgia Tech Honor Code. The course instructor is responsible for establishing reasonable deadlines and/or make-up material for the missed work, and for clearly communicating this information to the student. Students may choose to appeal to the Student Academic and Financial Affairs Committee of the Academic Senate for formal approval of this type of absence.

V. Grades / Average

A. Grades

- The letter grades used in the calculation of grade-point average (GPA) are as follows:

<table>
<thead>
<tr>
<th>Letter Grade</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Excellent. Four quality points.</td>
</tr>
<tr>
<td>B</td>
<td>Good. Three quality points.</td>
</tr>
<tr>
<td>C</td>
<td>Satisfactory. Two quality points.</td>
</tr>
<tr>
<td>D</td>
<td>Passing. One quality point.</td>
</tr>
<tr>
<td>F</td>
<td>Failure. No quality points. If the course is required, the student must repeat it.</td>
</tr>
<tr>
<td>I</td>
<td>Incomplete. The &quot;I&quot; grade is used when, for reasons beyond her/his control and deemed acceptable by the instructor, a student whose academic performance had been satisfactory becomes unable to fulfill a course's requirements. If the student's academic performance had been so poor as to preclude her/his passing, the instructor shall assign the grade of &quot;F&quot;. Regulation VII. &quot;Deficiencies,&quot; outlines the removal of the &quot;I&quot; grade. See the Registrar's Office website for more guidance on the use of the Incomplete grade under Incomplete grade page under the Faculty section.</td>
</tr>
<tr>
<td>S</td>
<td>Satisfactory</td>
</tr>
<tr>
<td>U</td>
<td>Unsatisfactory</td>
</tr>
<tr>
<td>V</td>
<td>No credit earned. The &quot;V&quot; grade is used when a student audits a course.</td>
</tr>
</tbody>
</table>

- The following grades are used under special conditions and are not included in the calculation of grade-point average (GPA):

<table>
<thead>
<tr>
<th>Letter Grade</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>W</td>
<td>Withdrawal without Penalty. Withdrawals from individual courses without penalty are not permitted after 60 percent of the academic term has passed, as specified by the official Academic Calendar, except in cases of hardship, as determined by the Undergraduate Institute Curriculum Committee or Graduate Institute Curriculum Committee, as appropriate. Withdrawal from the Institute is not permitted after 60 percent of the academic term has passed, except in cases of hardship, as determined by the Undergraduate Institute Curriculum Committee or Graduate Institute Curriculum Committee, as appropriate. With the exception of part-time graduate students, those who withdraw from the Institute and receive all grades of &quot;W&quot; customarily will not be permitted to enroll in courses in the next succeeding academic term. Regulation VII. &quot;Withdrawal and Readmission,&quot; outlines the Institute's policies on readmission. Faculty are expected to return to students a graded assignment or other meaningful performance feedback prior to the deadline for withdrawing from classes so that students can make informed decisions about withdrawing.</td>
</tr>
</tbody>
</table>

- The following grades are used in the cases indicated and are not be included in the calculation of grade-point average (GPA):
III. Scholastic Regulations

A. Classification of Students

Graduate students, with the exception of non-degree-seeking division.

Undergraduate students, with the exception of non-degree-seeking

Students, shall be classified at the end of each academic term.

1. Undergraduate students, with the exception of non-degree-seeking students, shall be classified at the end of each academic term by the Office of the Registrar on the basis of the total number of credit hours attempted.

2. Progress report grades are submitted to the Office of the Registrar for all classes numbered 1000 and 2000 in the Fall Semester and Spring Semester. These grades are used for advising students, not for calculating any grade-point average (GPA) at Georgia Tech. Progress report grades are "S" or "U." A grade of "U" indicates that, based on the work completed to that point in the academic term, the student's standing is in the "D" or lower range. Progress report grades must be submitted once 40 percent of the academic term has passed, as specified by the official Academic Calendar. The due date for reporting will be noon on Monday and the grades will be available to students that afternoon.

3. If a final course grade is believed to be erroneous, the student should contact the professor as soon as possible. In general, no change of grade will be made after the end of the student's next academic term in residence.

4. B. Academic Average

The "academic average," or grade-point average (GPA), is the ratio of total quality points earned to total credit hours attempted.

When a student passes a course, she/he receives the designated number of credit hours; at the same time, she/he receives a certain number of quality points, based on the letter grade earned. Multiply the number of credit hours designated to the specific course by the numerical value of the letter grade earned to determine the number of quality points earned. Letter grades carry the following numerical values:

- "A" = 4
- "B" = 3
- "C" = 2
- "D" = 1

For example, when a student earns a letter grade of "C" in a 3-credit-hour course, she/he receives 6 quality points.

Grade-point averages are truncated after two decimal places.

If a student takes the same course more than once, any later grade does not replace any earlier one. The academic average includes both attempts, unless a grade substitution has been approved and processed.

C. Grade Substitution

This policy is known as "freshman forgiveness" or "academic forgiveness" at some institutions. No assumptions based on experiences at other institutions should be made about the grade substitution policy at Georgia Tech. Students requesting grade substitutions must follow all steps outlined below.

1. First-time freshman students who receive a grade of "D" or "F" in a course within their first two academic terms of enrollment (first three academic terms for those who begin in the Summer Session for Freshmen) are eligible to repeat the course and have the original grade excluded from the calculation of the academic average. Grade substitution may be used only once per course, with a maximum of two courses in total.

2. The course must be repeated at Georgia Tech within the student's first four academic terms of enrollment (first five academic terms for those who begin in the Freshman Summer Session).

3. The application for grade substitution must be filed with the Registrar's Office no later than the deadline for withdrawing from a course during the student's next term of enrollment after the course is repeated.

4. The original course and grade will continue to appear on the student's transcript, with a notation that the course was repeated and that the original grade is not included in calculation of the academic average. Credit for the course will be counted only once.

5. If the revised academic average results in a change in academic standing for any term, then the revised standing will be reflected on the student's transcript. If standing is changed from "Dismissal" to a higher standing, it will be recorded as "standing from Dismissal" and the dismissal will continue to be counted with respect to regulations and policies related to Withdrawal and Readmission.

6. A course is not eligible for grade substitution if the student was found responsible for any academic misconduct in that course regardless of how many times it is repeated.

7. The grade substitution policy (including, but not limited to, course eligibility, number of courses, time limits, and deadlines) is not subject to exceptions and may not be petitioned to the Undergraduate Institute Curriculum Committee.

Download Form (http://registrar.gatech.edu/docs/catalog/GRADE_SUBSTITUTION_FORM.pdf)

VI. Scholastic Regulations

A. Classification of Students

1. Undergraduate students, with the exception of non-degree-seeking students, shall be classified at the end of each academic term by the Office of the Registrar on the basis of the total number of credit hours attempted.
attempted credit hours for which they have successfully earned credit in accordance with the following:

<table>
<thead>
<tr>
<th>Classification</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freshman</td>
<td>0-29</td>
</tr>
<tr>
<td>Sophomore</td>
<td>30-59</td>
</tr>
<tr>
<td>Junior</td>
<td>60-89</td>
</tr>
<tr>
<td>Senior</td>
<td>90+</td>
</tr>
</tbody>
</table>

2. Graduate and special students who have completed all requirements for a particular classification, as defined by their major department, may request reclassification through their major department.

3. Students scheduled for at least twelve (12) credit hours in a semester are classified as full-time students; those scheduled for six to eleven (6-11) hours are classified as part-time students; and those scheduled for one to five (1-5) hours are classified as less-than-part-time students.

B. Eligibility for Class Rings
A student may purchase a class ring any time after successfully earning credit for 70 attempted credit hours.

C. Academic Standing
1. The assignment of academic standing is based on the student's most recent academic term and her/his cumulative grade-point average.

2. The minimum satisfactory grade-point average (GPA) is 1.70 for freshmen and joint-enrolled high school students; 1.80 for sophomores; 1.95 for juniors; 2.00 for seniors and special undergraduates; 2.70 for master's and special graduate students; and, 3.00 for doctoral students.

3. Students not on academic probation are in good academic standing.

4. Academic warning
   a. Academic warning is a subcategory of good academic standing, differing only in the maximum allowable schedule load.
   b. A student who has a cumulative grade-point average below the minimum satisfactory scholarship requirement, or whose cumulative grade-point average for work taken during any term is below this requirement, shall be placed on academic warning.
   c. A student on academic warning whose grade-point average for the academic term is above the minimum satisfactory scholarship requirement and cumulative grade-point average is below the minimum satisfactory scholarship requirement shall remain on academic warning.

5. Academic probation
   a. A student on academic warning whose grade-point average is below the minimum satisfactory scholarship requirement for any academic term shall be placed on academic probation.
   b. An undergraduate student in good academic standing whose grade-point average for any academic term is below 1.00, based on at least six graded hours, shall be placed on academic probation.
   c. A student also may be placed on academic probation through other actions, as described in the following section.

6. Dismissal for unsatisfactory scholarship
   a. The Institute may drop from the rolls at any time a student whose record in scholarship is unsatisfactory.

b. A graduate student whose grade-point average for any term is 2.00 or below may be placed on academic probation or dropped, regardless of the student's previous record.

c. A student on academic probation whose grade-point average for the academic term of probation is below the minimum satisfactory scholarship requirement and whose cumulative grade-point average is below the minimum satisfactory scholarship requirement shall be dropped from the rolls for unsatisfactory scholarship.

d. An undergraduate student on academic warning whose grade-point average for any term is below 1.00, based on at least six graded hours, and cumulative grade-point average is below the minimum satisfactory scholarship requirement shall be dropped from the rolls for unsatisfactory scholarship.

e. The record of a student on academic probation whose grade-point average for the academic term in unsatisfactory, but whose overall academic record is satisfactory, may be reviewed by the Institute Undergraduate Curriculum Committee or the Institute Graduate Curriculum Committee, as appropriate. The student may be dropped or may be continued on academic probation.

7. Academic review
   A student who normally would be dropped from the rolls for academic deficiencies, but appears from the record not to have completed the academic term, may be placed on academic review. This is a temporary standing that makes the student ineligible for registration. If no acceptable explanation is given within a reasonable time, the standing is changed to drop.

8. The academic standing regulations given previously for graduate students do not preclude a school from having more rigorous requirements.

D. Satisfactory Academic Progress Toward Degree Completion
1. Satisfactory academic progress toward degree completion means that for each term of enrollment, the student completes a course or courses with the minimum necessary grades that are either prerequisites for courses required in the major or that are degree applicable to stay on track towards graduation. It is noted that some majors may require a minimum grade that is higher than "D."

2. If a student withdraws from all courses in a term, there will be no change in status. However, if a student withdraws from all courses in a second term of enrollment, they will be placed on warning for lack of satisfactory academic progress towards degree completion. If withdrawal occurs in a third term of enrollment, the status will be revised to probation. If withdrawal occurs in a fourth term of enrollment, the student will be placed on academic dismissal for lack of satisfactory progress towards degree completion. The number of withdrawal terms is cumulative and irrespective of whether or not they occur consecutively.

3. Students applying for readmission may be denied based on prior terms of withdrawals.

4. Eligibility for financial aid, NCAA Division I sports, etc. may be predicated on different satisfactory progress requirements. Information on those requirements should be directed to the appropriate office on campus and should not be confused with this academic policy.
E. Maximum Schedule Load

1. The maximum number of credit hours for which an undergraduate student may register in a Fall Semester or Spring Semester, based on her/his academic standing, is as follows:

<table>
<thead>
<tr>
<th>Standing</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good</td>
<td>21</td>
</tr>
<tr>
<td>Warning</td>
<td>16</td>
</tr>
<tr>
<td>Probation</td>
<td>14</td>
</tr>
</tbody>
</table>

2. The maximum number of credit hours for which an undergraduate student may register in a regular Summer Session, based on her/his academic standing, is as follows:

<table>
<thead>
<tr>
<th>Standing</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good</td>
<td>16</td>
</tr>
<tr>
<td>Warning</td>
<td>14</td>
</tr>
<tr>
<td>Probation</td>
<td>12</td>
</tr>
</tbody>
</table>

3. Students who are on probation or probation from dismissal may choose or be required to enroll in GT 2100. This course does not count toward graduation requirements nor would it count against the maximum course loads listed above.

4. A graduate student may register for a maximum of 21 credit hours in a Fall Semester or Spring Semester and a maximum of 16 credit hours during a regular Summer Session.

5. Requests for schedule overloads must be recommended by the student's major school and approved by the Institute Undergraduate Curriculum Committee or Institute Graduate Curriculum Committee, as appropriate.

6. During Phase 1 Registration, the Institute reserves the right to limit undergraduate students to 18 credits maximum for the Fall Semester and Spring Semester and to limit graduate students to less than 21 credit hours depending upon the needs of the program or school.

F. Academic Honors

The Institute encourages excellence in scholarship and gives official recognition to undergraduate students whose work is superior in any given academic term.

1. Dean's List
   a. The Dean’s List includes all degree-seeking undergraduates who, during the preceding academic term, earned a grade-point average (GPA) of 3.00 or higher, completed a schedule of at least twelve credit hours of coursework on a letter-grade basis, and are not on academic warning or probation or subject to any disciplinary action. All grades must be reported.

2. Faculty Honors
   a. Faculty Honors includes all degree-seeking undergraduates who, during the preceding academic term, earned a grade-point average (GPA) of 4.00, completed a schedule of at least twelve credit hours of coursework on a letter-grade basis with no "W" grades, and are not on academic warning or probation or subject to any disciplinary action. All grades must be reported.

G. Change of Major

1. Undergraduate students, with the exception of entering freshmen, by filing the required form, will be permitted one unrestricted transfer between majors (including undecided) until they have accumulated credit for sixty hours. After sixty hours or upon subsequent request for transfer, the transfer will be permitted at the discretion of the school that the student is seeking to enter. Students who transfer from another institution to pursue a degree at Georgia Tech will be permitted to change their major only at the discretion of the school that the student is seeking to enter. Transfer students are not eligible for the one unrestricted change of major. (Note: Certain majors, because of high enrollment, have been granted a waiver of the one unrestricted transfer regulation. Students should consult with the individual school concerning its current transfer policy.)

   - Programs with Change-of-Major restrictions:
     - Industrial and Systems Engineering (https://www.isye.gatech.edu/academics/bachelors/current-students/change-major)
     - Mechanical Engineering (http://www.me.gatech.edu/undergraduate/ug-curr/change_major/#me)
     - Music Technology (https://music.gatech.edu/about)

2. Graduate students, by filing the required form, may transfer with the concurrence of the schools involved and the graduate dean.

3. Students who change their majors must complete the degree requirements in the Catalog that was effective for the term in which the change of major became official, or any subsequent Catalog.

4. Admitted freshmen will not be allowed to submit a request for a change of major until after the deadline for withdrawal from classes with a W grade in the first term of their enrollment. The change would be effective for the second term of enrollment. This includes a change of major within the student’s current College. For freshmen admitted for Summer, the restriction is lifted after the withdraw deadline of their second semester of enrollment. All other restrictions also apply.

H. Exceptions

Exceptions to these scholastic regulations may be made by the Institute Undergraduate Curriculum Committee or the Institute Graduate Curriculum Committee, as appropriate, whenever a consideration of the student’s complete record indicates that the application of a specific regulation will result in injustice.

I. Course Requirements

1. Each course shall have a syllabus and course policies provided to students before the last day to drop a course without a W grade (the last day of Phase II registration). Each syllabus shall include an outline of the course objectives (learning outcomes), required materials, criteria used in determining the course grade, any other requirements for successful completion of the course, and a statement about services available through the Office of Disability Services. Each syllabus should outline acceptable student conduct as it relates to the Georgia Tech Honor Code and Student-Faculty Expectations Agreement. Students shall be informed of any changes made to the syllabus and course policies with reasonable time to adjust to these changes. Any changes to the syllabus after the first week of the term should be done prior to the last day to withdraw from the course with a W grade.

2. In all courses, faculty are expected to return to students a graded assignment or other meaningful performance feedback prior to the deadline for withdrawing from classes so that students can make an informed decision about withdrawing or changing the grade mode.

3. Progress Report grades of "S" or "U" will be submitted to the Office of the Registrar for all classes numbered in 1000 and 2000 ranges each semester prior to Mid-term, which is typically on the sixth week of Fall Semester and Spring Semester and on the fifth week of the Summer
VII. Deficiencies

A. About Deficiencies
1. A student who has received a grade of "I," "F," or "U" in a course has a deficiency in the course.
2. A student whose final grade is "F" or "U" has failed the course. The student must repeat and pass the course before credit will be allowed.

B. Removal of Deficiencies
1. When a grade of "I" ("Incomplete") is assigned in a course, the "I" grade must be removed and the grade change reported by the end of the student’s next academic term in residence or, if the student has not been enrolled, by the end of the academic term one calendar year from the date the incomplete was assigned. Failure to remove the "I" in the allotted time will result in the grade of "I" being changed to the grade of "F." To remove the "I" grade, the student should consult with the instructor as soon as possible after the academic term is over and complete whatever remaining coursework is outlined by the instructor. Repeating the course for credit does not remove the grade of "I."
2. A student who has a grade of "F" in a required course must schedule that course the next time it is offered while the student is in residence. When a course in which a "D" grade was earned is repeated and a grade of "F" is earned, the student must file a Petition to the Faculty to be allowed to use the "D" grade to meet graduation requirements.
3. A degree candidate who has otherwise completed all requirements for graduation and who has an "Incomplete" in laboratory work taken during his or her final academic term in residence may remove the "Incomplete" at the convenience of the department of instruction concerned.

VIII. Withdrawal/Readmission

A. Withdrawal
1. Withdrawal from the Institute will not be permitted after 60 percent of the academic term has passed, except in cases of hardship as determined by the Institute Undergraduate Curriculum Committee or Graduate Curriculum Committee, as appropriate. With the exception of part-time graduate students, students who withdraw from the Institute and receive all grades of "W" will not ordinarily be permitted to re-enroll the following term. A student may withdraw from the Institute via the Student Information System by the posted deadline in the official Academic Calendar. All holds on the student’s record must be cleared prior to withdrawal.
2. Students who cease attendance without withdrawing via the Student Information System receive grades of "F," "U," or "I" for their ongoing courses.
3. Permission and/or formal resignation are not required when a student has completed an academic term and does not register for the following term.
4. See Regulation V.A.3 (http://catalog.gatech.edu/rules/5) for further information on grading as it relates to withdrawal.

B. Readmission
1. Any student who is not enrolled for two or more consecutive terms (counting Summer Session) must apply for readmission. This application, with all the pertinent supporting information, must be submitted to the Office of the Registrar before the deadline for the academic term for which readmission is requested. Deadlines are listed below.

<table>
<thead>
<tr>
<th>Term</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall</td>
<td>July 1</td>
</tr>
<tr>
<td>Spring</td>
<td>December 1</td>
</tr>
<tr>
<td>Summer</td>
<td>April 1</td>
</tr>
</tbody>
</table>

Applications received after these deadlines will not be accepted.
2. Readmission is not guaranteed. Schools/Colleges must recommend readmission for any student wishing to return in majors under their jurisdiction.
3. The readmission policy supersedes the change of major policy. No School/College is obligated to readmit a student even if that student is within their limit for requesting a non-restricted change of major. Once readmission applies, the change of major process is not applicable including the non-restricted change of major.
4. Any student who has attended any other college or university should plan her/his readmission process in a way that allows ample time for her/his official transcript(s) from any other institution to arrive at Georgia Tech. If official transcripts have not been received prior to the last day of the Registration Period, the student seeking readmission will not be allowed to register.
5. Any student in good standing who is not enrolled for one single term will be allowed to re-enroll without applying for readmission to the Institute. This regulation makes no distinction among Fall Semester, Spring Semester, and Summer Session.
6. A student who is on academic warning or academic probation and who does not enroll for one single term may have a registration hold placed on their account. If a hold is placed, the student will be notified and the hold must be cleared by their major school. For example, if a student is placed on academic probation at the end of the Fall Semester and fails to enroll by the close of the Registration Period for the Spring Semester, a registration hold may be set, and it must be cleared by the student’s major school before they can register for any future academic term.
7. A student who has been dropped once for unsatisfactory scholarship usually will not be readmitted. A student who seeks an exception to this rule must have been out of the Institute for at least one term and have had a conference with the major school concerning the readmission. The Readmission Application Deadline for a student who has been dropped is two months prior to the published Readmission Application Deadline for the academic term.
8. A student who is dropped a second time for unsatisfactory scholarship will not be readmitted to the Institute.

9. A student who is on expulsion, defined as permanent separation from the Institute, is not eligible for readmission.

10. Students are readmitted under the current catalog that is in effect at the time of readmission. If a student wishes to follow the degree requirements from a catalog in effect prior to the term of readmission, she/he must make a request to the major school. There is no guarantee that such a request will be granted, and readmitted students should be prepared to follow the degree requirements as outlined in the current catalog. Programs of study that have been deactivated or terminated are not available for readmission. Students who were enrolled in a program of study that has since been deactivated are eligible for readmission to the Institute; however, they must select an active program at the time of readmission. Once a decision is made to no longer admit students to a program of study due to an impending deactivation or termination, readmission is also not allowed.

11. Any student, except a part-time graduate student, who withdraws during an academic term and wishes to return the following academic term must complete a Petition to the Faculty for consideration. This petition must be submitted to the Office of the Registrar before the deadline for the academic term for which readmission is requested.

12. Students may be eligible for academic renewal. See below for more information.
   a. University System of Georgia undergraduate students who have been readmitted or reinstated after a period of absence of three (3) calendar years or longer are eligible for academic renewal. Academic renewal for the student signals the initiation of a new grade-point average to be used for determining academic standing. This provision allows University System of Georgia degree-seeking students who earlier experienced academic difficulty to make a fresh start and have one final opportunity to earn an associate or bachelor’s degree (BR Minutes, June, 1995, p. 7). The complete policy is available online at: www.usg.edu/academic_affairs_handbook/section2/handbook/2.5_grading_system/ (http://www.usg.edu/academic_affairs_handbook/section2/handbook/2.5_grading_system)
   b. The application for academic renewal shall be considered as a petition to the Undergraduate Curriculum Committee.

13. Students in good academic standing may be eligible for an approved Leave of Absence.
   a. Interruption in enrollment due to circumstances outside the student’s control may qualify for an approved Leave of Absence. This may include, for example, required military service.
   b. It should be noted that an approved Leave of Absence would be effective in a future term (see item I for more details). Students on an approved Leave of Absence would not have to apply for re-admission and would be able to retain their email accounts during the approved absence. Prior to returning, the student would have to notify the Registrar’s Office so that the record could be reactivated for re-entry.
   c. The Leave of Absence would cover eligible students for at least two and no more than seven semesters (including Summer). If the seventh semester is a Spring term, students may opt to return in either the Summer or Fall term.
   d. Students who are on an Approved Leave of Absence may not attend class, live in campus housing, or access other campus services.
   e. The form to request an Approved Leave of Absence is on the Registrar’s Office website under the student tab, forms and student records.
   f. The Leave of absence may be used more than once, but for no more than seven total semesters during the student’s enrollment at Tech.
   g. Students who have been placed on academic drop or suspended or expelled for disciplinary reasons may not participate.
   h. Students must clear up any other issues such as registration holds or providing any requested documentation prior to re-entry. The Approved Leave of Absence does not override other considerations or restrictions on enrollment.
   i. Students should apply for the Leave of Absence as soon as possible. Applications for Leave of Absence will require review and signatures by the Office of the Vice President for Student Life and Dean of Students and the student’s major academic advisor. Other signature approvals, such as the Office of International Education and Financial Aid may also need to be obtained.
      • Students should bear in mind the time limits as outlined in section k below in determining the anticipated date of return.
      • Readmission is required when two or more consecutive terms have been missed (which includes Summer). Once the student has made the decision that they will have to or need to be out for two or more consecutive terms and the student wishes to return to Tech without being readmitted, the application for a Leave of Absence should be filed with the Registrar’s Office.
      • The clock begins when the student does not enroll for a second consecutive term. The Leave of Absence Request would have to be effective for the second consecutive missed term to avoid readmission.
   j. The Leave of Absence cannot be approved retroactively.
   k. Students must file a Return from Leave of Absence form to return. If the leave exceeds the 7 semester time frame, the student must apply for readmission. The form is on the Registrar’s Office website under the student tab, forms and student records.
   I. The Leave of Absence, if approved, would be effective in a future term. It will not be approved to be effective in the term in which application is made. It is in no way supplanted or replaces any other policy. If a student needs to withdraw from classes within a given term, they should follow the withdrawal process and if a Leave of Absence is needed or desired, it would be effective for a future term or terms only as approved.

C. Transfer Credit

1. Coursework pursued at another institution after dismissal from Georgia Tech for unsatisfactory scholarship may be considered as evidence for readmission.
2. If readmitted, a student will not necessarily be awarded transfer credit for credits earned at another institution after she/he withdrew from or was dismissed from Georgia Tech.
3. With the exception of a course from which a student withdrew and received a grade of "W" or "V," in no case will a student be awarded transfer credit for a course she/he completed at another institution if she/he had previously taken the course at Georgia Tech.

### D. Study Abroad

Any student in good standing who chooses to participate in an approved study abroad program for two or more terms must complete a Student Information Update Form with the study abroad coordinator prior to departure. This form enables the student to re-enroll for the term of "planned re-entry" without submitting a formal readmission application. It will be the student's responsibility to inform the study abroad coordinator of any change to her/his planned re-entry date.

### IX. Scheduling

#### A. General

1. All previously scheduled coursework takes precedence over newly scheduled material. Therefore, all work that is incomplete from a previous term should be completed, or arrangements to complete it should be made prior to placing emphasis on new coursework.

2. Students must follow the approved curriculum of the academic school in which they are registered. Students who do not follow the approved curriculum may be denied registration privileges.

3. Each student is strongly advised each term to schedule all prerequisite courses. A student who has not completed the stated prerequisites for a course but believes she/he has the necessary knowledge to fulfill prerequisite requirements should contact the department of instruction.

4. The completion of incomplete work from a previous term and the scheduling of out-of-sequence courses are the responsibility of the student, and, consequently, she/he will be held accountable. The number of scheduled credit hours allowed for an academic term may be adjusted to take into consideration the amount of incomplete work remaining regardless of the student's academic standing.

5. Students may not repeat courses on a letter-grade basis in which the grade of "B" or higher has been earned previously.

6. Subject to approval by a faculty advisor, a course may be taken more than once for academic credit. All grades and hours will count in determining the student’s grade-point average (GPA), but the course will be counted only once for credit toward a degree.

7. See Regulation X, "Pass/Fail Grading," (http://catalog.gatech.edu/rules/10) for the Institute's rules regarding courses taken on a Pass/Fail basis.

#### B. Academic Load

1. Maximum credit hour loads are explained in Regulation VI, "Scholastic Regulations," Section D, "Maximum Schedule Load." Any hours above these limits must obtain prior approval from the Undergraduate Institute Curriculum Committee or the Graduate Institute Curriculum Committee, as appropriate.

2. Graduate students must maintain a minimum of three credit hours each academic term. Exceptions to this regulation may be made during the term in which the student graduates.

#### C. Auditing of Courses

1. The auditing of a course will be permitted for a regularly enrolled student who has obtained the approval of her/his advisor and the departments concerned. Such a course counts at full value in computing the student's course load for an academic term.

2. The grade of "V" (i.e., "Visitor") is earned when a student audits a course. The "V" grade has no effect on a student's grade-point average (GPA).

3. No academic credit is granted for auditing a course.

4. Students are not permitted to change to or from an auditing status except through the regular procedures for schedule change or withdrawal. Any student who does not meet the instructor's requirements for a successful audit will be withdrawn with a grade of "W" assigned at the end of the academic term.

5. Members of the faculty or staff of the Georgia Institute of Technology may sit in on, rather than audit, a course with the permission of the instructor. The permission is granted on a space-available basis in the class.

#### D. Attending Classes

1. Students may attend only those particular classes for which they are registered and paid.

#### E. Undergraduate Students Taking Graduate Courses

A senior with a grade-point average (GPA) of at least 2.7 may enroll in a graduate course if she/he obtains permission from the school or department offering the course.

1. Up to twelve credit hours earned as an undergraduate student may count toward earning a master's degree if the following conditions are satisfied.

   a. The student was in residence at Georgia Tech for at least two semesters before registering for the course(s).

   b. The student did not apply credit for the course toward a bachelor's degree. Special exceptions may apply in certain schools, as described below.

      i. If a student pursues both a bachelor's and master's at Georgia Tech, and if both degrees are in the same discipline, she/he may apply up to six credit hours of graduate-level credit in the major discipline to satisfying the requirements for both degrees. Because some master's degree programs do not have any unique undergraduate counterpart program, and because some master's programs are offered by several schools, the definition of "discipline" will be broadly interpreted in such cases. To qualify for this option, a student must complete the bachelor's degree with a cumulative grade-point average (GPA) of 3.5 or higher, and she/he must complete the master's degree within a two-year period following the award date of the bachelor's degree.

#### F. Graduate Students Taking Undergraduate Courses

Graduate students who wish to take a 1000- or 2000-level course must obtain a permit from the department teaching the course. The student must have the department of instruction enter a permit on her/his account, and then come in-person to the Office of the Registrar to have the course added to her/his schedule. Institute policy allows a graduate student to take a 1000- or 2000-level course on a Pass/Fail or audit basis only.
X. Pass/Fail Grading

A. General

1. At the option of the student’s major school, credit toward a bachelor’s degree may be allowed for courses taken under the pass/fail system and completed with a grade of “Pass.”
2. The major school must approve all pass/fail courses included in the final program of study, and students should be aware of school requirements.
3. In graduate programs, thesis research hours will be evaluated on a pass/fail basis.
4. Pass/fail enrollment in any course may be restricted by the school or department offering the course.
5. Students who are permitted to register under the pass/fail system will be so designated on the official class rolls. The grades recorded will be “S” for “Satisfactory” or “U” for “Unsatisfactory.” These grades will not be included in the calculation of the grade-point average and cannot be changed to a grade that will count in the average.
6. Withdrawals from courses taken on a pass/fail basis will follow the same rules that govern withdrawals from courses included in the grade-point average.
7. The deadline to change the grade mode from letter grade to pass/fail (and vice versa) is the same day as the Last Day to Withdraw from Individual Courses without a Penalty.

Grade mode changes are allowed online during the Registration Period. After the Registration Period ends, the following form must be completed and submitted to the Office of the Registrar.

Download Form (http://www.registrar.gatech.edu/docs/catalog/grade_mode.pdf)

B. Credit Hours Permitted

1. The maximum number of credit hours that a student may earn on a pass/fail basis is related to the number of credit hours required for the program of study in which the student is enrolled.

<table>
<thead>
<tr>
<th>Hours included in program of study</th>
<th>Hours allowed on pass/fail basis</th>
</tr>
</thead>
<tbody>
<tr>
<td>45 to 70 credit hours</td>
<td>3 credit hours</td>
</tr>
<tr>
<td>71 to 90 credit hours</td>
<td>6 credit hours</td>
</tr>
<tr>
<td>91 or more credit hours</td>
<td>9 credit hours</td>
</tr>
</tbody>
</table>

2. For a second undergraduate degree, these limits apply to the credit hours included in the program of study for that second degree.
3. A master’s degree program of study may include up to three semester credit hours on a pass/fail basis.

XI. Cross Enrollment and Concurrent Registration

A. General

1. Students who are enrolled at Georgia Tech may not receive credit for courses completed at another institution during the same academic term, unless prior permission has been obtained for cross enrollment or concurrent registration, as described in this section.
2. With the approval of the student’s major school, a student may schedule courses at any one of the colleges or universities comprising the Atlanta Regional Consortium for Higher Education (ARCHE), if such courses are not available in a particular term at Georgia Tech. A list of participating institutions is available from the Office of the Registrar.
3. Cross enrollment also is permitted among institutions participating in the Georgia Tech Regional Engineering Program (GTREP) and selected institutions in the Regents’ Engineering Transfer Program (RETP).
4. All cross enrollment registration activities are performed at the student’s home institution.
5. For institutions not participating in cross enrollment, a student must apply in advance for permission to be concurrently registered at both Georgia Tech and the other institution, except during the Summer.

B. Eligibility

1. Cross enrollment and concurrent registration are available only to degree-seeking juniors, seniors, and graduating students, except during the Summer Session, when concurrent registration is available to all degree-seeking students. Ordinarily students will not be allowed to participate during their first academic term at Georgia Tech, nor will students be allowed to cross enroll for more than two courses per academic term. Special rules apply to students participating in the RETP programs. International Plan students may cross enroll or register concurrently for a language course(s) not offered at Georgia Tech as early as the second semester of their first year of enrollment. Special permission to do this will be granted to International Plan students only. Forms and procedures are available from the Office of the Registrar. Any student seeking an exception to these eligibility requirements should contact the Office of the Registrar.
2. To participate in cross enrollment or concurrent registration, a student must be in good standing during the term when the application is processed.
3. During the term of cross enrollment or concurrent registration, the student must enroll in three or more credit hours at Georgia Tech and be in good standing. The total academic load carried at all institutions combined may not exceed the number of credit hours for which the student would be allowed to register at Georgia Tech.
4. Any cross enrollment and concurrent registration course must be completed with a grade of “C” or better in order to receive credit for the course. Credits earned under cross enrollment will be treated as transfer credit but will count as in-residence credit toward a degree. Credits earned under concurrent registration will be treated as transfer credit and will not count as in-residence credit toward a degree. Grades received in cross enrollment or concurrent registration courses will not be included in the calculation of the grade-point average. No credit will be awarded until an official transcript from the participating institution is received by the Office of the Registrar.

XII. Examinations

A. General

1. Any Examination for Advanced Standing or special examination must be authorized by the Registrar before being scheduled.
2. If the instructor considers it necessary during an examination, students may be required to present their student identification card to the instructor or an authorized representative.
B. Examinations for Advanced Standing

1. Students who offer satisfactory evidence that they are qualified to do so may receive credit for a course by examination. Such an examination is called an "Examination for Advanced Standing."

2. Examinations for advanced standing require the recommendation of the department of instruction in which the course is offered, payment of the appropriate fee to the Office of the Bursar, and authorization by the Office of the Registrar.

3. Examinations for Advanced Standing will usually be offered during the Final Examination Period.

4. A student will not be allowed to take an Examination for Advanced Standing in a given course more than twice.

5. Students will not be allowed to take an Examination for Advanced Standing in a course for which any prerequisite has not been met, except with the consent of the school offering the course.

6. An Examination for Advanced Standing will be reported with an "S" or "U" grade. Neither grade will be included in the calculation of grade-point average (GPA).

7. Advanced standing is not allowed for laboratory or studio classes, except with the consent of the school offering the course.

8. Students may not use more than nine credits of advanced standing to meet degree requirements.

9. Students may submit the Advanced Standing Application and Fee to obtain six to eight hours of proficiency credit for foreign language at the 1001 or 1002 levels upon completion of two classes in the same language at the 2000 level or higher with a minimum grade of "C."

C. Final Instructional Class Days and Reading Periods

The following applies to the standard academic terms, including the Fall Semester, Spring Semester, and Full Summer Session. It does not apply to the Early Short Summer Session and Late Short Summer Session. Given the variability in the exact timing of the Full Summer Session, the Office of the Registrar will adjust the final instructional class days and reading periods for this semester only in order to meet required instructional time. This policy replaces the former Dead Week (Week Preceding Final Examinations) policy.

1. Final Instructional Class Days
   a. Final Instructional Class Days are scheduled during each regular term including the Full Summer Session and are the last two instructional days of the term immediately preceding the first reading period.
   b. No tests or quizzes are to be administered on these days. Lab quizzes and/or practicums may be given in courses comprised of both a lecture and a scheduled lab, wherein the lecture carries at least two credits.
   c. For all courses, graded homework or assignments, lab reports, course projects, demonstrations, studio reviews, and presentations may be due during these two days, provided that they are listed on the syllabus at the start of the semester.
   d. All quizzes and tests should be graded and reported to students on or before the last Final Instructional Class Day.

2. Reading Periods
   a. Reading Periods will be designated to provide time for students to prepare for final examinations.
   b. No classes meet. This includes labs, recitations, projects, design/capstone courses, and studios.
   c. No assignments, projects, presentations, or other graded activities are allowed.
   d. Instructors may schedule optional review sessions for students during reading periods, but no credit or extra credit may be attached to these optional sessions. New content may not be covered, and any materials (e.g., handouts, slides, practice problems, etc.) that are provided at these optional review sessions must be made available to all students. This provision does not require that such optional sessions be audio or video recorded.

3. Requests for exceptions to the Final Instructional Class Day and Reading Period policies may be made in writing by the Dean of the College (or her/his designee) to the Student Rules and Regulations Committee (SRR). The SRR will then make a recommendation to the Undergraduate Institute Curriculum Committee or Graduate Institute Curriculum Committee, as appropriate, for approval or denial. Requests must be made no later than the academic term prior to the desired term of implementation and will be regularly reviewed.

4. Student concerns may be discussed with the faculty member and/or reported to the Chief Academic Officer of the department of instruction, or with the Assistant Provost for Academic Advocacy and Conflict Resolution. For more information, see the Student Academic Grievance Policy.

D. Final Examinations

1. In regularly scheduled lecture courses of the Institute, a final examination shall be administered at the time specified in the official Final Examination Schedule as distributed by the Office of the Registrar. In courses such as seminars, senior design, capstone, writing courses, and laboratories, final examinations may be waived and may be replaced with appropriate assessment. The decision to give a final examination in these courses shall be made by the instructor of record. An announcement of the course's final examination policy shall be made to the class at its first meeting and included in the syllabus.

2. No assessment other than a final examination or its replacement may be due during the Final Examination Period.

3. Requests to change a class's final examination time within the Final Examination Period must be submitted to the Chief Academic Officer of the department of instruction for approval no later than one week before the beginning of the Final Examination Period. Any such request must have the unanimous approval of the class as shown by secret ballot, as well as approval by the instructor of the class.

4. A change in the scheduling of a final examination for an individual student ordinarily will not be permitted; however, such a change may be allowed for hardship cases at the discretion of the instructor. The request for a change must be justified in writing by the student and shall be submitted to the instructor prior to Final Examination Period and may be rescheduled to an appropriate time.

5. In the event a student has two final examinations scheduled for at the same time, the course having the lower number shall be considered in conflict and the student shall notify the instructor no later than two weeks before the Thursday of the Final Examination Period. In such case, the final examination in that course shall be given during the Final Examination Period or, by agreement of the instructor and the student, at a mutually satisfactory time.
a. If the student notifies the instructor after the above deadline but before the Thursday of the Final Examination Period, the student shall, at the discretion of the instructor:
   i. receive a course grade of "I" (Incomplete), with an opportunity to take a makeup final examination following the academic term (and have the course grade changed as warranted by the results of the test), or
   ii. be given the final examination during the Conflict Examination Period or at an alternative time during the Final Examination Period.

b. A student who fails to notify the instructor of the conflict before the Thursday of the Final Examination Period shall, at the discretion of the instructor:
   i. receive a score of zero on the final examination, or
   ii. be given the final examination during the Conflict Examination Period or at an alternative time during the Final Examination Period.

6. In the event a student is scheduled for three final examinations in one day, the examination scheduled for the middle period shall be considered in conflict and the student shall notify the instructor no later than two weeks before the Thursday of the Final Examination Period. In such case, the final examination in that course shall be given during the Conflict Examination Period or, by agreement of the instructor and the student, at a mutually satisfactory time.

a. If the student notifies the instructor after the above deadline but before the Thursday of the Final Examination Period, the student shall, at the discretion of the instructor:
   i. receive a course grade of "I" (Incomplete), with an opportunity to take a makeup final examination following the academic term (and have the course grade changed as warranted by the results of the test), or
   ii. be given the final examination during the Conflict Examination Period or at an alternative time during the Final Examination Period.

b. A student who fails to notify the instructor of the conflict before the Thursday of the Final Examination Period shall, at the discretion of the instructor:
   i. receive a score of zero on the final examination, or
   ii. be given the final examination during the Conflict Examination Period or at an alternative time during the Final Examination Period, or
   iii. be given the final examination at the time scheduled for the course.

XIII. Undergraduate Degrees

A. General

1. To be considered for admission to candidacy for a degree, a student must complete the Online Application for Graduation during the academic term preceding the term in which she/he will complete the degree requirements for her/his program.

2. A student who wishes to withdraw her/his name from the rolls of degree candidates must formally withdraw the Online Application for Graduation before the end of the seventh week of the semester (or fourth week of the summer term). This privilege will be extended to a degree candidate only once.

3. A degree program may include a maximum of four hours of basic ROTC and a maximum of six hours of advanced ROTC.

4. The diploma of a candidate for a degree shall bear the date of the commencement at which the degree is awarded.

5. All requirements for the degree must be completed and certified by the Registrar no later than 48 hours after Final Grade Submission Deadline of the academic term in which the candidate intends to graduate. If a candidate is not certified by the appropriate deadline, the candidate will be graduated at the next scheduled commencement. The diploma will bear the date of the commencement at which the degree is awarded. It is the responsibility of the student to reactivate the Online Application for Graduation for the appropriate term.

B. Residency Rule

No student may be considered a candidate for a degree unless the final 36 credit hours required for the degree are earned in residence at Georgia Tech and approved by the major school.

C. Ten-Year Rule

Work that was completed more than ten years prior to commencement must be validated by special examinations before it can be counted toward a degree.

D. Requirements For a Bachelor's Degree

1. To be a candidate for a degree, undergraduate students must have passed or be enrolled in all courses required for the degree, must have a grade-point average for their entire academic program of at least 2.00, and must have done creditable work in their departmental courses so as to merit the recommendation for the degree by the chair and faculty of their school.

2. A bachelor's degree program must require at least 21 credit hours of upper division courses in the major field and at least 39 credit hours of upper division work overall.

3. A bachelor's degree program must require at least 120 credit hours, plus the Wellness Requirement, for a total of 122 credit hours.

4. A student, with the approval of her/his school or specialization, may satisfy the requirements for a bachelor's degree by meeting all of the requirements associated with any one curriculum year that has been in effect during her/his period of enrollment in the Institute (or that has been in effect during her/his last two years in the program at one of the RETP institutions, if her/his enrollment there occurred prior to her/his enrollment at Georgia Tech). A curriculum year is in effect for a student only if the student's date of matriculation is prior to the ending date of the Spring Semester concluding that curriculum year.

5. Constitution and History Requirements

a. The Georgia law, as amended March 4, 1953, requires that before graduation all students pass examinations or pass comparable courses in United States and Georgia history and in the United States and Georgia Constitutions.

b. For courses that may satisfy the Constitution Requirement and History Requirement, see the Core Curriculum (p. 92) section of the Catalog.

6. Regents' Exam

   • Since Spring 2010, the Regents' Exam has no longer required at Georgia Tech. To be considered a degree candidate, a student
must complete an Online Application for Graduation during the term preceding the final term in residence.

7. Wellness Requirement
   a. Unless medically exempted, all students are required to satisfy the wellness requirement prior to graduation, as specified in the Core Curriculum (p. 101) section of the Catalog.
   b. The Health Information Record on file with the Director of Health Services will be used to determine any medical exemptions from the Wellness Requirement. All certificates of disability from personal physicians must be endorsed by the Director of Health Services before they will be accepted by the School of Applied Physiology.

E. Graduation with Academic Distinction
1. For graduation with highest honor, the minimum grade-point average (GPA) shall be 3.55.
   For graduation with high honor, the minimum grade-point average (GPA) shall be 3.35.
   For graduation with honor, the minimum grade-point average (GPA) shall be 3.15.
2. A student must have earned at least 60 semester credit hours (excluding remedial coursework) at Georgia Tech to graduate with highest honor; with high honor, or with honor.
3. In order to qualify for graduation with honors, all grades or grade corrections affecting the honors designation must be received and certified by the Office of the Registrar no later than noon on Wednesday following Commencement.
4. Tentative honors at graduation (recognized at Commencement) are determined by the grade-point average (GPA) entering the graduating term and the sum total of graded hours accumulated prior to the graduation term plus graded hours registered for and pending during the graduation term.

F. Second Undergraduate Degree
1. A student enrolled for a second undergraduate degree shall be classified as an undergraduate student, except that a graduate student wishing to pursue a second undergraduate degree will remain classified as a graduate student. A graduate student, with approval of the major school, may work toward a second undergraduate degree while pursuing a graduate program.
2. To be a candidate for a second undergraduate degree, a student must have the recommendation of the chair of the school concerned and the approval of the Undergraduate Institute Curriculum Committee.
3. To obtain a second undergraduate degree, a student must complete all major required courses for the degree and earn credit for a total of at least 36 credit hours in excess of the requirement for any previous degrees earned.
4. All items in Regulation XIII, "Undergraduate Degrees," (p. 162) apply to students completing second undergraduate degrees.

G. Minors
1. A student may complete a minor in another academic field while completing the requirements of her/his major degree program.
2. With the approval of the major school, the student should consult an advisor in the minor field, who can inform the student of the requirements for the minor.
3. A Change of Undergraduate Minor Form must be completed, signed by the Minor Advisor/Coordinator and the Major Advisor, and submitted to Office of the Registrar. Students are encouraged to submit the completed form when they decide to pursue the minor but no later than the Deadline for the Online Application for Graduation in the academic term preceding anticipated graduation.
4. Students who change or add a minor must complete the requirements in the Catalog that was effective for the term in which the change or addition of a minor became official, or any subsequent edition of the Catalog.
5. A readmitted student who wishes to pursue a minor must indicate her/his choice on the Application for Readmission. Requirements for the minor are those in effect at the time the student is readmitted as stated in the current edition of the Catalog. The readmitted student may select only minors offered at the time of readmission.
6. Some courses in a minor may have prerequisites that are not included in the minor description. Some minors may have additional requirements that students must meet before being admitted to that minor.
7. The student must declare any minor(s) prior to applying for graduation. A Minor Program of Study Form signed by the major and minor advisor may be required depending on the minor. Minor requirements and information for a Minor Program of Study Form are located in DegreeWorks.
8. The minor will be conferred at the same time the degree is conferred.
9. Minors may not be conferred retroactively upon students who have graduated.
10. The minor will not be printed on the diploma, but both the degree and minor will be recorded on the student's transcript.
11. A student who has applied for a minor but does not wish to complete the minor must have her/his advisor contact the Office of the Registrar for the minor to be removed prior to completing an Online Application for Graduation. Minors will be audited with the major and the status will be noted in DegreeWorks.

XIV. Graduate Degrees
The faculty of Georgia Tech grants advanced degrees in engineering, science, management, computing, architecture, city and regional planning, public policy, and other technology-related areas. The goals for graduate studies and research are to establish an educational environment that will strengthen students' personal and professional development, to encourage students and faculty to pursue the discovery and generation of new knowledge through research, to investigate ways of applying such knowledge for the benefit of society and humanity, and to foster the development of new tools, objects, and ideas.

Students whose interests and aptitudes lead them beyond the limits of the traditional undergraduate curriculum may broaden their knowledge of a given field and pursue independent inquiry through graduate study. A graduate education is of particular benefit to students interested in careers in research, management, development, design, or consulting; to those who aspire to formulate and administer policy; and to those who desire careers in higher education.

Graduate Student Work Loads
Full-time students must be enrolled for at least 12 credit hours on a letter grade or pass/fail basis. As an exception, the advisor and school chair may allow up to three hours out of the minimum 12 to be taken on an audit basis in fall and spring semesters; in summer semesters,
A doctoral student normally does not request transfer credit. The rules appearing on the approved program of study form for the masters degree at Georgia Tech. The courses to be transferred would typically be those stated in the catalog effective the semester in which they enrolled or the regulations in the catalog that records the change. Students with fellowships, graduate research or teaching assistantships, traineeships, tuition waivers, or student visas, and those assigned to the Institute by the armed forces for the purpose of pursuing a degree are required to enroll full time. Part-time doctoral students engaged in research for their Ph.D.s should meet the minimum enrollment requirement and register for the number of 9000 level hours consistent with the time they and their faculty advisors spend on the dissertation research.

Graduate Policies and Regulations

The Institute Graduate Curriculum Committee, with the approval of the Academic Faculty Senate, is responsible for establishing academic policy for the graduate programs; however, final authority rests with the Senate. This committee reserves the right to change requirements for degrees as may be appropriate. Students enrolled at the time such changes appear in the catalog have the privilege of following either the regulations stated in the catalog effective the semester in which they enrolled or the regulations in the catalog that records the change.

This catalog records the institute-wide policies and regulations that govern the graduate programs. Schools may make additional rules concerning their programs and the pursuit of their degrees, but such rules may not contradict Institute policies and regulations.

Transfer Credit

A student may not apply for transfer credit until after matriculation at Georgia Tech. The courses to be transferred would typically be those appearing on the approved program of study form for the masters degree. A doctoral student normally does not request transfer credit. The rules relative to and the process for obtaining transfer of credit for graduate-level courses are as follows:

1. Student’s in a master’s degree program requiring fewer than 33 semester credit hours may receive up to six hours of transfer credit for graduate-level courses taken at an institution accredited by a Canadian or U.S. regional accrediting board, or at a foreign school or university that has a signed partner agreement with Georgia Tech, and not used for credit toward another degree. This ensures completion of at least one-third of the courses for a degree in residence at Georgia Tech (applies to programs that are face-to-face and online format). The student must supply a current transcript for this evaluation.

2. To obtain transfer of credit, the student must complete the following procedure:
   a. The student will confer with the graduate advisor to ascertain whether the courses to be transferred are a logical part of the student’s graduate program;
   b. If the courses are appropriate, the student will deliver to the school that teaches such courses a copy of the current transcript, necessary descriptive materials including catalog descriptions, and textbooks used for evaluation. The faculty of the appropriate school will determine the equivalent Georgia Tech course and the number of credit hours accepted. The faculty member who prepares the transfer credit form should have the school chair consign it. The school should then send the form directly to the registrar with a copy of the student’s Approved Program of Study attached;
   c. If the student wishes to transfer more than the number of hours permitted in item one listed above, a petition must be submitted to the Institute Graduate Curriculum Committee that includes statements of possible justification for the granting of such a petition, transfer credit forms, and the recommendation of the student’s school chair.

3. A joint enrollment student may receive graduate credit for up to one-third of the hours required for the degree for graduate courses taken at Emory University or Georgia State University provided that the following is true:
   a. Georgia Tech does not offer such courses;
   b. The student’s advisor and school chair approve the courses in advance and in writing;
   c. The student passes the courses with a C or better. Advance approval is satisfied when the courses appear on the student’s proposed Program of Study.

4. A student may not receive transfer credit from universities outside the United States and Canada unless the courses were taken at a foreign institution or university that is accredited by a Canadian or U.S. regional accrediting board or has a signed partner agreement with Georgia Tech. In any other case, an international student can obtain credit for courses previously taken but not applied toward another degree by filling out an Examination for Advanced Standing Authorization Request Form, paying the appropriate fee at the Bursar’s Office, and passing the examination for advanced standing. The school or college that normally teaches the equivalent course will administer any necessary examinations.

Double Counting Credit between Master’s Degrees

Students who are pursing two Master’s degrees at Georgia Tech may double count a maximum of 6 hours of credit for both degrees. This ensures that each degree involves a minimum of 24 hours of coursework completed at Tech that is not double counted. The six-hour limit may be exceeded when specifically allowed as a component of an approved degree program.

Staff Members

No staff member beyond the rank of instructor in a school may work for a master’s degree in that school. No new staff member with the rank of
assistant professor in a school may work for a doctoral degree in that school.

**General**

A student who wishes to withdraw her/his name from the rolls of degree candidates must formally withdraw the Online Application for Graduation before the end of the seventh week of the semester (or fourth week of the summer term). This privilege will be extended to a degree candidate only once.

**XV. Student Vehicles**

Students desiring to operate motor vehicles on campus are subject to all rules set forth by the Georgia Tech motor vehicle regulations.

**Parking and Transportation Services**

Georgia Tech Parking and Transportation Services maintains information on its web site regarding:

- Parking (https://pts.gatech.edu/subsite1/Pages/default.aspx)
- Transit (https://pts.gatech.edu/subsite2/Pages/Transit.aspx)
- Alternative Transportation (https://pts.gatech.edu/Alternative_Transportation/Pages/Alternative%20Transportation.aspx)

**Bicycles**

The Georgia Tech Police Department provides important information for students who ride bicycles.

- Bicycle Information (http://www.police.gatech.edu/crimeprevention/bicycle)

**XVI. Medical Regulations**

A Medical Entrance Form and proof of required immunizations and tuberculosis screening must be on file with Stamps Health Services (http://www.health.gatech.edu). Failure to provide this information may result in a health hold and delay of registration. All international students (F1 and J1 visas) are required to have health insurance coverage. Students may elect to purchase the health insurance made available by Georgia Tech or may have their own comparable medical insurance.

**Student Health Insurance**

**Source:** Georgia Tech Policy Library (http://www.policylibrary.gatech.edu/student-affairs/health-insurance-information)

The Georgia Board of Regents (BOR) offers student health insurance for eligible students and their dependents. Two groups of students may purchase student health insurance: Mandatory and Voluntary. Mandatory students are required by the BOR to have student health insurance and the charge is applied automatically to the student's account along with tuition. Mandatory Graduates: Teaching Assistant, F1 or J1 visa holder, Research Assistant, Fellowship or Full tuition waiver. Mandatory Undergraduates: F1 or J1 visa holders. Mandatory students who already have health insurance may apply to waive the Board of Regents (BOR) student health insurance coverage.

There is a 30 day open enrollment period at the start of each semester to enroll for student insurance coverage, to enroll for the voluntary plan, or for mandatory students to add spouse/dependents coverage. For students and spouses with Board of Regents (BOR) student health insurance, Stamps Health Services (SHS) is the primary care provider. SHS renders care to students, spouses, and domestic partners. Dependent children are not eligible to be treated at SHS.

More information is available at www.health.gatech.edu (http://www.health.gatech.edu)

**Immunizations**

**Source:** Georgia Tech Policy Library (http://www.policylibrary.gatech.edu/student-affairs/immunizations)

All incoming students must comply with the Board of Regents of the University System of Georgia’s immunization requirements. It is strongly recommended that immunization requirements are met as soon as possible to avoid a registration hold. A registration hold keeps students from registering for classes.

Incoming students must use Stamps Health Services Immunizations Form.

More information is available at www.health.gatech.edu (http://www.health.gatech.edu)

**Special Health Considerations**

**Source:** Georgia Tech Policy Library (http://www.policylibrary.gatech.edu/student-affairs/special-health-considerations)

It is the responsibility of all students to notify the Health Center, the School of Applied Physiology, and the Office of Disabled Student Services of any disability that would make participation in swimming, competitive sports, and aerobic training hazardous to their well-being. Any student requesting special consideration because of mental or physical disability should have his or her physician write an explanatory letter, giving full details of the disability and consequent limitations on physical activity, to the medical director of Health Services. This letter must accompany the Medical Entrance Form.

**Treatment**

**Source:** Georgia Tech Policy Library (http://www.policylibrary.gatech.edu/student-affairs/treatment)

Stamps Health Services (SHS) offers comprehensive health care to students, spouses, and/or domestic partners of Georgia Tech students. Eligibility status is determined before an appointment is scheduled for services. Services are provided through payment of the Health Fee or on a pay-per-visit basis. The Health Fee Coverage Period begins one business week before the first day of class of the upcoming term. The coverage period ends the last business day prior to the first day of class of the upcoming term.

More information about the Health Fee is available on the Stamps Health Services (http://health.gatech.edu/finance/Pages/Health-Fee.aspx) web site.

**XVII. Extracurricular Activities**

**A. Participation**

1. In order to be eligible to participate in extracurricular activities, a student must satisfy the following requirements:
   a. be enrolled in a degree program and be registered;
   b. for Fall and Spring semesters, maintain a schedule with at least six credit hours on a for-credit basis or be a student registered...
with the Center for Career Discovery and Development on a work term

c. all student organization officers must be enrolled in Georgia Tech classes with at least six credit hours on a for-credit basis or be a student registered with the Center for Career Discovery and Development on a work term in Atlanta

2. Changes in academic standing that affect eligibility become effective at the end of each academic term, usually the Tuesday following Final Examination Period.

3. Any student placed on Academic Drop/Dismissal or Review, or placed on Suspension or Expulsion by the Office of Student Integrity, is immediately ineligible for participation. Any student placed on Suspension in Abeyance may be immediately ineligible, based upon the individual organization’s decision to allow participation.

4. Changes in disciplinary standing that affect eligibility become effective immediately.

5. Participation also requires satisfaction of any additional requirements established by the Student Activities Committee of the Academic Senate.

B. Scheduling of Events

1. All student organizations must make written application to, and receive permission from, the Division of Student Life to hold a social function.

2. In each term, the weekend before the Final Examination Period is closed to student-sponsored extracurricular events.

C. Student Organizations

1. All student organizations must adhere to the Student Organization Code of Conduct, the Student/Student Organization Alcohol Policy, and other policies set forth by the Division of Student Life.

2. Every organization must renew its charter every year or when changing officers by submitting an Officer Update Form and by signing the Alcohol Policy Acknowledgement Form.

3. Requirements and standards for chartering a student organization are established by the Student Activities Committee of the Academic Senate and are available from the Division of Student Life.

D. Fraternity and Sorority Regulations

1. To be eligible for initiation, a student must be a full-time student not on academic or disciplinary probation.

2. The initiation of any individual must be registered with and approved by the Division of Student Life prior to the initiation.

3. The individual must meet all Georgia Tech Interfraternity Council (IFC) or Panhellenic requirements concerning initiation.

4. All fraternities and sororities are subject to the rules established by the Georgia Tech IFC/Panhellenic/National Pan-Hellenic and all Georgia Tech policies, rules, and regulations.

E. Intercollegiate Athletics Regulations

1. To be eligible for intercollegiate athletic competition, a student must satisfy the following requirements:

   a. be eligible to participate in extracurricular activities, as defined in Regulation XVII, “Extracurricular Activities,” Section A, “Participation” (http://catalog.gatech.edu/rules/17);

   b. be carrying a full-time workload as defined in Regulation VI, “Scholastic Regulations,” Section A, “Classification of Students,” Item 3 (p. 154);

   c. for Summer semesters, be carrying an appropriate workload (3-16 hours) with the provision that the definition of full-time in Regulation VI, “Scholastic Regulations,” Section A, “Classification of Students,” Item 3 remains applicable;

   d. be making satisfactory progress toward a degree; and

   e. meet any further requirements of the NCAA or other governing organization; see the Athletic Director for details.

2. No student may be excused from regularly scheduled classes for athletic practice.

3. Special accommodations may be made (or coordinated) for intercollegiate student-athletes whose competition schedules conflict with the first week of reading periods and final exams.

4. No student may participate in more than two sports in intercollegiate competition in any school year, except by permission of the Division of Student Life. Being a manager or assistant manager is counted as participation within the meaning of this rule.

XVIII. Academic Honor Code

Academic Honor Code

The Academic Honor Code is a student initiative that became an official Institute policy in 1996. The objective of the Academic Honor Code is to increase academic integrity and strengthen trust in the Georgia Tech community. All students are required to sign an agreement acknowledging their awareness of the Academic Honor Code. They are strongly encouraged to seek a full understanding of their instructors’ expectations regarding academic honor.


The Honor Agreement

“Having read the Georgia Institute of Technology Academic Honor Code, I understand and accept my responsibility as a member of the Georgia Tech community to uphold the Honor Code at all times. In addition, I understand my options for reporting honor violations as detailed in the Code.”

XIX. Code of Conduct

CourseLeaf Help User: dbarbero3 Leepfrog Page Body

The official and most current versions of this policy document can be found in the Georgia Tech Policy Library (http://www.policylibrary.gatech.edu) and/or the Office of Student Integrity (http://osi.gatech.edu) web site. In the event of any conflict, the document in the Policy Library and/or on the OSI web site shall govern.

- Student Code of Conduct (p. 167) | source (http://www.policylibrary.gatech.edu/student-affairs/code-conduct)

Additional policy documents are available in the Georgia Tech Policy Library (http://www.policylibrary.gatech.edu).

- Academic Honor Code (http://www.policylibrary.gatech.edu/student-affairs/academic-honor-code)
• Student Organizations Code of Conduct (http://www.policylibrary.gatech.edu/student-affairs/student-organizations-code-conduct)
• Student/Student Organization Alcohol Policy (http://www.policylibrary.gatech.edu/student-affairs/studentstudent-alcohol-policy)
• Student Sexual Misconduct Policy (http://www.policylibrary.gatech.edu/student-affairs/student-sexual-misconduct-policy-change)

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**Student Code of Conduct**

**Last Revised:** March 2016

**Review Date:** March 2019

**Policy Owner:** Student Life

**Contact Name:** John Stein

**Contact Title:** VP of Student Life

**Contact Email:** john.stein@vpss.gatech.edu

**Policy Statement:**

The most current Student Code of Conduct can be found on the Office of Student Integrity Web site as listed in the References. In the event of any conflict, the Code found on the Web site will govern.

A. General (p. 167)
B. Prohibited Academic Conduct (p. 168)
C. Prohibited Non-Academic Conduct (p. 169)
D. Student Code of Conduct Procedures (p. 170)
E. Sanctions (p. 172)
F. Interim Suspension (p. 173)
G. Appeal Procedures (p. 173)
H. Record Keeping and Release of Information (p. 174)
I. References (p. 174)

**A. General**

1. **Purpose**

The Student Code of Conduct educates all members of the Georgia Tech Community about the Institute’s expectations and Students’ rights, and creates a standard by which Students are expected to conduct themselves for the purpose of establishing an environment conducive to academic excellence.

2. **Definitions**

As used in this Code:

- “Administrative Conference” refers to the meeting between the Respondent and the Student Conduct Administrator that occurs during an investigation. An Administrative Resolution may be offered during this conference.

- “Administrative Resolution” refers to a decision by a Student Conduct Administrator that will result in the Respondent either being found responsible or not for the alleged violation.

- “Advisor” refers to an individual, chosen by the Student or Organization, who assists a participant with the Student Conduct process. Attorneys at law are not allowed to serve as Advisors to Complainant(s) or Respondent(s) unless the Student or Students are subject to criminal prosecution or the parent/legal guardian is the attorney.

- “Appellate Officer” means the person authorized by the Institute to consider an appeal of a disciplinary decision rendered by a Student Conduct Administrator, a Student Conduct Panel, or the Vice President for Student Life and Dean of Students.

- “Business day” means any day in which the Institute is open for its full hours of operation, in accordance with the Institute’s official calendars. All campuses will follow their respective calendars. When an authorized Institute Official closes the Institute, it will not be considered an official business day.

- “Chairperson” means a member of a Student Conduct Panel who is identified by the Institute to oversee the proceedings during a hearing.

- “Complainant” means any person who submits a complaint to OSI alleging that a Student or Organization violated the Student Code of Conduct, or anyone who has been affected by the alleged misconduct.

- “Community” includes any Student, Faculty member, Institute Official, or any other person employed by the Institute. A person’s status in a particular situation shall be determined by the Vice President for Student Life and Dean of Students.

- “Faculty Member” means any person hired by the Institute to conduct classroom, teaching, or research activities or who is otherwise considered by the Institute to be a member of its Faculty, except as otherwise provided in Section D.5.c.

- “Group” means a number of persons who are associated with each other, but who have not complied with Institute requirements for registration as an Organization.

- “Group or Organization Activity” means any activity on or off Institute Premises that is directly initiated for, or supervised by a Group or Organization including any individual activity occurring in buildings, facilities, grounds, utilities, or resources (including computer resources) owned, leased, operated, controlled, or supervised by an Institute Organization.

- “Hazing” is conduct, whether on or off Institute property, which exceeds the normal expectations of the organizational purpose or mission and which a) endangers the mental or physical health or safety of a student as a condition of affiliation with a group or organization and/or b) which is sufficiently severe or pervasive enough to interfere with academic responsibilities.

- “Information” means any Witness testimony, documents, statements, or tangible material presented to a Student Conduct Administrator or Student Conduct Panel.

- “Institute” and “Georgia Tech” each refer to the Georgia Institute of Technology and all of its undergraduate, graduate, and professional schools, divisions, and programs.

- “Institute Official” is defined as faculty, administration, or staff personnel including Students serving as Institute employees.

- “Institute Premises” includes all land buildings, facilities, grounds, utilities, resources, and other property (including computer resources) in the possession of, or owned, operated, leased, controlled, or supervised by the Institute (including adjacent streets and sidewalks).

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**References**

- Student Code of Conduct Procedures
- Sanctions
- Interim Suspension
- General
- Appeal Procedures
- Record Keeping and Release of Information
- Hazing
- Prohibited Non-Academic Conduct
- Prohibited Academic Conduct
- Student Code of Conduct
- Student/Student Organization Alcohol Policy
- Student Sexual Misconduct Policy
- Contact Email: john.stein@vpss.gatech.edu
“May” is used in the permissive sense.

“Office of Student Integrity” or “OSI” means the office designated by the Institute to oversee the Student Code of Conduct.

“Organization” means a number of persons who have complied with, or are in process of complying with the requirements for chartering.

“Policy” or “Policies” means any written rule or regulation of the Institute.

“Preponderance of the Evidence” means it is more likely than not that the Accused is responsible for a violation of the Student Code of Conduct.

“President” means Georgia Institute of Technology or his/her designee.

“Respondent” means a Student, Group, or Organization who is alleged to be in violation of the Student Code of Conduct.

“Sanction” and “Supplementary Requirements” means the conditions imposed upon an Respondent found responsible for a violation of the Student Code of Conduct.

“Student” means any person who is taking or auditing classes of the Institute, either full-time or part-time; is participating in academic programs; or is pursuing undergraduate, graduate, or professional studies. A Student is also any person who matriculates in any Institute program, has been accepted for enrollment, or is eligible to reenroll without applying for readmission.

“Student Conduct Administrator” means an Institute Official authorized on a case-by-case basis by the Vice President for Student Life and Dean of Students to impose Sanctions upon any Student(s) found to have violated the Student Code of Conduct.

“Student Conduct Panel” means a set of persons authorized by the Institute to determine whether the Respondent has violated the Student Code of Conduct. In academic cases, the Panel makes a decision and Sanctions, if applicable, to the Director of Student Integrity.

“Weapon” means any object or substance designed, intended, or used to inflict or threaten bodily injury.

“Will” and “shall” are used in the imperative sense.

“Witness” is defined as a person providing Information during the Conduct process.

3. Authority

a. This Code is not written with the specificity of a criminal statute and should not be confused with criminal law. Institute conduct proceedings are not restricted by the rules of evidence governing criminal and civil proceedings. Students may be held accountable both to civil authorities and the Institute for acts that constitute violations of law and the Code. Proceedings under this Code may be carried out prior to, simultaneously with, or following civil or criminal proceedings. Students who reside in Institute housing will be held accountable under housing policies and procedures in accordance with Section D.

b. OSI, in consultation with the Office of Legal Affairs, shall develop consistent operating procedures for the administration of the Student Code of Conduct process and for the conduct of Student Conduct Panel hearings.

c. Any question of the interpretation or application of the Student Code of Conduct shall be referred to the Vice President for Student Life and Dean of Students for final determination.

d. In any instance in which reference is made to an official of the Institute, such reference shall mean the official or his/her designee.

4. Jurisdiction

a. The Institute reserves the right to take necessary and appropriate action to protect the safety and well-being of the community. Academic misconduct relevant to any Institute activity will be addressed regardless of where it may have occurred. Non-academic misconduct will be addressed whenever such acts:

i. occur on Institute Premises; or
ii. occur at Institute sponsored activities; or
iii. occur at Group or Organization Activities; or
iv. occur off Institute Premises when conduct adversely affects the Institute and/or the pursuit of its objectives.

b. Each Student shall be responsible for his/her conduct from the time of application for admission through the actual awarding of a degree. This includes conduct that may occur before classes begin or after classes end, as well as during the academic year and during periods between terms of actual enrollment. The Code shall apply to a Student’s conduct even if the Student withdraws from school while a disciplinary matter is pending. The Code applies to Institute programs in remote and overseas locations.

c. The Institute shall retain jurisdiction over all Students irrespective of when the Student is subject to tenets of an agreement with other schools.

5. Inappropriate Classroom Behavior

The primary responsibility for managing the classroom environment rests with the instructor. Students who engage in any acts that result in disruption of a class may be directed by the instructor to leave the class for the remainder of the class period. Longer suspensions from a class can be administered only by the Vice President for Student Life and Dean of Students in accordance with this Code.

6. Student Organizational Discipline

Student Organizations are accountable to this Code. A Student Organization and its officers may be held collectively and individually responsible when violations of this Code by those associated with the Organization have received the consent or encouragement of the Organization, or of the Organization’s leaders or officers.

B. Prohibited Academic Conduct

Any Student accused of committing or attempting to commit one or more of the following acts of academic misconduct is subject to conduct procedures in accordance with Section D.

1. Unauthorized Access: Possessing, using, or exchanging improperly acquired written or verbal information in the preparation of a problem set, laboratory report, essay, examination, or other academic assignment.

2. Unauthorized Collaboration: Unauthorized interaction with another Student or Students in the fulfillment of academic requirements.
3. Plagiarism: Submission of material that is wholly or substantially identical to that created or published by another person or persons, without adequate credit notations indicating the authorship.

4. False Claims of Performance: False claims for work that has been submitted by a Student.

5. Grade Alteration: Alteration of any academic grade or rating so as to obtain unearned academic credit.

6. Deliberate Falsification: Deliberate falsification of a written or verbal statement of fact to a Faculty member and/or Institute Official, so as to obtain unearned academic credit.

7. Forgery: Forgery, alteration, or misuse of any Institute document relating to the academic status of the Student.

8. Distortion: Any act that distorts, or could distort grades or other academic records.

9. Intellectual Property: The unauthorized use of an instructor’s intellectual property, including marketing and selling, is prohibited (such properties may include power point presentations, lecture notes (any media), examination questions, study guides, etc.).

C. Prohibited Non-Academic Conduct

Any Student accused of committing or attempting to commit one or more of the following acts of non-academic misconduct is subject to conduct procedures in accordance with Section D. Any Student Organization accused of committing or attempting to commit one or more of the following acts of non-academic misconduct is subject to conduct procedures in accordance with the Addendum “Student Organization Code of Conduct Procedures.”

1. Alcohol violations including, but not limited to:
   a. Underage use or possession of alcohol.
   b. Possession or consumption of alcohol in an unauthorized area.
   c. Use or possession of fake identification.
   d. Distribution of alcohol to underage person(s).
   e. Behavior, while under the influence of alcohol that endangers any person.
   f. Disorderly conduct associated with the use of alcoholic beverages.

2. Illegal drugs and other substance violations including, but not limited to:
   a. Use or possession of illegal drugs (without valid medical or dental prescription).
   b. Behavior, while under the influence of illegal drugs, that endangers any person.
   c. Manufacturing, furnishing, selling, or distributing of any narcotic or dangerous drug controlled by law.
   d. Disorderly conduct associated with the use of illegal drugs.

3. Unjustifiably pushing, striking, or otherwise intentionally causing reasonable apprehension of such harm to any person.

4. Disorderly conduct including, but not limited to:
   a. Boisterousness, rowdiness, obscene, or indecent conduct or appearance.
   b. Obstruction or disruption of teaching, research, administration, or other Institute activities, including its public service functions or other authorized activities.
   c. Breach of the peace.
   d. Attempting to influence the impartiality of a Student Conduct Administrator and/or a member of a Student Conduct Panel at any point in the Student Conduct process.

5. Behavior that endangers any person(s), including self.

6. Unauthorized use of Institute facilities or premises including:
   a. Unauthorized entry into any Institute Premises or remaining without permission in any building after normal closing hours.
   b. Possessing, using, making, or causing to be made any key or other means of access to any Institute Premises without proper authorization.

7. Furnishing false information to any Institute Official.

8. Forgery, alteration, replication, or misuse of any document, record, or identification upon which the Institute relies, regardless of the medium.

9. “Hazing” is conduct, whether on or off Institute property, which exceeds the normal expectations of the organizational purpose or mission and which a) endangers the mental or physical health or safety of a student as a condition of affiliation with a group or organization and/or b) which is sufficiently severe or pervasive enough to interfere with academic responsibilities.

10. Safety violations, including, but not limited to:
    a. Intentionally initiating or causing to be initiated any false reporting, warning or threat of fire, explosion, or other emergency.
    b. Tampering with safety devices or other emergency, safety, or firefighting equipment.
    c. Setting or attempting to set an unauthorized fire.
    d. Unauthorized possession of fireworks, firearms, and/or ammunition.
    e. Unauthorized possession of weapons and/or dangerous materials or chemicals.
    f. Unauthorized sale, possession, furnishing, or use of any bomb or explosive or incendiary device.

11. Theft and/or unauthorized possession or use of property or services belonging to the Institute, another person, or any other entity.

12. Malicious or unauthorized damage to or destruction of Institute property or property belonging to another.

13. Illegal gambling, including online gambling.

14. Failure to return or submit property or records of the Institute within the time prescribed by the Institute.

15. Acting with any other person to perform an unlawful act or to violate an Institute regulation or Policy.

16. Failure to comply with instructions or a directive of any properly identified Institute Official while that person is acting in the performance of his/her duties.

17. Abuse of the Student Code of Conduct Procedures including, but not limited to:
    a. Failure to cooperate with the investigation, resolution, and procedures of the Student Code of Conduct.
    b. Falsification, distortion, or misrepresentation of Information before a Student Conduct Administrator or Student Conduct Panel.
    c. Disruption or interference with the orderly conduct of an Administrative Conference and/or a Student Conduct Panel proceeding.
    d. Attempting to influence the impartiality of a Student Conduct Administrator and/or a member of a Student Conduct Panel at any point in the Student Conduct process.
Throughout the conduct process, the Respondent is granted the following rights:

3. Rights of the Respondent

Throughout the conduct process, the Respondent is granted the following rights:

21. Violation of any Board of Regent's policy and/or federal, state, or local law.

22. Discriminatory conduct including

a. objectively offensive conduct directed at a particular person or persons based upon that person or persons’ race, color, religion, sex, national origin, age, disability, sexual orientation, gender identity, veteran status, or any class protected by law that creates a hostile environment or that results in excluding participation in, or denies the benefits of any educational program or working opportunity for that person or persons.

b. verbal or written threats, coercion or any other conduct that is based on race, color, religion, sex, national origin, age, disability, sexual orientation, gender identity, veteran status, or any class protected by law, that by design, intent or recklessness incites reasonable fear of physical harm or otherwise unreasonably interferes with another’s ability or opportunity to participate in work, education, research, living, or other activities.

Allegations of sex and/or gender-based discrimination will be governed by the Student Sexual Misconduct Policy.

D. Student Code of Conduct Procedures

1. Case Referrals

Any person may file a complaint against a Student for violations of the Student Code of Conduct. The complaint shall be prepared in writing and directed to OSI or, in academic cases, the instructor of record may hold a Faculty Conference (see Section D.5.c.). The procedures for filing a complaint can be found on the OSI web site. The complaint should be submitted as soon as possible after the event takes place or when it is reasonably discovered, and no later than thirty (30) business days following the discovery of the incident. The Complainant should forward any supporting documentation to OSI within ten (10) business days of the original submission or OSI may process the case based solely on the original complaint. OSI may also initiate a complaint based upon information received.

2. Communication

All communication (requests for meetings, notifications, notice of hearings, etc.) will be provided via official Institute e-mail addresses, as defined by the Office of Information Technology. If the Respondent is not currently enrolled, the notification will be sent via U.S. Postal Service to the last known address on file with the Registrar.

3. Rights of the Respondent

Throughout the conduct process, the Respondent is granted the following rights:

a. to seek information from a Student Conduct Administrator about the Investigation and Resolution Process;

b. to be informed of the charge(s) and alleged misconduct upon which the charge is based;

c. to be informed of the Information upon which a charge is based and afforded an opportunity to offer a relevant response;

d. to be accompanied by an Advisor;

e. to remain silent with no inference of responsibility drawn;

f. to call and question relevant Witnesses;

g. to present Information in his/her behalf;

h. to be considered not responsible until proven responsible by a Preponderance of the Evidence;

i. to be informed of the outcome of the disciplinary proceeding in writing;

j. to appeal the decision; k. to waive any of the above rights; and

l. to have resolution of the case within a reasonable time.

4. Investigation and Resolution Process

The Institute’s conduct process utilizes an investigatory model, not an adversarial model, with the primary goal of uncovering the truth. The standard of proof shall be a Preponderance of the Evidence. The investigation and resolution process is as follows:

a. After OSI receives a complaint, the Student Conduct Administrator will review the complaint and any supporting Information to decide what, if any process to initiate. The Student Conduct Administrator will:

• determine whether the facts as alleged in the complaint or report are sufficient to initiate a conduct process.

• If the Student Conduct Administrator determines that the facts of the complaint or report, even if true, would not constitute a violation of policy, no further action will be taken. Otherwise, the Student Conduct Administrator may (1) attempt to resolve the situation through an informal resolution process including, but not limited to, mediation or a meeting between the Respondent and a Student Conduct Administrator or a third party; or (2) initiate a conduct process.

b. If OSI receives multiple complaints involving the same Student, each complaint will be considered separately in determining whether a conduct process should be initiated. Multiple charges against the same Respondent will generally be investigated and adjudicated separately; however, multiple charges may be aggregated under appropriate circumstances, which may include, but are not limited to, consent of the parties, similar or related conduct, and the administrative burden of considering the charges separately.

c. If the Student Conduct Administrator initiates a conduct process, the Respondent is notified and is requested to contact the Student Conduct Administrator within five (5) business days of the notification to schedule an Administrative Conference. During the conduct process, the Respondent should continue to attend class and required Institute functions unless otherwise instructed by the Vice President for Student Life and Dean of Students or OSI. Should the Respondent fail to contact the Student Conduct Administrator within five (5) business days, or fail to attend the Administrative Conference, the Student Conduct Administrator may resolve the case in the Student’s absence, or may refer the case to a Student Conduct Panel.

d. At the Administrative Conference, the Respondent is presented with the alleged violation of the Student Code of Conduct, supporting Information, and an explanation of his/her rights. The Respondent may bring an Advisor. However, if the Advisor disrupts the investigation and resolution process, he/she may be asked to leave. The Respondent will
be provided the opportunity to present his/her version of the reported incident.

e. The case will be adjudicated by the Student Conduct Administrator or a Student Conduct Panel. The Respondent may state a preference for a decision to be rendered by the Student Conduct Administrator or by a Student Conduct Panel. The Respondent may also request that the case be adjudicated by a different Student Conduct Administrator than that initially authorized to hear the case in the event of perceived bias of the initially authorized official. The Student’s reasons for his/her preference must be conveyed to the Vice President for Student Life and Dean of Students, in writing, before the investigation begins. Ordinarily, the Student’s preference will be honored; however, the Vice President for Student Life and Dean of Students, according to appeal procedures described in Section G.

f. If the case is to be adjudicated by the Respondent shall provide his/her statement regarding the alleged misconduct, supporting Information, and names of Witnesses no later than 48 hours following the conclusion of the Administrative Conference. The Student Conduct Administrator shall continue the investigation as necessary by meeting with the Complainant(s) and Witnesses and gathering additional Information. If the Student Conduct Administrator determines that a Witness (including faculty or staff) may have relevant Information, s/he will make a good faith effort to contact such Witness to obtain a statement from the Witness. Before rendering a decision, the Student Conduct Administrator will communicate with the Respondent and share with the Respondent the Information collected. The Student Conduct Administrator will then render a final decision, which will be communicated to the Respondent via the Respondent’s Institute e-mail address.

g. If the case is to be adjudicated by the Student Conduct Panel, the case shall be referred to the Student Conduct Panel and follow the procedures outlined in Section D.5.b.

h. Resolution of the case should be made within thirty (30) business days of the Administrative Conference. If resolution cannot be reached in thirty (30) business days, OSI will inform the Respondent and Complainant. OSI may waive this timeline for good cause.

5. Forms of Case Resolution

a. Administrative Resolution
The Student Conduct Administrator renders a decision of 1) Not Responsible, which closes the case, or 2) Responsible for one or more violations with an appropriate Sanction and, as warranted, one or more from among the Supplementary Requirements. The Respondent, after being notified of the Student Conduct Administrator’s decision, may submit an appeal to the Vice President for Student Life and Dean of Students according to the appeal procedures described in Section G.

b. Student Conduct Panel
The Student Conduct Panel is convened only when either the Student Conduct Administrator or the Respondent elects this form of resolution. The Student Conduct Panel, after convening a hearing, makes a recommendation of 1) Not Responsible, which closes the case, or 2) Responsible for one or more violations of the Student Code of Conduct with an appropriate Sanction and, as warranted, one or more from among the Supplementary Requirements. The Respondent, after being notified of the decision, may submit an appeal to the Vice President for Student Life and Dean of Students according to procedure procedures described in Section G. The Student Conduct Panel, at the request of the Respondent, may also conduct a hearing solely to determine appropriate sanctions in cases where the Respondent accepts responsibility for a violation of this Code.

2. Decisions and Sanctions for Non-academic Cases
The Student Conduct Panel, after convening a hearing, recommends a disciplinary decision to the Director of Student Integrity. The Director of Student Integrity, after reviewing the case, renders a decision of 1) Not Responsible, which closes the case, or 2) Responsible for one or more violations of the Student Code of Conduct with an appropriate Sanction and, as warranted, one or more from among the Supplementary Requirements. The Respondent, after being notified of the decision and Sanction, may appeal to the Vice President for Student Life and Dean of Students, according to appeal procedures described in Section G.

3. Scheduling of Student Conduct Panel Hearing
After the case is forwarded to a Student Conduct Panel, the Complainant and the Respondent will be notified of available dates and times for a hearing. The Respondent may indicate preferences from among the available dates and times. These preferences will be considered by OSI if received within three (3) business days of the date the options were presented to the Respondent.

This official notice will be provided at least five (5) business days prior to the hearing and will include the time, date, and location of the hearing. In addition, the notice will specify the Complainant(s), Witnesses(s), and nature of the alleged misconduct. The Accused may waive the notification timeline in order to expedite the hearing process. Upon request, the Respondent may meet with a Student Conduct Administrator to review Information and hearing procedures.

6. Hearing Participants and Attendees
• Student Conduct Panel hearings shall ordinarily be closed except for the Respondent(s), the Complainant(s), Advisor(s), and Witnesses. Exceptions may be made at the discretion of the Chairperson. Witnesses are allowed at the discretion of the Chairperson. The Chairperson may exclude any person, including the Respondent, who disrupts a hearing.
• An Respondent Student who fails to appear after proper notice will be deemed to have responded “Not Responsible” to the charges against him/her and to have exercised the right to remain silent without prejudice. At the discretion of the Chairperson the hearing may be conducted in the absence of the Student(s) and all the Information regarding the alleged misconduct shall be presented and considered.
• The Complainant(s) and Respondent(s) have the right to be accompanied by an Advisor. The Complainant(s) and/or Respondent(s) should select an Advisor who can attend the hearing at the scheduled date and time. Delays are not usually granted due to scheduling conflicts of an Advisor.
• Subject to the Chairperson’s control of the hearing, the Complainant(s), Respondent(s), and their Advisor(s), shall be allowed to attend the Student Conduct Panel hearing, but not Panel deliberations.
• In Student Conduct Panel hearings involving more than one Respondent, OSI may permit the Student Conduct Panel hearings concerning each Student to be conducted either separately or jointly.
• A maximum of two (2) character Witnesses will be allowed in a hearing.

7. Hearing Procedures
• The Chairperson shall exercise control over the proceedings to achieve orderly completion of the hearing.
• Advisors are restricted to private communications with their advisee(s). However, if the Advisor disrupts the investigation and resolution process, he/she may be asked to leave.
• All questions by the Complainant(s) and Respondent(s) must be directed to the Chairperson, rather than to the Witness directly. Questions of whether potential Information will be received shall be resolved at the discretion of the Chairperson.
• In addition to the Information provided by OSI, the Student Conduct Panel, at the discretion of the Chairperson, may accept additional pertinent Information and testimony (including impact statements). Any letters of recommendation submitted by the Respondent will be admitted for consideration at the discretion of the Chairperson and, if admitted, will be viewed only during Panel deliberations.
• All procedural questions arising during the hearing are subject to the final decision of the Chairperson.
• The Student Conduct Panel’s standard of proof shall be a Preponderance of the Evidence.
• The Student Conduct Panel in consultation with OSI, may reasonably accommodate concerns for the personal safety, well-being, and/or fears of confrontation of the Complainant(s), Respondent(s), and/or Witnesses during the hearing.
• The Student Conduct Panel shall make a recording and/or summary transcription of the proceeding, which will serve as the official record of the hearing. No other recording will be permitted. The Respondent or the Complainant may request a copy of the Institute’s recording upon payment of the cost to reproduce the recording, or may listen to the original recording in a location designated by OSI at no charge. The record shall be the property of the Institute, and is subject to the Family Educational Rights and Privacy Act of 1974, 20 USC §1232g.

c. Faculty Conference (optional academic case resolution)
A faculty conference is an optional way in which an alleged act of academic misconduct can be resolved.

1. Initiation of Complaint
The Faculty Conference is initiated by the instructor of record, who requests the meeting with the Respondent to discuss the alleged misconduct. Should the Respondent not choose to participate in a Faculty Conference, the instructor should forward the case to OSI for investigation.

2. Participants
The Faculty Conference involves the instructor of record and the Respondent. The Faculty Conference may also involve Witnesses and a representative from OSI if requested by either the instructor or the Respondent.

3. Process
During the Faculty Conference, the instructor of record explains the alleged misconduct, supporting Information, and the Rights of the Respondent. The Respondent has the opportunity to provide 1) his/her response to alleged misconduct, 2) supporting Information, and 3) Witnesses.

4. Conclusion
• If the instructor finds the Respondent not responsible, the case is closed.
• If the instructor finds the Respondent responsible, but the Respondent does not admit responsibility, the instructor forwards the case to OSI for investigation.
• If the instructor finds the Respondent responsible, and the Respondent acknowledges responsibility, the instructor proposes a Faculty Resolution including 1) a Sanction of Disciplinary Warning, or Disciplinary Probation, 2) a grade penalty, and 3) an educational component.
• If the Respondent agrees to the Faculty Resolution, the Faculty Member forwards the resolution to OSI for consideration. OSI will determine if the Respondent has prior disciplinary history. If so, in the case will be investigated by OSI, in accordance with Section D.4.
• If the Respondent does not agree to the Faculty Resolution, the Faculty Member forwards the case to OSI.

5. Implementation
• The Respondent is formally notified of the proposed Faculty Resolution by OSI, according to the communication guidelines in Section D.2.
• The Faculty resolution goes into effect upon delivery unless the Respondent requests within five (5) business days that the case be forwarded to OSI for investigation.

E. Sanctions
Sanctions are imposed only when the Respondent is found responsible for one (1) or more violations of the Student Code of Conduct. All Sanctions are officially recorded. Sanctions are determined by the severity of the case and the disciplinary history of the Respondent(s).

A. Sanctions
Sanctions are imposed only when the Respondent is found responsible for one (1) or more violations of the Student Code of Conduct. All Sanctions are officially recorded. Sanctions are determined by the severity of the case and the disciplinary history of the Respondent(s). A Respondent who is found responsible must be given one of the four (4) Sanctions, listed in Section E.1 in ascending order of severity. In addition the Respondent may be subject to one or more Supplementary Requirements. There is no requirement that a Student receive less severe sanctions before more severe sanctions; some conduct may warrant immediate expulsion.

1. Sanction Descriptions

a. Disciplinary Warning
A Disciplinary Warning means that the Student has been found responsible for violating the Institute’s Code of Conduct. Any further disciplinary violation may result in disciplinary action up to, and including Expulsion.

b. Disciplinary Probation
Disciplinary Probation means that the Student has been found responsible for violating the Institute’s Code of Conduct. Disciplinary Probation is for a specified period of time. Any further disciplinary violation may result in disciplinary action up to, and including Expulsion.

c. Suspension
Suspension means that the Student has been found responsible for violating the Institute’s Code of Conduct. Suspension is separation of the Student from the Institute for a specified period of time, after which the Student is eligible to return. Conditions for readmission may be specified by OSI or the Vice President for Student Life and Dean of Students.
suspended Student shall immediately leave campus and may not re-enter campus without prior approval from OSI. Students on suspension are not permitted to enroll in classes at the Institute during their suspension. The Vice President for Student Life and Dean of Students will determine when the Respondent has met the requirements for readmission. Any further disciplinary violation may result in disciplinary action up to and including Expulsion.

d. Expulsion
Expulsion means that the Student has been found responsible for violating the Institute's Code of Conduct. Expulsion is permanent separation and termination of the Respondent's status as a Georgia Tech Student, and exclusion from Institute Premises, privileges, and activities.

2. Supplementary Requirements

a. Restitution: Payment to the Institute or to an affected party for damages resulting from a violation of the Student Code of Conduct.

b. Fine: A monetary penalty paid to the Institute.

c. Grade Change: Change of grade for the course and/or coursework in which the academic misconduct occurred.

d. Programmatic Requirements: Required completion of designated educational programs (e.g., alcohol, community issues, anger management, assessments, etc.).

e. Restrictions: Exclusion from participation in specified services and activities.

f. Revocation of Admission and/or Degree: Admission to, or a degree awarded from the Institute may be revoked for fraud, misrepresentation, or other violation of Institute standards in obtaining the degree, or for other serious violations committed by a Student prior to graduation.

g. Withholding Degree: The Institute may withhold awarding a degree otherwise earned until the completion of the process set forth in this Student Code of Conduct, including the completion of all Sanctions and Supplementary Requirements, if any.

h. Other Requirements: Other Requirements may be imposed.

F. Interim Suspension
In certain circumstances the Vice President for Student Life and Dean of Students may impose an Institute suspension prior to the investigation and resolution process.

1. The Vice President for Student Life and Dean of Students will determine if interim suspension is warranted. Interim suspension may be imposed only:

   • To ensure the Student's physical or emotional safety and well-being; or
   • To ensure the safety and well-being of members of the Institute Community or to preserve Institute property; or
   • If the Student poses a definite threat of disruption of, or interference with the normal operations of the Institute; or
   • If the Student is charged with a felony.

2. During the interim suspension the Student may be denied access to classes, campus facilities, and all other Institute activities or privileges.

3. The Student shall be notified in writing of this action and the reasons for the Interim Suspension, in accordance with Section F.1. The notice should include the time, date, and place of a subsequent meeting with the Vice President for Student Life and Dean of Students in order for the student to show cause why he/she should not be interim suspended.

4. Cases of interim suspension shall be given priority and will be expedited through the Conduct process.

G. Appeal Procedures

1. Reasons for Appeal
The appeal process is not intended to grant a new hearing at a higher level. An appeal shall be limited to a review of the record of the initial hearing, supporting documents, and the Respondent's written appeal. The Respondent must explicitly state why he or she believes an appeal is warranted. Appeals will be considered only for the following reasons:

   a. To determine whether the original hearing was conducted fairly and in conformity with prescribed procedures;
   b. To determine whether there was sufficient evidence to support the decision;
   c. To determine whether the Sanctions and Supplementary Requirements imposed were appropriate for the violation for which the Student was found responsible; and/or
   d. To determine whether new Information, not available at the time of the hearing, is relevant to the final decision.

2. Process
If a case is appealed, sanctions are not imposed unless the welfare of a person or the community is threatened.

Sanctions will be imposed if an appeal is not filed, the deadline for an appeal passes, or when an appeal decision has been finalized.

The appeal must be addressed to the appropriate Appellate Officer, and delivered to the Office of Student Integrity within five (5) business days of the delivery of the decision. Appeal decisions will normally be rendered within ten (10) business days either in person, or accordance with the communication guidelines in Section D.2. Extension of these deadlines may be granted for extenuating circumstances. At the discretion of the Appellate Officer, a designee may be selected to determine the outcome of the appeal.

For all decisions made by the Office of Student Integrity, the Appellate Officer shall be the Vice President for Student Life and Dean of Students.

For all academic cases where the sanction includes suspension or expulsion, Undergraduate Students may, after an appeal to the Vice President for Student Life and Dean of Students, appeal to the Institute President, via the Vice Provost for Undergraduate Education. The Vice Provost for Undergraduate Education will review and make a recommendation to the Institute President. The Institute President’s decision will be the final decision of the Institute.

For all academic cases where the sanction includes suspension or expulsion, Graduate Students may, after an appeal to the Vice President for Student Life and Dean of Students, appeal to the Institute President, via the Vice Provost for Graduate Education and Faculty Affairs. The Vice Provost for Graduate Education and Faculty Affairs will review and make a recommendation to the Institute President. The Institute President’s decision will be the final decision of the Institute.

For all non-academic cases where the sanction includes suspension or expulsion, the Student may, after an appeal to the Vice President for
Student Life and Dean of Students, appeal to the Institute President, via the Vice President for Student Vice President for Student Life and Dean of Students. The Institute President’s decision will be the final decision of the Institute.

3. Appeal Decisions

Decisions of the Appellate Officer go into effect immediately. The Appellate Officer is authorized to take one of the following actions:

a. dismiss the appeal for failure to state valid reasons, in accordance with Section G.1.

b. find no error and uphold the original decision;

c. uphold the original decision, but modify Sanctions and Supplementary Requirements;

d. remand the case to a Student Conduct Administrator or Student Conduct Panel; or

e. reverse the original decision.

4. Board of Regents

The Board of Regents of the University System of Georgia (the "Board") is the final appellate authority for all cases of suspension or expulsion that have been reviewed by the Institute President. Should the Respondent be dissatisfied with the decision of the Institute President, he/she may apply to the Board for a review of the decision. The application for review shall be submitted in writing to the executive secretary of the Board within the period specified by the Board of Regents.

H. Record Keeping and Release of Information

1. Maintenance of Disciplinary Files

A case referral results in the creation of a disciplinary file in the name of the Respondent. Disciplinary files of Students found responsible of any charges against them will be retained for five (5) years after graduation or date of last attendance. Disciplinary records containing records of Suspension and Expulsion will be permanently retained. This file shall be destroyed if the Student is found not responsible for the charges.

2. Release of Information

Student disciplinary records shall be governed by the Family Educational Rights of Privacy Act 20 U.S.C. § 1232g.

a. Academic or non-academic misconduct resulting in expulsion may be released to third parties indefinitely.

b. Academic misconduct that resulted in suspension may be released to third parties for five years after sanction completion.

c. Any non-academic misconduct that resulted in suspension where a potential threat to the campus community exists (including but not limited to illegal drug distribution, endangering or harming any person, or jeopardizing the safety of any person) may be released to third parties for five years after sanction completion. In instances of suspension where no threat to the community is identified, the suspension may be reported until the sanction is complete.

d. Any academic or non-academic misconduct that did not result in suspension or expulsion is not released to third parties.

e. The Institute requires a specific written request from the student to release the entire disciplinary record to third parties.

3. Parent/Legal Guardian Notification

Parents/Legal Guardians of Students under the age of 21 may be notified when a Student is found responsible for violating the Georgia Tech Student Policy on Alcohol and other Drugs when any of the following occur:

a. A Student endangers himself/herself or others while under the influence of alcohol or other substances. Specific instances include driving under the influence, fighting, alcohol poisoning, and hospitalization.

b. When the Vice President for Student Life and Dean of Students determines that any future violation of Institute Policy will most likely result in suspension from the Institute.

c. When a Student Conduct Administrator determines that any future violation of Institute Policy will likely result in removal from housing.

4. Transcript Encumbrances

In pending cases that could result in Suspension or Expulsion, the Vice President for Student Life and Dean of Students will normally place a temporary encumbrance (hold) on a Student’s records. The Vice President for Student Life and Dean of Students will also place a hold on a Student’s records if the Student fails to respond to an official request to meet or if the Student fails to complete assigned Sanctions.

I. References

Academic Honor Code: www.honor.gatech.edu (http://www.honor.gatech.edu)

Board of Regents: www.usg.edu/policymanual/ (http://www.usg.edu/policymanual)

Computer Use and Network Policy: www.security.gatech.edu (http://www.security.gatech.edu)

Department of Housing: www.housing.gatech.edu (http://www.housing.gatech.edu)

Faculty Senate: www.Facultysenate.gatech.edu (http://www.Facultysenate.gatech.edu)

Office of the Vice President for Student Life and Dean of Students: www.deanofstudents.gatech.edu/ (http://www.deanofstudents.gatech.edu)

Office of Student Integrity: www.osi.gatech.edu (http://www.osi.gatech.edu)

Title IX Information: www.ohr.gatech.edu/ers/titleix (http://www.ohr.gatech.edu/ers/titleix)

The following policies can be found on the OSI Web site: Alcohol and Drugs Policy Georgia Tech Policy on Student Sexual Misconduct

Policy History:

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<td>March 2015</td>
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XX. Grievance Procedures

These procedures are intended to provide students at Georgia Tech a means for setting forth grievances relating to academic matters, intellectual diversity, and grade disputes when they believe that an instructor has acted unfairly or improperly in assignment of grades. It is not the intention of these procedures to provide a forum for questioning the judgment or grading policies of faculty. A student’s concerns may be discussed with a faculty member and/or reported to the school or unit head, the academic deans, of the Assistant Vice Provost for Academic Affairs.

A. Applicability of the Grievance Procedures

1. Subject Matter:
   These procedures apply to the review of grievances concerning academic matters and grade disputes. Grade appeals must be initiated by the grievant within their next enrolled academic term following the academic term of the course in question, and best efforts should be applied to resolve the appeal within that academic term.

2. Grievant:
   These procedures shall be the appellate procedures for students at Georgia Tech. Students who have pursued a formal grievance procedure or who have pursued informally the resolution of a grievance in their own school, college, or unit and have had that appeal dismissed, may submit the grievance for review under these procedures.

B. Overview of Grievance Process

1. Informal resolution attempted at the school, department, or unit level.
2. Formal resolution sought at the school, department, or unit level.
3. Formal resolution sought at the Institute level: appeal reviewed and, if so determined, heard by the Student Grievance and Appeal Committee.

C. Steps in the Grievance Process*

*The steps of the grievance process must followed in the order presented below:

1. The student shall attempt to resolve the grievance with the individual faculty member, the department, or the unit involved.
2. If the grievance is not resolved in Step C.1 and the student elects to continue the grievance process, the student may request a formal hearing setting forth in writing the complaint and the remedy sought at the school, college, or unit level. Upon receipt of such appeal, the unit director will acknowledge the appeal in writing within seven calendar days and will expeditiously proceed to constitute an ad hoc appeal committee. The unit director will serve as a nonvoting member of the committee. In addition, the following four committee members will be selected:
   a. One tenured faculty member from within the unit, selected by the unit director.
   b. One member of the academic faculty, selected by the student. The student may elect not to select a faculty member; in that case, the committee will consist of three members.
   c. One member from outside the unit, selected by the Student Grievance and Appeal Committee in consultation with the unit director.
   d. One member of the academic faculty selected by the faculty member whose action is in question.

The Committee will proceed with due haste to examine the merits of the complaint and to render a decision within 30 days. During the proceedings, the student may present any and all evidence that the student deems necessary to support the complaint, except that the Committee must agree that the evidence is in some way relevant. Such evidence may consist of documentation and/or testimony, within reason. Both grievant and respondent may be accompanied by advisors; the role of advisor must, however, be restricted to advice. Grievant and respondent must make their own cases before the committee.

Following a hearing and a written decision at the school, college, or unit level, the grievance is presumed to be resolved unless the grievant appeals.

3. The grievant may appeal the decision that has been rendered by the school, college, or unit to the Student Grievance and Appeal Committee.
   a. If the Committee, or subset thereof appointed by the chairperson, rules that the procedures are not applicable or that based on the facts stated by the grievant viewed in the light most favorable to the grievant, there is no basis for relief, then the appeal is denied
   b. If the Committee rules that the Institute procedural rules are applicable and that a hearing of the appeal is warranted, the Committee shall initiate a hearing process.
   c. If a student wishes to have a grievance outcome reviewed by the Student Grievance and Appeal Committee with a view to a formal hearing, the student shall observe the following requirements:
      i. The appeal must be in writing. It must state the basis for the grievance and the facts that support it, including a summary of the steps that have already been taken to resolve the grievance, reasons why the student finds the resolutions unfair or unsatisfactory, and a statement of the desired remedy.
      ii. The written appeal must be presented to the chairperson of the Student Grievance and Appeal Committee within thirty days after the student has received notice of a decision from a school, college, or unit.
      iii. The decision as to whether a formal hearing is warranted shall be made available, in writing, to the parties concerned within thirty days after the Committee has received notice of the appeal.
      iv. The Committee may alter a deadline specified in these procedures on written petition of either party showing a meritorious reason for delay; if the Committee itself needs to extend a deadline, it may do so on its own authority for periods up to fourteen calendar days; for longer delays, the Committee must request an extension from the Executive Board of the Institute.
      v. The determination of the Committee as to whether a hearing is warranted is final.
      vi. The Committee shall develop and, with the approval of the Academic Senate, establish and publish its own rules of procedures for the conduct of formal hearings.
vii After receiving testimony and the relevant documents, the Committee shall make a decision within thirty days on the basis of the received material.

viii The Committee's decision shall contain finding of fact, the decision arrived at, reasons for the decision, and the criteria or policy applied in reaching the decision.

D. Remedies

1. General

   If the Committee finds, after a formal hearing, that a faculty member, a departmental committee, or an administrator of a unit has not acted fairly or properly, it will recommend a remedy. It will seek to find a remedy that can be implemented by those whose cooperation is needed. In the matter of a grade dispute, this must include the faculty member involved in the dispute.

2. Enforcement

   a. If any party does not comply with the decision of the Committee, the Committee shall, upon request of any party, seek full compliance through the administrative offices of the Institute through the Chief Academic Officer (CAO).

   b. The merits of the dispute shall not be subject to review in the process of enforcement. There shall be strong presumption in favor of the remedy selected by the Committee.

3. Report of a Final Decision

   After a final decision has been made in a case, the Committee shall prepare a report setting forth its findings and recommendations for action and present the report to the CAO. A copy of the report shall be presented to the parties concerned and to those persons involved in implementing the Committee’s recommendations. All such communications shall be effectuated in person or by certified mail with a return receipt requested; such receipt will become part of the Institute records of the case.

   Care will be given that no incomplete or inaccurate information pertaining to the grievance is placed in any file and that all evidence obtained at any stage of the process and all deliberations and proceedings be kept confidential. At the conclusion of each case, the Student Grievance and Appeal Committee shall transmit original or true copies of the documents related to the case to the appropriate Office of the Vice President of Student Affairs, who shall keep such records securely as Institute records for a period of time specified by Institute statutes.

   a. Grade Changes:

      In decisions that would result in the changing of a posted grade, the CAO will instruct the unit director to ask the involved faculty member to effect the prescribed grade change or, if cooperation is not forthcoming, to effect the grade change directly by action of the unit director. Such action shall not be construed as restrictive of the resources of the faculty member through the usual appeal procedure of the Institute.

4. Final Appeal

   Appeal of the decision of the Committee to the CAO shall be permitted only for the purposes of procedural review. Such appeals shall be submitted in writing, with copies to the Committee. The CAO will review the findings of the Committee and, upon judgment that the Committee has failed to follow these procedures or has failed to follow the procedures approved by the Academic Senate for the operation of the Student Grievance and Appeal Committee (XXI.C.3.c.c6), return the case to the Committee for reconsideration, along with description of the received error in procedure and a recommendation for its correction.

XXI. Exceptions

Where appeals are not otherwise specified, exceptions to these regulations may be made by the appropriate faculty committee upon petition by the student and recommendation of the student's school or department. Blanket exceptions that have the effect of amending these regulations shall be referred to the Academic Senate for approval.

XXII. Student-Faculty Expectations

A. Preamble

The Georgia Tech community believes that it is important to continually strive for an atmosphere of mutual respect, acknowledgement, and responsibility between faculty members and the student body. Therefore, we herein endeavors to enumerate the specific expectations of each side. However, this document is not intended to be either comprehensive or limiting in regards to the Institute's statutes. Ultimately, simple respect for knowledge, hard work, and cordial interactions will help build the environment we seek. We remain committed to the ideals of Georgia Tech, agree to abide by these principles in our time here, and will encourage each other to uphold these responsibilities.

B. Student Expectations

We hold that all students have the right to expect:

1. a positive, respectful, and engaged academic environment inside and outside the classroom;
2. to attend classes at regularly scheduled times without undue variations and without penalty if the student cannot attend instructional, lab, or examination hours not institutionally scheduled; to have their instructor of record be present during most scheduled lecture periods.
3. to receive a syllabus which should include an outline of the course objectives, evaluation criteria, and any other requirements for successful completion of each course during the first week of class meetings and to be clearly informed of any changes made to the syllabus during the semester with reasonable time to adjust to these changes;
4. to consult with faculty outside of usual classroom times through regularly scheduled office hours or a mutually convenient appointment;
5. to have reasonable access to Institute facilities and equipment in order to complete course assignments and/or objectives;
6. to have reasonable time to learn course material prior to the administration of an examination;
7. to receive a clear explanation of the faculty's definition and interpretation of academic misconduct within the course that extends over and beyond those clearly defined in the Georgia Tech Honor Code;
8. to have reasonable access to grading instruments and/or grading criteria for individual assignments, exams, or exams and to review graded material in a timely fashion;
9. to consult with each course’s faculty regarding the petition process for graded coursework;
10. faculty to adhere to formal Institute policies, rules and regulations, such as the policy on Final Instructional Class Days and Reading Periods, and the confidentiality policies of FERPA.

11. faculty to be supportive of students’ desires and needs to find rewarding careers after graduation from Georgia Tech. Faculty should be flexible in allowing students to attend the Georgia Tech All Majors Career Fair (http://www.careerdiscovery.gatech.edu/all-majors-career-fair) that occurs in the Fall and Spring Semesters and should refrain when possible from scheduling quizzes or tests on those days;

12. faculty to be flexible during the semester when students have off campus interviews for jobs or graduate/professional schools and should allow students to make up missed work when possible.

C. Faculty Expectations

We hold that all faculty members have the right to expect:

1. a positive, respectful, and engaged academic environment inside and outside the classroom;

2. students to appear regularly for class meetings in a timely fashion;

3. to select qualified Teaching Assistants in accordance with departmental protocols as well as the right to delegate grading, studio and laboratory instruction, tutoring, and other academic activities to these individuals;

4. students to appear at office hours or a mutually convenient appointment for official matters of academic concern;

5. full attendance at examination, midterms, presentations, studios, and laboratories, with the exception of formal pre-approved excused absences or emergency situations;

6. students to be prepared for class, appearing with appropriate materials and having completed assigned readings and homework;

7. full engagement within the classroom, including meaningful focus during lectures, appropriate and relevant questions, and class participation;

8. to cancel class due to emergency situations and to cover missed material during subsequent class meeting times at the discretion of the instructor;

9. students to act with integrity and to adhere to the principles of the Georgia Tech Student Honor Code;

10. students to adhere to the formal Institute policies, such as the Student Code of Conduct.

11. students to make every effort to minimize their absences from scheduled lectures, laboratories, and studios during the Georgia Tech All Majors Career Fair (http://www.careerdiscovery.gatech.edu/all-majors-career-fair) that occurs in the Fall and Spring Semesters, and to notify them in advance if they intend to miss class to attend the Georgia Tech All Majors Career Fair;

12. students to notify them as soon as possible when they have off campus interviews for jobs or graduate/professional schools that conflict with class attendance.
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• Health and Medical Sciences. Minor (p. 562)
• Health, Medicine, and Society. Minor (p. 563)
• History. Minor (p. 564)
• Industrial Design. Minor (p. 564)
• International Affairs. Minor (p. 565)
• International Business, Language, and Culture. Minor (p. 565)
• Japanese. Minor (p. 568)
• Korean. Minor (p. 568)
• Law, Science, and Technology. Minor (p. 568)
• Leadership Studies. Minor (p. 569)
• Linguistics. Minor (p. 571)
• Materials Science and Engineering. Minor (p. 571)
• Mathematics. Minor (p. 572)
• Middle Eastern and North African Studies. Minor (p. 572)
• Multidisciplinary Design/Arts History. Minor (p. 573)
• Music. Minor (p. 574)
• Music Technology. Minor (p. 576)
• Naval Science. Minor (p. 577)
• Nuclear and Radiological Engineering. Minor (p. 577)
• Performance Studies. Minor (p. 578)
• Philosophy. Minor (p. 578)
• Physics. Minor (p. 579), BS (p. 471), MS (p. 534), PhD (p. 496)
• Political Science. Minor (p. 580)
• Psychology. Minor (p. 581), BS (p. 474), MS, (p. 535) PhD (p. 500)
• Public Policy. Minor (p. 582), BS (p. 477), MS (p. 535), PhD (p. 497)
• Public Policy Joint Degree with Georgia State University. PhD (p. 498)
• Quantitative Biosciences. PhD (p. 498)
• Quantitative and Computational Finance. MS (p. 536)
• Real Estate Development. MRED (p. 507)
• Robotics. Minor (p. 582), PhD (p. 499)
• Russian Studies. Minor (p. 583)
• Science, Technology, and Society. Minor (p. 584)
• Science Fiction Studies. Minor (p. 583)
• Scientific and Engineering Computing. Minor (p. 585)
• Social Justice. Minor (p. 586)
• Sociology. Minor (p. 587)
• Spanish. Minor (p. 587)
• Sports, Society, and Technology. Minor (p. 588)
• Statistics. MS (p. 536)
• Supply Chain Engineering. MS (p. 537)
• Sustainable Cities. Minor (p. 589)
• Sustainable Electrical Energy. PMSEE (p. 593)
• Technical Communication. Minor (p. 589)
• Technology and Business. Minor (p. 590)
• Urban Design. MS (p. 538)
• Women, Science, and Technology. Minor (p. 590)

• Aerospace Engineering. Minor (p. 539)
• Architectural History. Minor (p. 539)
• Architecture. Minor (p. 540)
• Biochemistry. Minor (p. 540)
• Biology. Minor (p. 541)
• Biomedical Engineering. Minor (p. 541)
• Chemistry. Minor (p. 542)
• Chinese. Minor (p. 543)
• Computational Data Analysis. Minor (p. 543)
• Computing and Business. Minor (p. 544)
• Computing and Devices. Minor (p. 545)
• Technology and Business. Minor (p. 590)
• Women, Science, and Technology. Minor (p. 590)
• Aerospace Engineering. BS (p. 191)
• Applied Languages & Intercultural Studies. BS (p. 192)
• Applied Physics. BS (p. 204)
• Architecture. BS (p. 206)
• Biochemistry. BS (p. 208)
• Biology. BS (p. 214)
• Biomedical Engineering. BS (p. 217)
• Business Administration. BS (p. 219)
• Chemistry. BS (p. 234)
• Chemical and Biomolecular Engineering. BS (p. 232)
• Civil Engineering. BS (p. 244)
• Computational Media. BS (p. 247)
• Computer Engineering. BS (p. 270)
• Computer Science. BS (p. 272)
• Earth and Atmospheric Sciences. BS (p. 335)
• Economics. BS (p. 339)
• Economics and International Affairs. BS (p. 340)
• Electrical Engineering. BS (p. 341)
• Environmental Engineering. BS (p. 343)
• Global Economics and Modern Languages. BS (p. 346)
• History, Technology, and Society. BS (p. 356)
• Industrial Design. BS (p. 359)
• Industrial Engineering. BS (p. 360)
• International Affairs. BS (p. 374)
• International Affairs and Modern Languages. BS (p. 376)
• Literature, Media, and Communication. BS (p. 389)
• Mathematics. BS (p. 432)
• Materials Science and Engineering. BS (p. 424)
• Mechanical Engineering. BS (p. 439)
• Music Technology. BS (p. 459)
• Neuroscience. BS (http://www.catalog.gatech.edu/programs/neuroscience-bs)
• Nuclear and Radiological Engineering. BS (p. 464)
• Physics. BS (p. 471)
• Psychology. BS (p. 474)
• Public Policy. BS (p. 477)
• Aerospace Engineering. MS (p. 508)
• Analytics. MS (p. 509)
• Applied Systems Engineering. PMASE (p. 592)
• Architecture. M.Arch (p. 502), MS (p. 510)
• Bioengineering. MS (p. 512)
• Bioinformatics. MS (p. 512)
• Biomedical Engineering. MS (p. 513)
• Biology. MS (p. 513)
• Biomedical Innovation and Development. MBID (p. 503)
• Building Construction and Facility Management. MS (p. 513)
• Business Administration. MBA (p. 503).
• Business Administration - Global Business. MBA (p. 504).
• Business Administration - Management of Technology. MBA (p. 505).
• Chemical Engineering. MS (p. 515)
• Chemistry. MS (p. 515)
• City and Regional Planning. MCRP (http://catalog.gatech.edu/programs/mcrp)
• City and Regional Planning & Architecture. M.Arch/MCRP (http://catalog.gatech.edu/programs/march-mcrp-dual-degree)
• City and Regional Planning & Civil Engineering. MCRP/MSCE (http://catalog.gatech.edu/programs/mcrp-msce-dual-degree)
• City and Regional Planning & Public Policy. MCRP/MSPP (http://catalog.gatech.edu/programs/mcrp-public-policy-ms)
• City and Regional Planning & Law. MCRP/JD (http://catalog.gatech.edu/programs/planning-law-mcrp-jd)
• Civil Engineering. MS (p. 515)
• Computational Science and Engineering. MS (p. 516)
• Computer Science. MS (p. 516)
• Cybersecurity. MS (p. 521)
• Digital Media. MS (p. 522)
• Earth and Atmospheric Sciences. MS (p. 522)
• Economics. MS (p. 522)
• Electrical and Computer Engineering. MS (p. 523)
• Engineering Science and Mechanics. MS (p. 523)
• Environmental Engineering. MS (p. 523)
• Geographic Information Science and Technology. MS (p. 524)
• Health Systems. MS (p. 525)
• History and Sociology of Technology and Science. MS (p. 525)
• Human-Computer Interaction. MS (p. 526)
• Industrial Design. M.ID (p. 507)
• Industrial Engineering. MS (p. 529)
• International Affairs. MS (p. 530)
• International Logistics. MS (p. 530)
• Management. MS (p. 539)
• Materials Science and Engineering. MS (p. 531)
• Mathematics. MS (p. 531)
• Mechanical Engineering. MS (p. 532)
• Medical Physics. MS (p. 533)
• Manufacturing Leadership. PMML (p. 592)
• Music Technology. MS (p. 533)
• Nuclear Engineering. MS (p. 533)
• Operations Research. MS (p. 534)
• Occupational Safety and Health. PMOSH (p. 592)
• Physics. MS (p. 534)
• Psychology. MS (p. 535)
• Public Policy. MS (p. 535)
• Quantitative and Computational Finance. MS (p. 536)
• Real Estate Development. MRED (p. 507)
• Statistics. MS (p. 536)
• Supply Chain Engineering. MS (p. 537)
• Sustainable Electrical Energy. PMSEE (p. 593)
• Urban Design. MS (p. 538)
• Aerospace Engineering. PhD (p. 479)
• Algorithms, Combinatorics, and Optimization. PhD (p. 480)
• Applied Physiology. PhD (p. 480)
Georgia Institute of Technology offers three types of Certificates: 

**Undergraduate Embedded**

Undergraduate embedded certificates are intended to encourage students to use the elective course requirements in their degree program to form a coherent package of coursework in a specified area. Undergraduate embedded certificates will be granted only to students who, in addition to the undergraduate embedded certificate program requirements, have satisfied requirements for an undergraduate degree. The offering unit is responsible for verifying satisfaction of all undergraduate embedded certificate requirements, as well as completion of an undergraduate degree. Undergraduate embedded certificates are not recorded on the student's transcript or diploma. Arrangements must be made for awarding undergraduate embedded certificates within colleges or offering units. Undergraduate embedded certificates will not be awarded at the Institute level.

**Undergraduate Certificate Guidelines** (http://catalog.gatech.edu/policies/certificate-guidelines/undergraduate-certificate-guidelines)

**Graduate Embedded**

Graduate embedded certificates are intended to encourage students to use the elective course requirements in their degree program to form a coherent package of coursework in a specified area.

Graduate embedded certificates will be granted only to students who, in addition to the graduate embedded certificate program requirements, have satisfied requirements for an graduate degree. The offering unit is responsible for verifying satisfaction of all graduate embedded certificate requirements, as well as completion of an graduate degree. Graduate embedded certificates are not recorded on the student’s transcript or diploma. Arrangements must be made for awarding graduate embedded certificates within colleges or offering units. Graduate embedded certificates will not be awarded at the Institute level.

**Graduate Stand-Alone Certificate Guidelines**

**Graduate Stand-Alone** (p. 183)

Stand-alone certificates may be completed independent of students being enrolled as Master’s or Doctoral student. These certificates represent a cohesive program of study of a smaller size than a Master’s program and provide more flexibility to professionals for pursuing graduate education, including a means for professionals to renew and retrain due to a fast-changing work force. When completed, these certificates appear on the student’s academic record (transcript), and the student receives a certificate of completion.

**Graduate Stand-Alone Certificate Guidelines**

**Undergraduate Embedded Certificates**

- Architecture. PhD (p. 480)
- Bioengineering. PhD (p. 482)
- Bioinformatics. PhD (p. 482)
- Biology. PhD (p. 482)
- Biomedical Engineering. PhD (p. 483)
- Building Construction. PhD (p. 483)
- Chemical Engineering. PhD (p. 484)
- Chemistry. PhD (p. 484)
- City and Regional Planning. PhD (p. 484)
- Civil Engineering. PhD (p. 485)
- Computational Science and Engineering. PhD (p. 485)
- Computer Science. PhD (p. 486)
- Digital Media. PhD (p. 486)
- Earth and Atmospheric Sciences. PhD (p. 487)
- Economics. PhD (p. 487)
- Electrical and Computer Engineering. PhD (p. 488)
- Engineering Science and Mechanics. PhD (p. 488)
- Environmental Engineering. PhD (p. 488)
- History and Sociology of Technology and Science. PhD (p. 488)
- Human-Centered Computing. PhD (p. 489)
- Industrial Engineering. PhD (p. 499)
- International Affairs, Science, and Technology. PhD (p. 490)
- Machine Learning. PhD (p. 491)
- Materials Science and Engineering. PhD (p. 494)
- Mathematics. PhD (p. 494)
- Mechanical Engineering. PhD (p. 494)
- Music Technology. PhD (p. 494)
- Nuclear Engineering. PhD (p. 495)
- Ocean Science and Engineering. PhD (p. 495)
- Operations Research. PhD (p. 496)
- Physics. PhD (p. 496)
- Psychology. PhD (p. 500)
- Public Policy. PhD (p. 497)
- Public Policy Joint Degree with Georgia State University. PhD (p. 498)
- Quantitative Biosciences. PhD (p. 498)
- Robotics. PhD (p. 499)
- Analytics. MS (p. 510)
- Computer Science. MS (p. 520)
- Cybersecurity. MS (p. 521)
• Chinese. Undergraduate Certificate (http://www.catalog.gatech.edu/programs/undergraduate-embedded-certificate-chinese)
• Computation and Quantitative Biology. Undergraduate Certificate (http://catalog.gatech.edu/policies/certificate-guidelines/undergraduate-certificate-guidelines)
• Computational Design. Undergraduate Certificate (http://catalog.gatech.edu/policies/certificate-guidelines/undergraduate-certificate-guidelines)
• Construction Management. Undergraduate Certificate (http://www.catalog.gatech.edu/programs/undergraduate-embedded-certificate-construction-management)
• Economics. Undergraduate Certificate (http://catalog.gatech.edu/policies/certificate-guidelines/undergraduate-certificate-guidelines)
• Entrepreneurship. Undergraduate Certificate (http://www.catalog.gatech.edu/programs/undergraduate-embedded-certificate-entrepreneurship)
• Environmental Science. Undergraduate Certificate (http://www.catalog.gatech.edu/programs/undergraduate-embedded-certificate-environmental-science)
• European Affairs. Undergraduate Certificate (http://www.catalog.gatech.edu/programs/undergraduate-embedded-certificate-european-affairs)
• French. Undergraduate Certificate (http://www.catalog.gatech.edu/programs/undergraduate-embedded-certificate-french)
• German. Undergraduate Certificate (http://www.catalog.gatech.edu/programs/undergraduate-embedded-certificate-german)
• Information Technology Management. Undergraduate Certificate (http://www.catalog.gatech.edu/programs/undergraduate-embedded-certificate-information-technology-management)
• Integrative Biology. Undergraduate Certificate (http://www.catalog.gatech.edu/programs/undergraduate-embedded-certificate-integrative-biology)
• International Business. Undergraduate Certificate (http://www.catalog.gatech.edu/programs/undergraduate-embedded-certificate-international-business)
• Land Development. Undergraduate Certificate (http://catalog.gatech.edu/policies/certificate-guidelines/undergraduate-certificate-guidelines)
• Latin American Affairs. Undergraduate Certificate (http://www.catalog.gatech.edu/programs/undergraduate-embedded-certificate-latin-american-affairs)
• Leadership and Organizational Change. Undergraduate Certificate (http://www.catalog.gatech.edu/programs/undergraduate-embedded-certificate-leadership-organizational-change)
• Linguistics. Undergraduate Certificate (http://www.catalog.gatech.edu/programs/undergraduate-embedded-certificate-linguistics)
• Nuclear and Radiological Engineering. Undergraduate Certificate (http://www.catalog.gatech.edu/programs/undergraduate-embedded-certificate-nuclear-radiological-engineering)
• Philosophy. Undergraduate Certificate (http://www.catalog.gatech.edu/programs/undergraduate-embedded-certificate-philosophy)
• Pre-Law. Undergraduate Certificate (http://www.catalog.gatech.edu/programs/undergraduate-embedded-certificate-pre-law)
• Political Science. Undergraduate Certificate (http://www.catalog.gatech.edu/programs/undergraduate-embedded-certificate-political-science)
• Public Policy. Undergraduate Certificate (http://www.catalog.gatech.edu/programs/undergraduate-embedded-certificate-public-policy)
• Russian. Undergraduate Certificate (http://www.catalog.gatech.edu/programs/undergraduate-embedded-certificate-russian)
• Software Engineering. Undergraduate Certificate (http://catalog.gatech.edu/policies/certificate-guidelines/undergraduate-certificate-guidelines)
• Spanish. Undergraduate Certificate (http://www.catalog.gatech.edu/programs/undergraduate-embedded-certificate-spanish)
• Sustainable Architecture. Undergraduate Certificate (http://www.catalog.gatech.edu/programs/undergraduate-embedded-certificate-sustainable-architecture)

Graduate Embedded Certificates
• BioRobotics. Graduate Certificate (http://www.catalog.gatech.edu/programs/graduate-embedded-certificate-biorobotics)
• Geographic Information Systems. Graduate Certificate (http://www.catalog.gatech.edu/programs/graduate-embedded-certificate-geographic-information-systems)
• Micro Electro Mechanical Systems. Graduate Certificate (http://www.catalog.gatech.edu/programs/graduate-embedded-certificate-microelectro-mechanical-systems)
• Public Policy. Graduate Certificate (http://www.catalog.gatech.edu/programs/graduate-embedded-certificate-public-policy)
Graduate Stand-Alone Certificates

- Graduate Stand-Alone Certificate Guidelines (http://catalog.gatech.edu/policies/certificate-guidelines/graduate-certificate-guidelines)

Once graduate stand-alone certificate programs are approved by the Institute, they will be listed here.

Bachelor of Science in Computer Science - Thread: Intelligence & Media

The Threads™ represent partial paths through the curriculum. Thus, a student weaves a degree from these Threads. Students are not forced to make Thread decisions very early in their academic careers; however, they may if they want. We define the Threads so they are flexible enough to allow for a variety of technical and creative experiences. Threads are coherent enough that students develop computing skills even if their focus shifts as they go along.

The Media thread is where computing meets design. This thread prepares students by helping them to understand the technical and computational capabilities of systems in order to exploit their abilities to provide creative outlets.

The Intelligence thread is where computing models intelligence. This thread is concerned with computational models of intelligence from top to bottom. To this end, we emphasize designing and implementing artifacts that exhibit various levels of intelligence as well as understanding and modeling natural cognitive agents such as humans, ants, or bees. Students acquire the technical knowledge and skills necessary for expressing, specifying, understanding, creating, and exploiting computational models that represent cognitive processes. It prepares students for fields as diverse as artificial intelligence, machine learning, perception, and cognitive science, as well as for fields that benefit from applications of techniques from those fields.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>APPH 1040</td>
<td>Sci Foundation of Health</td>
<td>2</td>
</tr>
<tr>
<td>or APPH 10 Sci of Phys Act &amp; Health</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ENGL 1101</td>
<td>English Composition I</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 1102</td>
<td>English Composition II</td>
<td>3</td>
</tr>
<tr>
<td>MATH 1552</td>
<td>Integral Calculus</td>
<td>4</td>
</tr>
<tr>
<td>CS 1301</td>
<td>Intro to Computing ¹</td>
<td>3</td>
</tr>
<tr>
<td>or CS 1315</td>
<td>Intro Media Computation</td>
<td></td>
</tr>
<tr>
<td>Any HUM</td>
<td>(p. 93)</td>
<td>6</td>
</tr>
<tr>
<td>PHYS 2211</td>
<td>Intro Physics I ²</td>
<td>4</td>
</tr>
<tr>
<td>Lab Science ²</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>MATH 1551</td>
<td>Differential Calculus</td>
<td>2</td>
</tr>
<tr>
<td>MATH 1554</td>
<td>Linear Algebra ⁴</td>
<td>4</td>
</tr>
<tr>
<td>or MATH 1564</td>
<td>LinAlg w Abstract Vec Sp</td>
<td></td>
</tr>
<tr>
<td>MATH 1564</td>
<td>Linear Algebra ⁴</td>
<td>4</td>
</tr>
</tbody>
</table>

Select one of the following:

- HIST 2111 United States to 1877
- HIST 2112 United States since 1877
- INTA 1200 American Government
- POL 1101 Government of the U.S.
- PUBP 3000 US Constitutional Issues
- PSYC 1101 General Psychology
- Any SS (p. 97) 6

Core F - Courses Related to Major

Lab Science ²

- CS 1100 Freshman Leap Seminar 1
- CS 1331 Intro-Object Orient Prog ¹ 3
- CS 1332 Data Struct & Algorithms ¹ 3
- CS 2050 Intro Discrete Math CS ¹ 3
- or CS 2051 Honors Discrete Math CS
- MATH 2550 Intro Multivariable Calc ⁴ 2

Major Requirements

- CS 2340 Objects and Design ¹ 3
- CS 4001 Computing & Society ¹ 3
- or CS 4002 Robots and Society
- or CS 4726 Privacy Tech Policy Law
- or SLS 311Tech and Sustain Community

Junior Design Options (Capstone)

Junior Design Option ¹, ³ 6

Concentration

- CS 2110 Computer Organiz&Program ¹ 4
- CS 3451 Computer Graphics ¹ 3
- CS 3510 Dsgn&Analysis-Algorithms ¹ 3
- or CS 3511 Algorithms Honors
- CS 3600 Intro-Artificial Intell ¹ 3

Select one of the following for Computational Complexity ¹:

- CS 3240 Languages and Computation
- CS 4510 Automata and Complexity
- CS 3630 Intro-Perception&Robotic
- CS 3790 Intro-Cognitive Science
- PSYC 3040 Sensation & Perception

Select six credit hours of the following for Approaches to Intelligence ¹:

- CS 4635 Knowledge-Based AI
- CS 4476 Intro to Computer Vision
- CS 4641 Machine Learning
- CS 4646 Mach Learn for Trading
- CS 4649 Robot Intelli Planning
- CS 4650 Natural Language
- CS 4731 Game AI

Select six credit hours of the following for Media Technology ¹:

- CS 4455 Video Game Design
- CS 4460 Intro Info Visualization
- CS 4464 Computational Journalism
- CS 4475 Comp Photography
Bachelor of Science in Computer Science - Thread: Intelligence & Media

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 4480</td>
<td>Digital Video Special FX</td>
</tr>
<tr>
<td>CS 4496</td>
<td>Computer Animation</td>
</tr>
<tr>
<td>CS 4590</td>
<td>Computer Audio</td>
</tr>
<tr>
<td>MATH 3012</td>
<td>Applied Combinatorics</td>
</tr>
<tr>
<td>MATH 3215</td>
<td>Probability &amp; Statistics</td>
</tr>
<tr>
<td>MATH 3670</td>
<td>Statistics &amp; Applns</td>
</tr>
<tr>
<td>CEE 3770</td>
<td>Statistics &amp; Applications</td>
</tr>
<tr>
<td>ISYE 3770</td>
<td>Statistics &amp; Applications</td>
</tr>
<tr>
<td>ISYE 3311</td>
<td>Basic Statistical Meth</td>
</tr>
<tr>
<td>LMC 3431</td>
<td>Basic Statistical Meth</td>
</tr>
<tr>
<td>CS 3312</td>
<td>Computer Animation</td>
</tr>
<tr>
<td>CS 4980</td>
<td>Research Capstone Proj</td>
</tr>
</tbody>
</table>

Free Electives
- 14 credit hours

Total Credit Hours
- 126 credit hours

Pass-fail only allowed for Free Electives (max 6 credit hours), CS 1100, and CS 1171 (if required).

1. Minimum grade of C required.
2. Two of three lab sciences MUST be a sequence.
3. Junior Design Options are as follows (students must pick one option and may not change):
   - Option 1 - LMC 3432, LMC 3431, CS 3311, CS 3312.
   - Option 2 - ECE VIP courses and LMC 3403.
   - Option 3 - Satisfy Georgia Tech Research Option.
   - Option 4 - CS 2701 (3 hours), CS 4699-I2P (3 hours), LMC 3403 (3 hours) = 9 hours OR CS 4699-I2P (6 hours), LMC 3403 (3 hours) = 9 hours

Six credits of the Junior Design option are used as Major Requirements and the average credits of research/VIP (5 credit hours/2 credit hours) may be used as free electives. Students completing VIP for their junior design requirement will be required to complete at least three semesters of VIP. (VIP 1 + VIP 2 + VIP 3) (for a total of 5 credit hours) + LMC 3403 = 8 hours of VIP credit. Students using CREATE-X for junior design take at least 6 hours of CREATE-X Start-up Lab and Idea 2 Prototype (I2P) and 3 of the 6 hours must be I2P. Students take these 6 hours with LMC 3403 (3 hours) for a total of 9 hours. Extra three hours for CREATE-X option can be used in free electives.

4. Two credit hours of MATH 1554 may count along with MATH 2550 to give Area F 18 credit hours.

Cooperative Programs
The College of Computing participates in the undergraduate and graduate Cooperative Programs. See links below for further Information:

- Undergraduate Cooperative Plan (http://catalog.gatech.edu/academics/special-academic-programs/experiential-education/center-career-discovery-development)
- Graduate Cooperative Plan (http://catalog.gatech.edu/academics/special-academic-programs/experiential-education/graduate-cooperative-plan)

International Plan
The College of Computing (http://www.cc.gatech.edu) has an approved BS CS International Plan that accommodates the unique requirements of this option discussed in the International Plan section of the catalog (p. 86).

However, due to the flexible nature of the Threads curriculum, the International Plan designation may not be available with all of the Thread combinations. Efforts will be made to work with interested students to accommodate their individual circumstances with regard to the International Plan designator for the Bachelor of Science in Computer Science.

Research Option
To complete the Research Option in the College of Computing, students must:

1. Complete at least nine units of undergraduate research
   a. Over at least two, preferably three terms
   b. Research may be for either pay or credit;

2. Write an undergraduate thesis/report of research on their findings;

3. Take
   a. LMC 4701: Undergraduate Research Proposal Writing (taken during the first or second semester of research)
   b. LMC 4702: Undergraduate Research Thesis Writing (taken during the thesis writing semester).

Research Classes
The following classes count toward fulfillment of the Research Option:

Research for Credit

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 2699</td>
<td>Undergraduate Research (Freshman and Sophomore)</td>
<td>1-12</td>
</tr>
<tr>
<td>CS 4699</td>
<td>Undergraduate Research (Junior and Senior)</td>
<td>1-12</td>
</tr>
<tr>
<td>CS 4980</td>
<td>Research Capstone Proj</td>
<td>1-21</td>
</tr>
</tbody>
</table>

Research for Pay (Audit only)

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 2698</td>
<td>Research Assistantship (Freshman and Sophomore)</td>
<td>1-12</td>
</tr>
<tr>
<td>CS 4698</td>
<td>Research Assistantship (Junior and Senior)</td>
<td>1-12</td>
</tr>
</tbody>
</table>

To get credit toward completion of the Research Option for research for pay, students must be registered for the appropriate audit-only, research for pay class (CS 2698 or 4698). If work on research for pay begins after the close of registration and the student has not signed up for the appropriate class, unfortunately it is not possible to get credit toward the Research Option for work that term.

A research project will also fulfill the capstone design requirement if the student registers for CS 4980 for one of the research terms. This is typically done the last semester of research, while taking LMC 4702.

Completion of the Research Option is noted on the student's transcript. For more information, see www.urop.gatech.edu (http://www.urop.gatech.edu).
BS/MS in Computer Science

Students who want to pursue

the BS/MS option must apply to the MSCS program after completing at least 60 hours of work towards the BSCS degree. Applicants should have a cumulative GPA of at least 3.4. This GPA must be maintained for the student to take graduate level courses.

Students admitted to the program will take 6 hours during their final undergraduate year to double count in both their BSCS and MSCS degrees; they should choose 3 hours of MS Core or Elective hours their fall semester and 3 hours of MS Core or Elective hours their spring semester that can count toward their thread hours and CS Specialization hours.

Visit College of Computing (https://www.cc.gatech.edu) for more information.

Bachelor of Science in Physics - Astrophysics

The School of Physics offers two undergraduate degrees, the Bachelor of Science in Physics and the Bachelor of Science in Applied Physics. The basis of the Bachelor of Science in Physics degree is the traditional preparation of a student for graduate study in physics.

Each of the baccalaureate programs contains the following:

1. courses needed to meet general institutional degree requirements;
2. a core of technical courses intended to give a strong background in mathematics and the physical principles of mechanics, electricity and magnetism, thermodynamics, and the quantum theory that governs physical phenomena at the microscopic level of molecules, atoms, and nuclei;
3. technical electives that enable the student to explore areas of his or her choice in greater depth;
4. courses involving undergraduate research, and
5. free electives, about fifteen percent of the total hours, which may be employed to schedule additional technical or nontechnical courses.

The considerable flexibility inherent in the physics curricula is advantageous to students who wish to work out individual programs of study. At the same time, this flexibility suggests the need for consultation with advisors so students can make the best use of elective hours and avoid scheduling difficulties that may arise in later semesters. Students may utilize their elective freedom in the physics curricula to specialize in particular areas of physics, to prepare for careers in interdisciplinary areas of science, to compose a preprofessional program, or to gain a background in other technical or nontechnical disciplines. Students should contact their academic advisor for assistance in planning programs of study with emphasis directed toward a particular objective. Since some students who earn a degree in physics have transferred from other disciplines, the School has planned its degree programs to enable most students to transfer into physics with little or no loss of credit.

A total of 120 credit hours (exclusive of wellness) and a grade-point average of at least 2.0 in physics courses numbered 3000 and higher are requisites for the bachelor’s degree in physics.

BS/MS in Computer Science

Students who want to pursue

the BS/MS option must apply to the MSCS program after completing at least 60 hours of work towards the BSCS degree. Applicants should have a cumulative GPA of at least 3.4. This GPA must be maintained for the student to take graduate level courses.

Students admitted to the program will take 6 hours during their final undergraduate year to double count in both their BSCS and MSCS degrees; they should choose 3 hours of MS Core or Elective hours their fall semester and 3 hours of MS Core or Elective hours their spring semester that can count toward their thread hours and CS Specialization hours.

Visit College of Computing (https://www.cc.gatech.edu) for more information.

Bachelor of Science in Physics - Astrophysics

The School of Physics offers two undergraduate degrees, the Bachelor of Science in Physics and the Bachelor of Science in Applied Physics. The basis of the Bachelor of Science in Physics degree is the traditional preparation of a student for graduate study in physics.

Each of the baccalaureate programs contains the following:

1. courses needed to meet general institutional degree requirements;
2. a core of technical courses intended to give a strong background in mathematics and the physical principles of mechanics, electricity and magnetism, thermodynamics, and the quantum theory that governs physical phenomena at the microscopic level of molecules, atoms, and nuclei;
3. technical electives that enable the student to explore areas of his or her choice in greater depth;
4. courses involving undergraduate research, and
5. free electives, about fifteen percent of the total hours, which may be employed to schedule additional technical or nontechnical courses.

The considerable flexibility inherent in the physics curricula is advantageous to students who wish to work out individual programs of study. At the same time, this flexibility suggests the need for consultation with advisors so students can make the best use of elective hours and avoid scheduling difficulties that may arise in later semesters. Students may utilize their elective freedom in the physics curricula to specialize in particular areas of physics, to prepare for careers in interdisciplinary areas of science, to compose a preprofessional program, or to gain a background in other technical or nontechnical disciplines. Students should contact their academic advisor for assistance in planning programs of study with emphasis directed toward a particular objective. Since some students who earn a degree in physics have transferred from other disciplines, the School has planned its degree programs to enable most students to transfer into physics with little or no loss of credit.

A total of 120 credit hours (exclusive of wellness) and a grade-point average of at least 2.0 in physics courses numbered 3000 and higher are requisites for the bachelor’s degree in physics.
Choose one of the following:  

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS 4147</td>
<td>Relativity</td>
<td>6</td>
</tr>
<tr>
<td>PHYS 4247</td>
<td>Cosmology</td>
<td></td>
</tr>
<tr>
<td>PHYS 4347</td>
<td>Fund of Astrophysics</td>
<td></td>
</tr>
<tr>
<td>PHYS 4263</td>
<td>Nuclei,Particles &amp; Fields</td>
<td></td>
</tr>
<tr>
<td>Physics Electives 2,3</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Free Electives</td>
<td>19</td>
<td></td>
</tr>
<tr>
<td>Total Credit Hours</td>
<td>122</td>
<td></td>
</tr>
</tbody>
</table>

Student must have 2.0 in all PHYS classes 3000-level or higher

1. If PHYS 2231 is taken, extra hour goes toward Free Electives
2. Any PHYS course or BIOL 4478, CHEM 3411, CHEM 3412, CHEM 3511, EAS 2750, EAS 4300, EAS 4430, ECE 4501, MATH 2106, MATH 3215, MATH 3235, MATH 4320, MATH 4347 MATH 4348, MATH 4581, NRE 3301, NRE 4610
3. Minimum of one class in PHYS 3211, PHYS 3226, PHYS 4322
4. If PHYS 2232 is taken, extra hour goes toward Free Electives

### Research Option in Physics

The Research Option is intended for students who seek a concentrated research experience, culminating in an undergraduate thesis, integrated into their undergraduate studies in Physics. The purpose of this program is to prepare students who plan to go on to graduate research after their BS degree. This option includes three or four semesters of focused research in the student's junior and senior years. Students who complete this option receive a designation on their transcript. For an undergraduate to fulfill the Research Option in the School of Physics, the student must fulfill the following requirements:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS 4698</td>
<td>Research Assistantship 1</td>
<td>9</td>
</tr>
<tr>
<td>or PHYS 4699</td>
<td>Undergraduate Research</td>
<td></td>
</tr>
<tr>
<td>LMC 4701</td>
<td>US Rsch Proposal Writing 2</td>
<td>1</td>
</tr>
<tr>
<td>LMC 4702</td>
<td>US Rsch Thesis Writing 3</td>
<td>1</td>
</tr>
<tr>
<td>Research Thesis 4</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>Total Credit Hours</td>
<td>122</td>
<td></td>
</tr>
</tbody>
</table>

1. At least three credits must be PHYS 4699.
2. LMC 4701: Undergraduate Research Proposal Writing - typically taken during the first or second semester of research.
3. LMC 4702: Undergraduate Research Thesis Writing - taken during the term in which the thesis is completed.
4. Write and submit an undergraduate research thesis to the School of Physics based on the student’s research that is approved by the student’s research advisor.

Course requirements are detailed in brochures available from the School of Physics. For specific questions, students should contact the Associate Chair for Undergraduate Studies in the School of Physics.

### BS/MS Chemical and Biomolecular Engineering

The program seeks to engage undergraduate students at Georgia Tech who indicate an interest in, and ability for, additional education beyond the BS degree. Students with significant AP credit will be especially well positioned to take full advantage of this opportunity.

Students in the BS/MS Program will remain undergraduates until they meet the requirements for the BS degree; after which, their status will change to graduate student.

Students are eligible to apply for the program after completion of thirty semester credit hours at Georgia Tech (i.e., at the end of freshman year). As a practical matter, it is recommended that students apply to the program immediately after completion of CHBE 3110. Students must have a Georgia Tech GPA of 3.5 or higher for admission into the program.

Admission into the program will be based on academic performance at Georgia Tech, as well as the potential for advanced study and/or research as assessed from the essay and recommendation letter.

Continuation in the program will require the student to maintain a GPA of 3.0 or higher. This GPA requirement should not deter students from taking challenging courses. The program will not penalize students who opt out after receiving the BS degree. Additionally, students participating in the program will be eligible for the six credit-hour Graduate Course Option (http://www.catalog.gatech.edu/academics/graduate/masters-degrees/graduate-course-option).

Additional Information (http://www.chbe.gatech.edu/programs/bs-ms)

- Bachelor of Science in Chemical and Biomolecular Engineering (p. 232)
- Graduate Course Option (p. 77)

The following list outlines the requirements for the Master of Science in Chemical and Biomolecular Engineering.

#### Required Courses

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHBE 6XXX</td>
<td>Chemical Engineering Elective</td>
<td>3</td>
</tr>
<tr>
<td>CHBE 6100</td>
<td>Adv CHE Thermodynamics</td>
<td>3</td>
</tr>
<tr>
<td>CHBE 6200</td>
<td>Transport Phenomena</td>
<td>3</td>
</tr>
<tr>
<td>CHBE 6260</td>
<td>Mass Transfer</td>
<td>3</td>
</tr>
<tr>
<td>CHBE 6300</td>
<td>Kinetics &amp; Reactor Dsgn</td>
<td>3</td>
</tr>
<tr>
<td>CHBE 6500</td>
<td>Math Model-Chem Process</td>
<td>3</td>
</tr>
<tr>
<td>Elective</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Select one of the following:</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>CHBE 7000</td>
<td>Master's Thesis</td>
<td></td>
</tr>
<tr>
<td>Other Electives</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Credit Hours</td>
<td>30</td>
<td></td>
</tr>
</tbody>
</table>

### BS/MS Electrical and Computer Engineering

This program allows highly qualified students to receive the Bachelor of Science in either Electrical Engineering or Computer Engineering and a master’s degree in Electrical and Computer Engineering. The joint BS/MS degree program affords undergraduate electrical or computer engineering
majors the opportunity to broaden their studies and improve their career prospects.

Eligible Georgia Tech undergraduates normally apply for this program during their junior year. Contact the Electrical and Computer Engineering Graduate Affairs Office for program information, eligibility requirements, and applications.

BS/MS Information (5 Year) (http://www.ece.gatech.edu/academic/grad/bsms_prog)

BS/MS in Computational Media and Digital Media

Students who want to pursue the five-year BS/MS combination in CM and DM must apply to the school of LMC after completing at least 75 hours of work towards the CM degree. Applicants should have a cumulative GPA of at least 3.5. This GPA must be maintained for the student to take graduate level courses. Students must start the program in the Fall to be on track with other MS students.

Students admitted to the program will take a total of twelve credit hours of graduate course work during their final undergraduate year; six credit hours of that work, in DM courses, will count towards two 4000 level LMC courses (6 hours) and will count for both undergraduate and graduate credit. During the summer term after their fourth year, students will participate in an approved internship program. During their fifth year, students will take a total of 24 credit hours, including either LMC 6800 or LMC 7000, and with no more than three courses taken outside of the DM program.

Students admitted to the program will take a total of twelve credit hours of graduate course work during their final undergraduate year; six credit hours of that work, in DM courses, will count towards two 4000 level LMC courses (6 hours) and will count for both undergraduate and graduate credit. During the summer term after their fourth year, students will participate in an approved internship program. During their fifth year, students will take a total of 24 credit hours, including either LMC 6800 or LMC 7000, and with no more than three courses taken outside of the DM program.

BS/MS in Earth and Atmospheric Sciences

EAS offers a BS/MS Program. EAS majors may apply to the BS/MS program after completing at least thirty semester credit hours at Georgia Tech with a GPA of at least 3.5.

Students admitted to the program must maintain a cumulative GPA of at least 3.0.

As part of the program, students may use up to 6 credit hours of graduate-level coursework in the major discipline for both degrees.

To apply, complete the BS/MS application form, a biographical statement, and two letters of recommendation.

EAS Undergraduate Information (http://www.eas.gatech.edu/academics/5Year_BSMS)

BS/MS in Environmental Engineering

The joint BS/MS program is designed to attract the best-of-the-best undergraduate students and is especially intended for students who demonstrate an interest in and ability for, additional education beyond the bachelor’s degree.

Students will be eligible to apply for the program after completion of 30 semester credit hours at Georgia Tech and appropriate progress in their degree program. As a practical matter, students should apply for the program at least three semesters prior to graduation in order to take graduate-level courses prior to receiving their BS degree. Students must have a Georgia Tech GPA of 3.5 or higher for admission into the BS/MS Program in Environmental Engineering.

This program is available only to those completing a Bachelor’s degree with majors of Civil Engineering or Environmental Engineering.

The key components of this program are intense interaction among students and faculty, including mentoring and undergraduate research, and careful advising and course planning to enable students to begin challenging coursework in their fourth year of study.

Students in the joint BS/MS program remain undergraduates until they meet the requirements for the bachelor's degree, at which point they will receive the BSEnvE degree. Their status will then be changed to graduate status. Graduate school application fees and the GRE requirements are waived.

Once admitted, a GPA of at least 3.0 must be maintained to remain in the program. Additionally, students in the BS/MS program are eligible to use the Graduate Course Option (http://catalog.gatech.edu/academics/graduate/masters-degrees/graduate-course-option) even if their cumulative grade-point average is below 3.5 at the time they complete their bachelor’s degree.

BS/MS in International Affairs

The Sam Nunn School of International Affairs offers a BS/MS program for students enrolled in the International Affairs undergraduate program who demonstrate an interest in and ability for additional education beyond the BS degree.

Students in the BS/MS program will remain undergraduates until they meet requirements for the undergraduate degree, at which point they will receive their BS degree and be changed to graduate status. Students will be eligible to apply for the program after completion of 45 semester credit hours at Georgia Tech (i.e., at the end of their third semester), and if they show appropriate progress in their degree program thereafter. Any student in good standing in the BS INTA program is eligible to apply to the program. Admissions decisions will be based on GPA and judgments of the faculty who have served as advisors or instructors. Continuation in the program will require the student to maintain a GPA of 3.5 or higher in Ivan Allen College courses. The program will not penalize students who opt out after the bachelor’s degree. Students participating in this program will be eligible for the six semester credit-hour Graduate Course Option, which allows students completing both the bachelor’s and master’s in the same discipline to use up to 6 credit hours of graduate-level coursework in the major discipline for both degrees.

The Graduate-level Credits Required in the BS/MS Program are usually as follows:

<table>
<thead>
<tr>
<th>Core</th>
<th>15</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electives</td>
<td>21</td>
</tr>
<tr>
<td>Total Credit Hours</td>
<td>36</td>
</tr>
</tbody>
</table>

Specific Requirements for the Program

| INTA 6202 | Comparative Politics | 3 |
| INTA 6302 | Intl Political Economy | 3 |
| INTA 6003 | Empirical Research Meth | 3 |
| INTA 6102 | Intl Relations Theory | 3 |
| INTA 6103 | International Security | 3 |
### MS Track and Free Electives

<table>
<thead>
<tr>
<th>Total Credit Hours</th>
<th>36</th>
</tr>
</thead>
</table>

Contact the BS/MS program director for further information.
http://www.inta.gatech.edu/current-students/graduate/5yrbsms

INTA Undergraduate Information (http://www.inta.gatech.edu)

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## BS/MS in Literature, Media, and Communication / Digital Media

Students who wish to pursue the BS/MS combination in LMC and DM must apply to the School after completing at least seventy-five credit hours of work toward an LMC degree that includes the Interaction Design thread. Applicants should have a 3.5 GPA.

Students admitted to the program will select the LMC 4400 seminar option and take a total of twelve credit hours of graduate coursework during their final undergraduate year. Six credit hours of that work, in DM media courses, will replace the STAC free electives and will count for both undergraduate and graduate credit. During the summer term after their fourth year, students will participate in an approved internship program. During the fifth year, students will take a total of twenty-four credit hours, including either LMC 6800 (Project) or LMC 7000 (Thesis), and with no more than three courses taken outside the DM program.

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### BS/MS in Materials Science and Engineering

The School of Materials Science and Engineering (MSE) offers a BS/MS program for outstanding students who want to obtain a graduate degree in addition to their BS degree. The advanced degree provides the additional knowledge and specialization needed to further facilitate a technical career. As a participant in this program, students have an opportunity to work with individual faculty members on projects in one of the traditional or innovative research areas in MSE. See www.mse.gatech.edu (http://www.mse.gatech.edu) for more details.

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### BS/MS in Mechanical Engineering

The Woodruff School offers a BS/MS program for those students who demonstrate an interest in and ability for additional education beyond the BS degree. Woodruff School students with a GPA of 3.5 or higher are eligible to apply for the program after completion of 30 credit hours at Georgia Tech, but before the completion of seventy-five credit hours, including transfer and advanced placement credits. Students who have more than 75 credit hours will be considered for the program on a case-by-case basis.

Participants in the BS/MS Program in the Woodruff School can obtain a master’s degree in mechanical engineering, nuclear engineering, medical physics, or in Georgia Tech’s interdisciplinary bioengineering graduate program. There are two options to consider:

#### Non-Thesis Option

The Non-Thesis Option is completed by taking 10 classes according to the MS degree requirements. In many cases, two courses can be counted towards both a student’s BS and MS degrees, thereby streamlining the process. With proper planning, most MS non-thesis degrees could be completed in one year.

#### Thesis Option

The Thesis Option involves working with a faculty member on a project in a wide range of research topics being investigated by Woodruff School faculty members. This will give you hands-on experience in working with a faculty mentor; the opportunity to work in a laboratory or a research environment; and the chance to perform theoretical and experimental work. These events will foster your career interests and expand your selection of possible employers. In some cases, a student will receive a graduate research assistantship, which includes a stipend and a tuition waiver. The time to graduation depends on your thesis project, your advisor, and your work ethic.

During the first year of your graduate studies, you will be encouraged to continue for the PhD In many cases, you might be working on an interesting topic of study as part of your master’s degree research that could provide the basis for doctoral research.

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BS/MS Information (https://www.me.gatech.edu/undergraduate/bsms)
BS/MS in Public Policy

The School of Public Policy offers a BS/MS program for students enrolled in the undergraduate program who demonstrate an interest in and ability for additional education beyond the BS degree.

Students in the BS/MS program remain undergraduates until they meet requirements for the undergraduate degree, at which point they receive their BS degree and change to graduate status. Students are eligible to apply for the program after completion of 30 semester credit hours at Georgia Tech (i.e., at the end of their first year), and if they show appropriate progress in their degree program thereafter. Admissions decisions will be based on GPA and judgments of the faculty who have served as advisors or instructors. Continuation in the program requires the student to maintain a GPA of 3.0 or higher in public policy courses.

Students participating in this program will be eligible for the six semester credit-hour Graduate Course Option, which allows students completing both the bachelor’s and master’s in the same discipline to use up to 6 credit hours of graduate-level coursework in the major discipline for both degrees.

The graduate-level credits required in the BS/MS Program are usually as follows:

<table>
<thead>
<tr>
<th>Core</th>
<th>22</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electives</td>
<td>12</td>
</tr>
<tr>
<td>Research Paper</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total Credit Hours</strong></td>
<td>37</td>
</tr>
</tbody>
</table>

**Specific Requirements for the Program**

**Required Courses**

- PUBP 6001 Intro to Public Policy 1
- PUBP 6010 Ethic,Epistem&Public Pol 3
- PUBP 6112 Research Dsgn-Policy Sci 3
- PUBP 3130 Research Methods 3
- PUBP 6114 Applied Policy Methods 3
- PUBP 6116 Microecon-Policy Analy 3
- PUBP 6118 Public Finance & Policy 3
- PUBP 6210 3
- Select one of the following: 3
  - PUBP 6014 Organization Theory
  - PUBP 6017 Public Management
  - PUBP 6018 Policy Implement & Admin

**Concentration**

Concentration 2 6

| **Total Credit Hours** | 31 |

Contact the BS PP program director for further information.

BS/MS Information (http://spp.gatech.edu/graduate-programs/five-year-bsms-program)

**Bachelor of Business Administration**

**- Strategy and Innovation**

Students with a broad interest in business and management activities and operating problems would profit from the Bachelor of Science in Business Administration degree program. The program builds upon knowledge of the functional, environmental, behavioral, and legal aspects of business and provides analytical and conceptual tools for analyzing complicated problems. It prepares the student for business and managerial responsibilities and decision making. The large number of elective hours allows the student to tailor a program to his or her individual educational objectives. Students must complete a concentration of electives in one of the following areas:

- Accounting
- Finance
- General Management
- Information Technology Management
- Leadership and Organizational Change
- Marketing
- Operations and Supply Chain Management
- Strategy and Innovation

The new BS Business Administration degree replaces the BS Management degree previously offered by the College of Business. Starting summer 2011, all new freshmen and transfer students will be admitted to the B.S. Business Administration (BSBA) degree as the B.S. Management (BSM) degree will no longer be offered to new students. Current Tech students who submit change of major forms to join the College of Business after January 17, 2011 will have the BSBA degree, as the BSM degree will no longer be available to new change of major students. Current BSM students can change their majors to BSBA, but are not required to change majors.

**Change of Major Policy**

The College of Business requires a 2.3 cumulative GPA for any non-College of Business students requesting a change of major to Business Administration if the student has completed sixty credits (junior standing) or more. There is no GPA requirement for freshmen and sophomores (less than sixty credits) requesting a major change. This policy was approved by the College of Business faculty in April 2007.

All students seeking a major change to Business Administration must attend a “change of major” meeting. Contact the College of Business Undergraduate Program Office (http://mgt.gatech.edu/programs/undergraduate) for dates and times of upcoming meetings.

Current Georgia Tech students who submit change of major forms to join the College of Business after January 17, 2011 will have the BS Business Administration degree, as the BS Management degree will no longer be available to new change of major students. Students who submit change of major forms before January 17, 2011 will have the BS Management degree. BS Management students may choose to stay in the BS degree or may change into the BSBA degree. Once a student changes majors to BSBA, he or she cannot return to the BSM degree.

The BSBA and BSM degrees have different degree requirements. Students joining the BSBA degree must complete all BSBA degree requirements, including one of the newly approved management concentrations and several other courses not currently required of all BSM students. Current BSM students MUST attend a change of major meeting to change their majors to BSBA so they understand the requirements of the new degree which are different than the BSM requirements.

Current BSM students who decide to continue pursuing the BSM degree should review previous Georgia Tech catalogs and the College of Business website to see the BSM requirements.

Contact the BS PP program director for further information.

BS/MS Information (http://spp.gatech.edu/graduate-programs/five-year-bsms-program)
<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>190</td>
<td>Bachelor of Business Administration - Strategy and Innovation</td>
<td></td>
</tr>
</tbody>
</table>

**Wellness**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit</th>
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</thead>
<tbody>
<tr>
<td>APPH 1040</td>
<td>Sci Foundation of Health</td>
<td>2</td>
</tr>
<tr>
<td>or APPH 1050</td>
<td>Sci of Phys Act &amp; Health</td>
<td></td>
</tr>
</tbody>
</table>

**Core A - Essential Skills**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGL 1101</td>
<td>English Composition I</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 1102</td>
<td>English Composition II</td>
<td>3</td>
</tr>
<tr>
<td>MATH 1552</td>
<td>Integral Calculus</td>
<td>4</td>
</tr>
<tr>
<td>or MATH 1712</td>
<td>Survey of Calculus</td>
<td></td>
</tr>
</tbody>
</table>

**Core B - Institutional Options**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 1301</td>
<td>Intro to Computing</td>
<td>3</td>
</tr>
<tr>
<td>or CS 1315</td>
<td>Intro Media Computation</td>
<td></td>
</tr>
</tbody>
</table>

**Core C - Humanities**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any HUM</td>
<td>(p. 93)</td>
<td>6</td>
</tr>
</tbody>
</table>

**Core D - Science, Math, & Technology**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lab Science</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>MATH 1551</td>
<td>Differential Calculus</td>
<td>4</td>
</tr>
<tr>
<td>&amp; MATH 1553</td>
<td>and Intro to Linear Algebra</td>
<td></td>
</tr>
<tr>
<td>or MATH 1712</td>
<td>Finite Mathematics</td>
<td></td>
</tr>
</tbody>
</table>

**Core E - Social Sciences**

Select one of the following:

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<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIST 2111</td>
<td>United States to 1877</td>
<td>3</td>
</tr>
<tr>
<td>HIST 2112</td>
<td>United States since 1877</td>
<td></td>
</tr>
<tr>
<td>INTA 1200</td>
<td>American Government</td>
<td></td>
</tr>
<tr>
<td>POL 1101</td>
<td>Government of the U.S.</td>
<td></td>
</tr>
<tr>
<td>PUBP 3000</td>
<td>US Constitutional Issues</td>
<td></td>
</tr>
<tr>
<td>ECON 2105</td>
<td>Prin of Macroeconomics</td>
<td>3</td>
</tr>
<tr>
<td>ECON 2106</td>
<td>Prin of Microeconomics</td>
<td>3</td>
</tr>
<tr>
<td>Any SS (p. 97)</td>
<td></td>
<td>3</td>
</tr>
</tbody>
</table>

**Core F - Courses Related to Major**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACCT 2101</td>
<td>Accounting I</td>
<td>3</td>
</tr>
<tr>
<td>ACCT 2102</td>
<td>Accounting II</td>
<td>3</td>
</tr>
<tr>
<td>MGT 2106</td>
<td>Legal Aspects-Business</td>
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<tr>
<td>MGT 2200</td>
<td>Information Technology</td>
<td>3</td>
</tr>
<tr>
<td>MGT 2250</td>
<td>Management Statistics</td>
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<tr>
<td>MGT 2255</td>
<td>Quant. Anlys. for Bus.</td>
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**Major Requirements**

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<tr>
<td>LMC 3403</td>
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<tr>
<td>MGT 3062</td>
<td>Financial Management</td>
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<tr>
<td>MGT 3101</td>
<td>Organizational Behavior</td>
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</tr>
<tr>
<td>MGT 3102</td>
<td>Mgt Hum Res-Reg Environ</td>
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<tr>
<td>MGT 3300</td>
<td>Marketing Management I</td>
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<tr>
<td>MGT 3501</td>
<td>Operations Management</td>
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<tr>
<td>MGT 3599</td>
<td>Career Develmt Workshop</td>
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<tr>
<td>MGT 3660</td>
<td>International Business</td>
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<tr>
<td>MGT 3659</td>
<td>Foundations of Strategy</td>
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**Strategy and Innovation Concentration**

Group A (all courses required): 1, 3

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<tr>
<td>MGT 3664</td>
<td>Corporate Strategy</td>
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<tr>
<td>MGT 4196</td>
<td>Strategy Consulting Prac</td>
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**Concentration electives:** 1, 2

Group B: 5

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<tr>
<td>MGT 3661</td>
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<tr>
<td>MGT 3662</td>
<td>Mgt In Healthcare Sector</td>
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<tr>
<td>MGT 3663</td>
<td>Technology Strategy</td>
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<tr>
<td>MGT 4803</td>
<td>Behavioral Economics</td>
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<tr>
<td>MGT 4803</td>
<td>Global Strategy</td>
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<tr>
<td>MGT 4803</td>
<td>IP Strategy</td>
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<tr>
<td>MGT 4803</td>
<td>Managerial Economics and Strategic Behavior</td>
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<tr>
<td>MGT 4803</td>
<td>Strategic Entrepreneurship</td>
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Group C:

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<tr>
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<tr>
<td>MGT 3743</td>
<td>Emerging Technologies</td>
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<tr>
<td>MGT 3744</td>
<td>Mangn Prod Serv Tech Dev</td>
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<tr>
<td>MGT 4050</td>
<td>Business Analytics</td>
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<td>MGT 4072</td>
<td>Entrepreneurial Finance</td>
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<tr>
<td>MGT 4341</td>
<td>Mgt Healthcare Operations</td>
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<tr>
<td>MGT 4670</td>
<td>Entrepreneurship</td>
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<tr>
<td>MGT 4803</td>
<td>Sustainable Business Practicum</td>
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<tr>
<td>MGT 4803</td>
<td>Innovation Tournaments for Sustainability</td>
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**Non-MGT Electives**

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<td>MGT 4803</td>
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**Free Electives**

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<tbody>
<tr>
<td>Free Electives</td>
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</table>

**Total Credit Hours**

|          |                                            | 122    |

1. C-minimum required.
2. Students must select one of two options: (1) they may select 9 credit hours of coursework from Group B or (2) select 6 credit hours of coursework from Group B and 3 credit hours of coursework from Group C.
3. Any courses except for MGT or ACCT.
4. Maximum 3 credits of internship; Maximum 9 credits of undergraduate research; Maximum 3 credits of Special Problems/Independent Study.
5. Other advisor approved MGT 4803 courses offered by the Strategy & Innovation Faculty.

**International Plan**

The International Plan (http://www.internationalplan.gatech.edu) degree option is available to all College of Business undergraduate students. This option has been specifically designed to increase the international competence of our students through foreign language instruction, selected international courses, overseas residential experience, and a capstone, culminating course. This international competence is characterized by a graduate's ability to communicate in a second world language, discuss substantively the major international socioeconomic processes, assimilate into foreign lifestyles and work environments, and communicate with confidence the specifics of management and business in a global context. Given the ever-increasing pace of globalization of business, this option should help students prepare for the business world of the future. All College of Business students should
achieve the following objectives:
The undergraduate aerospace engineering degree program is designed to provide each student with a general background for employment in industry or government, or advanced study in graduate school at the end of four years. The program stresses the analytical, experimental, and design aspects of aerospace engineering. A certain degree of specialization is available to undergraduate students through the proper choice of Options and through a choice of air- or space-focused tracks. In addition, opportunities for undergraduate research and team competition courses are available, depending on the student’s abilities and career objectives. Courses do not have to be taken during the specific semester indicated in the curriculum, but all prerequisites must be satisfied for each course. Advisement is encouraged before registration, with each student assigned a faculty advisor who remains the same for the full undergraduate program, unless the student requests a change. Students should consult with academic advisors for the availability of courses and recommended course sequences.

Educational Objectives
The undergraduate aerospace engineering degree program is designed to achieve the following objectives:

- Our graduates will be technically proficient and effective leaders and entrepreneurs. They will display high professional and ethical standards in aerospace engineering and related fields, and within industry, academia, and government.
- Our graduates will create new knowledge and engineering practices that develop products and services that have a global impact. They will collaborate with international partners and engage in culturally diverse teams.
- Our graduates will be life-long learners, continually developing their leadership, critical thinking, and problem-solving skills. They will be actively engaged in the acquisition and advancement of knowledge and technical expertise through research and development, and through active participation in professional societies, graduate studies, conferences, and symposia.
- Our graduates will transfer the knowledge gained from their aerospace engineering degrees to new fields that intersect with aerospace engineering such as robotics, medicine, and clean energy. They will use their degrees as a launching point for careers in other professional fields such as law, medicine, and public service.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>ENGL 1101</td>
<td>English Composition I</td>
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</tr>
<tr>
<td>MATH 1552</td>
<td>Integral Calculus</td>
<td>4</td>
</tr>
<tr>
<td>Core B - Institutional Options</td>
<td></td>
<td></td>
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<tr>
<td>CS 1371</td>
<td>Computing for Engineers</td>
<td>3</td>
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<tr>
<td>Core C - Humanities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Any HUM  (p. 93)</td>
<td>6</td>
<td></td>
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<tr>
<td>Core D - Science, Math, &amp; Technology</td>
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<tr>
<td>PHYS 2211</td>
<td>Intro Physics 1</td>
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<tr>
<td>PHYS 2212</td>
<td>Intro Physics II</td>
<td>4</td>
</tr>
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<td>MATH 1551</td>
<td>Differential Calculus</td>
<td>2</td>
</tr>
<tr>
<td>MATH 1553</td>
<td>Intro to Linear Algebra</td>
<td>2</td>
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<tr>
<td>Core E - Social Sciences</td>
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<td>Select one of the following:</td>
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<tr>
<td>HIST 2111</td>
<td>United States to 1877</td>
<td></td>
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<tr>
<td>HIST 2112</td>
<td>United States since 1877</td>
<td></td>
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<td>INTA 1200</td>
<td>American Government</td>
<td></td>
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<tr>
<td>POL 1101</td>
<td>Government of the U.S.</td>
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<td>PUBP 3000</td>
<td>US Constitutional Issues</td>
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<tr>
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<tr>
<td>ECON 2101</td>
<td>The Global Economy</td>
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<td>ECON 2105</td>
<td>Prin of Macroeconomics</td>
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<tr>
<td>ECON 2106</td>
<td>Prin of Microeconomics</td>
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<tr>
<td>Any SS (p. 97)</td>
<td>6</td>
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<tr>
<td>Core F - Courses Related to Major</td>
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<tr>
<td>MATH 2551</td>
<td>Multivariable Calculus</td>
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<tr>
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<td>Differential Equations</td>
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<td>MSE 2001</td>
<td>Prin&amp;App-lngr Materials</td>
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<td>CHEM 1310</td>
<td>General Chemistry</td>
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<tr>
<td>AE 1601</td>
<td>Introduction to AE</td>
<td>1</td>
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<td>COE 2001</td>
<td>Statics</td>
<td>2</td>
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<td>AE 2220</td>
<td>Dynamics</td>
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<td>COE 3001</td>
<td>Deformable Bodies</td>
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<td>AE 2610</td>
<td>Intro Exper Methods AE</td>
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<td>AE 2611</td>
<td>Technical Comm for AE</td>
<td>1</td>
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<tr>
<td>AE 3330</td>
<td>Intro AE Vehicle Perform</td>
<td>3</td>
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<tr>
<td>AE 3030</td>
<td>Aerodynamics</td>
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<tr>
<td>AE 3140</td>
<td>Structural Analysis</td>
<td>3</td>
</tr>
<tr>
<td>AE 3340</td>
<td>Design&amp;System Eng Method</td>
<td>2</td>
</tr>
<tr>
<td>AE 3530</td>
<td>Sys Dynamics&amp;Vibration</td>
<td>3</td>
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<tr>
<td>AE 3531</td>
<td>Ctrl Sys Analysis&amp;Design</td>
<td>3</td>
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<tr>
<td>AE 3610</td>
<td>Exper Fluids&amp;Solid Mech</td>
<td>2</td>
</tr>
<tr>
<td>AE 4531</td>
<td>Aircraft Flight Dynamics</td>
<td>3</td>
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<tr>
<td>or AE 4532</td>
<td>Spacecraft Flight Dynam</td>
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<tr>
<td>AE 4451</td>
<td>Jet &amp; Rocket Propulsion</td>
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<tr>
<td>AE 4341</td>
<td>Aircraft Design</td>
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<tr>
<td>or AE 4342</td>
<td>Space System Design</td>
<td></td>
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<tr>
<td>or AE 4343</td>
<td>Rotorcraft Design</td>
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<tr>
<td>AE 4610</td>
<td>Dynamics &amp; Control Lab</td>
<td>2</td>
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<td>AE Options 4</td>
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</table>
The School of Aerospace Engineering offers the "Research Option" under the BSAE degree program. In order to graduate with a BSAE (RO) degree, the students must complete at least nine units of undergraduate research (over at least two, preferably three terms). Research may be for either pay (AE 2698 or AE 4698) or credit (AE 2699 or AE 4699). Research for credit may be used towards the BSAE free elective requirements.

• Complete at least nine units of undergraduate research (over at least two, preferably three terms). Research may be for either pay (AE 2698 or AE 4698) or credit (AE 2699 or AE 4699). Research for credit may be used towards the BSAE free elective requirements.

• Write an undergraduate thesis/report of research on their findings. This is usually done during the graduating term.

• Take both LMC 4701 (typically taken during the first or second semester of research) and LMC 4702: (taken during the thesis-writing semester).

At least six of the nine required credit hours of research should be on the same topic. A research proposal must be approved by a faculty advisor and one other faculty member. This proposal will be written in LMC 4701 which serves as a prerequisite for LMC 4702. Completion of Research Option is noted on the student's transcript.

For additional details, please contact:

Lakshmi Sankar
Daurette Joseph

**BS/MS Honors Program**

A combined BS/MS honors program is also offered that prepares students for graduate studies and research. Please see http://ae.gatech.edu/bs-ms-honors-program for more information.

**Bachelor of Science in Applied Languages & Intercultural Studies**

The School of Modern Languages offers a Bachelor of Science degree in Applied Languages and Intercultural Studies, with separate language concentrations in Chinese, French, German, Japanese, Russian, and Spanish. The ALIS degree program delivers foreign language study in the many contexts in which other languages are spoken (including social and technical communication, cultural perspectives, industry, arts and literature, media and science) that will provide students with the competitive edge needed to meet 21st century language requirements of the global marketplace. Since this degree couples language and cultural development with studies in another discipline at Georgia Tech, graduates are expected to join the workforce in many different camps: international trade, management, operations and logistics, journalism, advertising and publicity, local and national government, not-for-profit entities, medicine, media, virtual world development, website design, among others. Students in this program take 33 credit hours of advanced language study in the areas of Societies and Cultures, Industry and Technology, Arts and Media, and Advanced Language Acquisition. In addition, students must complete a 15 credit hour concentration in an approved cluster or minor program. A total of 12 credit hours in the language or cluster areas must be completed abroad.

**Degree Information**

http://www.modlangs.gatech.edu/degrees

• Bachelor of Science in Applied Languages and Intercultural Studies - Chinese (p. 193)

• Bachelor of Science in Applied Languages and Intercultural Studies - French (p. 194)
The School of Modern Languages offers a Bachelor of Science degree in Applied Languages and Intercultural Studies, with separate language concentrations in Chinese, French, German, Japanese, Russian, and Spanish. The ALIS degree program delivers foreign language study in the many contexts in which other languages are spoken (including social and technical communication, cultural perspectives, industry, arts and literature, media and science) that will provide students with the competitive edge needed to meet 21st century language requirements of the global marketplace. Since this degree couples language and cultural development with studies in another discipline at Georgia Tech, graduates are expected to join the workforce in many different camps: international trade, management, operations and logistics, journalism, advertising and publicity, local and national government, not-for-profit entities, medicine, media, virtual world development, website design, among others. Students in this program take 33 credit hours of advanced language study in the areas of Societies and Cultures, Industry and Technology, Arts and Media, and Advanced Language Acquisition. In addition, students must complete a 15 credit hour concentration in an approved cluster or minor program. A total of 12 credit hours in the language or cluster areas must be completed abroad.

Degree Information [http://www.modlangs.gatech.edu/degrees]

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<thead>
<tr>
<th>Code</th>
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<th>Credit Hours</th>
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<td>2</td>
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<tr>
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<td>or APPH 10 Sci of Phys Act &amp; Health</td>
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<td>ENGL 1101</td>
<td>English Composition I</td>
<td>3</td>
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<td>ENGL 1102</td>
<td>English Composition II</td>
<td>3</td>
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<tr>
<td>MATH 1712</td>
<td>Survey of Calculus</td>
<td>4</td>
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<tr>
<td></td>
<td>or MATH 151 Integral Calculus</td>
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<tr>
<td>CS 1301</td>
<td>Intro to Computing</td>
<td>3</td>
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<tr>
<td></td>
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<tr>
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<td>(p. 93)</td>
<td>6</td>
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<tr>
<td>Lab Science</td>
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<tr>
<td>Lab Science</td>
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**Core E - Social Sciences**

Select one of the following:
- HIST 2111 United States to 1877
- HIST 2112 United States since 1877
- INTA 1200 American Government
- POL 1101 Government of the U.S.
- PUBP 3000 US Constitutional Issues

Any SS (p. 97)

**Core F - Courses Related to Major**

- Tech Requirement 7
- Approved Cluster 1

**ALIS Major Requirements**

Select one of the following:
- CHIN 3021 Chin Society & Culture I
- CHIN 3022 Chin Society & Culture II
- CHIN 3691 Chinese Current Events
- CHIN 3693 Conversation Practicum
- CHIN 4021 Adv Lang Music & Culture
- CHIN 4031 Chin-Language Cinema
- CHIN 4813 Special Topics
- CHIN 4901 Special Problems
- CHIN 4902 Special Problems
- CHIN 3692 Business Chinese 3
- or CHIN 3699 Conversation Practicum
- or CHIN 4699 Chinese Internship

Select one of the following:
- CHIN 3021 Chin Society & Culture I
- CHIN 3022 Chin Society & Culture II
- CHIN 3813 Special Topics
- CHIN 4003 Advanced Chinese II
- CHIN 4004 Advanced Chinese III
- CHIN 4021 Adv Lang Music & Culture
- CHIN 4031 Chin-Language Cinema
- CHIN 4699 Undergraduate Research
- CHIN 4813 Special Topics
- CHIN 4901 Special Problems
- CHIN 4902 Special Problems

Select two of the following:
- CHIN 3003 Intermediate Chinese III
- CHIN 3004 Advanced Chinese I
- CHIN 3021 Chin Society & Culture I
- CHIN 3022 Chin Society & Culture II
- CHIN 3691 Chinese Current Events
- CHIN 3692 Business Chinese
- CHIN 3693 Conversation Practicum
- CHIN 3813 Special Topics
- CHIN 4003 Advanced Chinese II
- CHIN 4004 Advanced Chinese III
- CHIN 4006 Intercultural Communication

- Bachelor of Science in Applied Languages and Intercultural Studies - German (p. 196)
- Bachelor of Science in Applied Languages and Intercultural Studies - Japanese (p. 198)
- Bachelor of Science in Applied Languages and Intercultural Studies - Russian (p. 199)
- Bachelor of Science in Applied Languages and Intercultural Studies - Spanish (p. 201)
### International Plan

The degree requirements for the Applied Languages and Intercultural Studies (Chinese, French, German, Japanese, Russian, and Spanish) - International Plan (ALIS-IP) are basically the same as for the ALIS degree, except that students are required to spend two terms abroad and then achieve Intermediate High (for Chinese, Japanese, and Russian: Intermediate Low) on the standardized ACTFL testing scale during an oral interview. The costs of the test will be paid for by the School of Modern Languages for each student. The terms abroad must total a minimum of twenty-six weeks; typically these consist of one semester of study plus a twenty-six-week building; typically these consist of one semester of study plus a twenty-six-week project abroad. Only one summer semester abroad will count in this total. ALIS-IP majors are strongly encouraged to enroll in the Language for Business and Technology (LBAT) intensive summer programs offered by the School of Modern Languages.

In addition to gaining advanced global competence, the International Plan designation will set ALIS majors apart from other applicants with recruitment from top companies and governmental agencies. Other required courses include the following, which can easily be obtained within the regular required curriculum offerings of Modern Languages (these requirements can also be met with courses taken abroad, upon consultation with ALIS degree advisors):

1. One course (p. 86) focused on international relations historically and theoretically, including topics such as:
   a. the role of state sovereignty and nationalism and non-state actors in the international system;
   b. international conflict, peace, security, intervention, and nation-building;
   c. international organizations, law, and ethics; and
   d. transnational problems of the environment, terrorism, health, and migration; among other issues.

2. One course (p. 86) that provides a historical and theoretical understanding of the global economy, including topics such as international trade, finance, investment, and production; regional economic integration (such as the EU); economic development and modernization; and questions of natural resource sustainability.

3. One course (p. 86) that provides familiarity with an area of the world or a country that allows them to make systematic comparisons with their own society and culture. A culminating course, occurring either at the end of or after the international experience that integrates knowledge of the discipline and the international experience in a global context. (satisfied by the CHIN 4500/FREN 4500/GRMN 4500/JAPN 4500/ RUSS 4500/SPAN 4500 course)

### Degree Information

Bachelor of Science in Applied Languages and Intercultural Studies - French

The School of Modern Languages offers a Bachelor of Science degree in Applied Languages and Intercultural Studies, with separate language concentrations in Chinese, French, German, Japanese, Russian, and Spanish. The ALIS degree program delivers foreign language study in the many contexts in which other languages are spoken (including social and technical communication, cultural perspectives, industry, arts and literature, media and science) that will provide students with the competitive edge needed to meet 21st century language requirements of the global marketplace. Since this degree couples language and cultural development with studies in another discipline at Georgia Tech, graduates are expected to join the workforce in many different camps: international trade, management, operations and logistics, journalism, advertising and publicity, local and national government, not-for-profit entities, medicine, media, virtual world development, website design, among others. Students in this program take 33 credit hours of advanced language study in the areas of Societies and Cultures, Industry and Technology, Arts and Media, and Advanced Language Acquisition. In addition, students must complete a 15 credit hour concentration in an approved cluster or minor program. A total of 12 credit hours in the language or cluster areas must be completed abroad.

Degree Information (http://www.modlangs.gatech.edu/degrees)

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<tr>
<td>MATH 1712</td>
<td>Survey of Calculus</td>
<td>4</td>
</tr>
<tr>
<td>or MATH 15</td>
<td>Integral Calculus</td>
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</tr>
<tr>
<td>CS 1301</td>
<td>Intro to Computing</td>
<td>3</td>
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<tr>
<td>or CS 1315</td>
<td>Intro Media Computation</td>
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</table>
or CS 1371 Computing for Engineers

Core C - Humanities
Any HUM (p. 93) 6

Core D - Science, Math, & Technology
Lab Science 4
Lab Science 4
MATH 1711 Finite Mathematics 4
or MATH 1551 & MATH 1553 Differential Calculus & Intro to Linear Algebra

Core E - Social Sciences
Select one of the following: 3
HIST 2111 United States to 1877
HIST 2112 United States since 1877
INTA 1200 American Government
POL 1101 Government of the U.S.
PUBP 3000 US Constitutional Issues
Any SS (p. 97) 9

Core F - Courses Related to Major
Tech Requirement 7 3
Approved Cluster 1 15

ALIS Major Requirements
Select one of the following: 2 3
FREN 3011 France Today I
FREN 3012 France Today II
FREN 3014 Intro To Contemp France
FREN 3015 Social Identities French
FREN 3017 Paris: Modernity Today
FREN 3061 Adv Business French I
FREN 3062 Adv Business French II
FREN 3500 Field Work Abroad
FREN 3691 French LBAT I
FREN 3692 French LBAT II
FREN 3693 French LBAT III
FREN 3694 LBAT French Sem Abroad
FREN 3813 Special Topics
FREN 4001 French Stylistics
FREN 4003 Francophone Lit I
FREN 4004 Francophone Lit II
FREN 4101 Francophone Africa
FREN 4102 Francophone Lit II
FREN 4103 Francophone Lit II
FREN 4104 Francophone Africa
FREN 4500 Intercultural Seminar
FREN 4699 Undergraduate Research
FREN 4901 Special Problems
FREN 4902 Special Problems
Select one of the following: 4 3
FREN 3110 Comics & Graphic Arts
FREN 3813 Special Topics
FREN 4011 French Art
FREN 4013 Literature & Visual Arts
FREN 4101 Francophone Lit I
FREN 4102 Francophone Lit II
FREN 4241 French Cinema I
FREN 4242 French Cinema II
FREN 4699 Undergraduate Research
FREN 4901 Special Problems
FREN 4902 Special Problems
Select one of the following: 5 6
FREN 3030 French Phonetics
FREN 3040 Reading and Translation
FREN 3121 Advanced Composition
FREN 3813 Special Topics
FREN 4001 French Stylistics
FREN 4699 Undergraduate Research
FREN 4901 Special Problems
FREN 4902 Special Problems
FREN 4500 Intercultural Seminar 3
ML Electives 6 15

Free Electives
Free Electives 26
Total Credit Hours 122

1 Designed for coursework toward certificates, minors, additional degrees, or study-abroad programs. Please consult with advisor on course selection.
2 Courses related to Societies/Cultures thread
3 Courses related to Industry/Technology thread
4 Courses related to Arts/Media thread
5 Courses related to Advanced Language Acquisition thread
6 Must be FREN 3000/4000 level course
International Plan

The degree requirements for the Applied Languages and Intercultural Studies (Chinese, French, German, Japanese, Russian, and Spanish) - International Plan (ALIS - IP) are basically the same as for the ALIS degree, except that students are required to complete at least 2 terms abroad and then achieve Intermediate High (for Chinese, Japanese, and Russian: Intermediate Low) on the standardized ACTFL testing scale during an oral interview. The costs of the test will be paid for by the School of Modern Languages for each student. The terms abroad must total a minimum of twenty-six weeks; typically these consist of one semester of study plus a significant amount of time spent with a research or work project abroad. Only one summer semester abroad will count in this total. ALIS-IP majors are strongly encouraged to enroll in the Language for Business and Technology (LBAT) intensive summer programs offered by the School of Modern Languages.

In addition to gaining advanced global competence, the International Plan designation will set ALIS majors apart from other applicants with recruiters from top companies and governmental agencies. Other required courses include the following, which can easily be obtained within the regular required curriculum offerings of Modern Languages (these requirements can also be met with courses taken abroad, upon consultation with ALIS degree advisors):

1. One course (p. 86) focused on international relations historically and theoretically, including topics such as:
   a. the role of state sovereignty and nationalism and non-state actors in the international system;
   b. international conflict, peace, security, intervention, and nation-building;
   c. international organizations, law, and ethics; and
   d. transnational problems of the environment, terrorism, health, and migration; among other issues.

2. One course (p. 86) that provides a historical and theoretical understanding of the global economy, including topics such as international trade, finance, investment, and production; regional economic integration (such as the EU); economic development and modernization; and questions of natural resource sustainability.

3. One course (p. 86) that provides familiarity with an area of the world or a country that allows them to make systematic comparisons with their own society and culture. A culminating course, occurring either at the end of or after the international experience that integrates knowledge of the discipline and the international experience in a global context. (satisfied by the CHIN 4500/FREN 4500/GRMN 4500/JAPN 4500/RUSS 4500/SPAN 4500 course)

Degree Information (http://www.modlangs.gatech.edu/degrees)

Bachelor of Science in Applied Languages and Intercultural Studies - German

The School of Modern Languages offers a Bachelor of Science degree in Applied Languages and Intercultural Studies, with separate language concentrations in Chinese, French, German, Japanese, Russian, and Spanish. The ALIS degree program delivers foreign language study in the many contexts in which other languages are spoken (including social and technical communication, cultural perspectives, industry, arts and literature, media and science) that will provide students with the competitive edge needed to meet 21st century language requirements of the global marketplace. Since this degree couples language and cultural development with studies in another discipline at Georgia Tech, graduates are expected to join the workforce in many different camps: international trade, management, operations and logistics, journalism, advertising and publicity, local and national government, not-for-profit entities, medicine, media, virtual world development, website design, among others. Students in this program take 33 credit hours of advanced language study in the areas of Societies and Cultures, Industry and Technology, Arts and Media, and Advanced Language Acquisition. In addition, students must complete a 15 credit hour concentration in an approved cluster or minor program. A total of 12 credit hours in the language or cluster areas must be completed abroad.

Degree Information (http://www.modlangs.gatech.edu/degrees)

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<td>PUBP</td>
<td>US Constitutional Issues</td>
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### ALIS Major Requirements

Select one of the following:  
- GRMN 301C Intro-German Literature
- GRMN 3011 Germany Today
- GRMN 303C Crossing Borders Lit/Cul
- GRMN 3110TV & Electronic Culture
- GRMN 369E Current Issues
- GRMN 3697 Communication & Culture
- GRMN 381J Special Topics
- GRMN 3901 Special Problems
- GRMN 401C Perspectives Grmn Media
- GRMN 4012 German Identity
- GRMN 402J Select Readings-Ger Lit
- GRMN 4024 Ger Film and Literature
- GRMN 402E German Culture & Film
- GRMN 4026 German Post-Wall Cinema
- GRMN 406E European Union
- GRMN 4120 Advanced Language Acquisition thread
- GRMN 4500 Intercultural Seminar

Select two of the following:  
- GRMN 401C Intro-German Literature
- GRMN 402E German Culture & Film
- GRMN 402G German Post-Wall Cinema
- GRMN 402H Advanced Stylistics
- GRMN 4061 Adv Business German I
- GRMN 4126 Advanced Stylistics

### Free Electives

Free Electives: 15

### Total Credit Hours

Total Credit Hours: 122

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2. Courses related to Societies/Cultures thread
3. Courses related to Industry/Technology thread
4. Courses related to Arts/Media thread
5. Courses related to Advanced Language Acquisition thread
6. Must be GRMN 3000/4000 level course
7. AE 1770, ARCH 4220, BC 3630, BMED 2400, CEE 1770, CHEM 1315, CP 4510, CS 1301, CS 1315, CS 1316, CS 1331, CS 1332, CS 4235, EAS 4430, EAS 4610, ECE 2030, ID 3103, ID 4103, LMC 3402, LMC 3410, ME 1770, ME 2016, MGT 2200, MGT 4051, MGT 4058, MGT 4052, MUSI 4630, PHYS 3266

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### International Plan

The degree requirements for the Applied Languages and Intercultural Studies (Chinese, French, German, Japanese, Russian, and Spanish) - International Plan (ALIS - IP) are basically the same as for the ALIS degree, except that students are required to spend two terms abroad and then achieve Intermediate High (for Chinese, Japanese, and Russian: Intermediate Low) on the standardized ACTFL testing scale during an oral interview. The costs of the test will be paid for by the School of Modern Languages for each student. The terms abroad must total a minimum of twenty-six weeks; typically these consist of one semester of study plus a
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3. One course (p. 86) that provides familiarity with an area of the world or a country that allows them to make systematic comparisons with their own society and culture. A culminating course, occurring either at the end of or after the international experience that integrates knowledge of the discipline and the international experience in a global context. (satisfied by the CHIN 4500/FREN 4500/GRMN 4500/JAPN 4500/RUSS 4500/SPAN 4500 course)

Degree Information (http://www.modlangs.gatech.edu/degrees)

Bachelor of Science in Applied Languages and Intercultural Studies - Japanese

The School of Modern Languages offers a Bachelor of Science degree in Applied Languages and Intercultural Studies, with separate language concentrations in Chinese, French, German, Japanese, Russian, and Spanish. The ALIS degree program delivers foreign language study in the many contexts in which other languages are spoken (including social and technical communication, cultural perspectives, industry, arts and literature, media and science) that will provide students with the competitive edge needed to meet 21st century language requirements of the global marketplace. Since this degree couples language and cultural development with studies in another discipline at Georgia Tech, graduates are expected to join the workforce in many different camps: international trade, management, operations and logistics, journalism, advertising and publicity, local and national government, not-for-profit entities, medicine, media, virtual world development, website design, among others. Students in this program take 33 credit hours of advanced language study in the areas of Societies and Cultures, Industry and Technology, Arts and Media, and Advanced Language Acquisition. In addition, students must complete a 15 credit hour concentration in an approved cluster or minor program. A total of 12 credit hours in the language or cluster areas must be completed abroad.

Degree Information (http://www.modlangs.gatech.edu/degrees)
International Plan

The degree requirements for the Applied Languages and Intercultural Studies (Chinese, French, German, Japanese, Russian, and Spanish) - International Plan (ALIS-IP) are basically the same as for the ALIS degree, except that students are required to spend two terms abroad and then achieve Intermediate High (for Chinese, Japanese, and Russian: Intermediate Low) on the standardized ACTFL testing scale during an oral interview. The costs of the test will be paid for by the School of Modern Languages for each student. The terms abroad must total a minimum of twenty-six weeks; typically these consist of one semester of study plus a significant amount of time spent with a research or work project abroad. Only one summer semester abroad will count in this total. ALIS-IP majors are strongly encouraged to enroll in the Language for Business and Technology (LBAT) intensive summer programs offered by the School of Modern Languages.

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Degree Information (http://www.modlangs.gatech.edu/degrees)

Bachelor of Science in Applied Languages and Intercultural Studies - Russian

The School of Modern Languages offers a Bachelor of Science degree in Applied Languages and Intercultural Studies, with separate language concentrations in Chinese, French, German, Japanese, Russian, and Spanish. The ALIS degree program delivers foreign language study in the many contexts in which other languages are spoken (including social and technical communication, cultural perspectives, industry, arts
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Degree Information (http://www.modlangs.gatech.edu/degrees)

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<td>RUSS 4695</td>
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RUSS 4500 Intercultural Seminar 3
ML Electives 6 15

Free Electives
Free Electives 26
Total Credit Hours 122

1 Designed for coursework toward certificates, minors, additional degrees, or study-abroad programs. Please consult with advisor on course selection.
2 Courses related to Societies/Cultures thread
3 Courses related to Industry/Technology thread
4 Courses related to Arts/Media thread
5 Courses related to Advanced Language Acquisition thread
6 Must be RUSS 3000/4000 level course
7 AE 1770, ARCH 4220, BC 3630, BMED 2400, CEE 1770, CHEM 1315, CP 4510, CS 1301, CS 1315, CS 1316, CS 1331, CS 1332, CS 4235, EAS 4430, EAS 4610, ECE 2030, ID 3103, ID 4103, LMC 3402, LMC 3410, ME 1770, ME 2016, MGT 2200, MGT 4051, MGT 4058, MGT 4052, MUSI 4630, PHYS 3266
8 Students may also take MATH 1551 and MATH 1554 or MATH 1551 and MATH 1554

International Plan

The degree requirements for the Applied Languages and Intercultural Studies (Chinese, French, German, Japanese, Russian, and Spanish) - International Plan (ALIS - IP) are basically the same as for the ALIS degree, except that students are required to spend two terms abroad and then achieve Intermediate High (for Chinese, Japanese, and Russian: Intermediate Low) on the standardized ACTFL testing scale during an oral interview. The costs of the test will be paid for by the School of Modern Languages for each student. The terms abroad must total a minimum of
Bachelor of Science in Applied Languages and Intercultural Studies - Spanish

The School of Modern Languages offers a Bachelor of Science degree in Applied Languages and Intercultural Studies, with separate language concentrations in Chinese, French, German, Japanese, Russian, and Spanish. The ALIS degree program delivers foreign language study in the many contexts in which other languages are spoken (including social and technical communication, cultural perspectives, industry, arts and literature, media and science) that will provide students with the competitive edge needed to meet 21st century language requirements of the global marketplace. Since this degree couples language and cultural development with studies in another discipline at Georgia Tech, graduates are expected to join the workforce in many different camps: international trade, management, operations and logistics, journalism, advertising and publicity, local and national government, not-for-profit entities, medicine, media, virtual world development, website design, among others. Students in this program take 33 credit hours of advanced language study in the areas of Societies and Cultures, Industry and Technology, Arts and Media, and Advanced Language Acquisition. In addition, students must complete a 15 credit hour concentration in an approved cluster or minor program. A total of 12 credit hours in the language or cluster areas must be completed abroad.

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<td>SPAN 3102</td>
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<td>Composition I</td>
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**Free Electives**

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<tr>
<td>ML Electives</td>
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</table>

Total Credit Hours 122

1. Designed for coursework toward certificates, minors, additional degrees, or study-abroad programs. Please consult with advisor on course selection.
2. Courses related to Societies/Cultures thread
3. Courses related to Industry/Technology thread
4. Courses related to Arts/Media thread
5. Courses related to Advanced Language Acquisition thread
6. Must be SPAN 3000/4000 level course
Bachelor of Science in Applied Mathematics - General

**Wellness**

<table>
<thead>
<tr>
<th>Course</th>
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<th>Credits</th>
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**Core A - Essential Skills**

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<td>ENGL 1102</td>
<td>English Composition II</td>
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<tr>
<td>MATH 1552</td>
<td>Integral Calculus</td>
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**Core B - Institutional Options**

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**Core C - Humanities**

Select one of the following:

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<td>3</td>
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<tr>
<td>HIST 2112</td>
<td>United States since 1877</td>
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<td>INTA 1200</td>
<td>American Government</td>
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<td>POL 1101</td>
<td>Government of the U.S.</td>
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<td>PUBP 3000</td>
<td>US Constitutional Issues</td>
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**Core D - Science, Math, & Technology**

<table>
<thead>
<tr>
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<tr>
<td>PHYS 2211</td>
<td>Intro Physics I</td>
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<tr>
<td>PHYS 2212</td>
<td>Intro Physics II</td>
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<tr>
<td>MATH 1551</td>
<td>Differential Calculus</td>
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<td>MATH 1553</td>
<td>Intro to Linear Algebra</td>
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**Upper-Level MATH**

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<td>MATH 3215</td>
<td>Probability &amp; Statistics</td>
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<td>MATH 4107</td>
<td>Abstract Algebra I</td>
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<td>MATH 4317</td>
<td>Analysis I</td>
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<td>MATH 4318</td>
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**MATH Electives**

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**Engineering or Science Electives**

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<th>Credits</th>
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<td>3000-level or higher BIOL, CHEM, EAS, PHYS, PSYC, ECON, CS, AE, BMED, CEE, CHBE, ECE, ISYE, MSE, ME</td>
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<td>PHYS 3000-level or higher</td>
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**Free Electives**

<table>
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<tbody>
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<td>Free Electives</td>
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</table>

Total Credit Hours 122

Pass-fail only allowed for Free Electives.

1. If PHYS 2231 is taken, extra hour goes toward Free Electives
2. MATH 3670 is not allowed. At most one of MATH 3406 and MATH 4305 are allowed.
3. Minimum grade of C required.
Bachelor of Science in Applied Physics

The School of Physics offers two undergraduate degrees, the Bachelor of Science in Physics and the Bachelor of Science in Applied Physics.

The degree program in applied physics may be better suited for entry into industry or government upon graduation, preparation for further professional training (medicine, law, dentistry, or business), or preparation for graduate study in some other discipline. The applied physics program differs from the traditional one in that a few courses intended primarily as preparation for graduate study in physics are replaced by courses oriented toward the applications of physics.

Each of the baccalaureate programs contains the following: a) courses needed to meet general institutional degree requirements; b) a core of technical courses intended to give a strong background in mathematics and the physical principles of mechanics, electricity and magnetism, thermodynamics, and the quantum theory that governs physical phenomena at the microscopic level of molecules, atoms, and nuclei; c) technical electives that enable the student to explore areas of his or her choice in greater depth; d) courses involving undergraduate research, and e) free electives, about fifteen percent of the total hours, which may be employed to schedule additional technical or nontechnical courses.

The considerable flexibility inherent in the physics curricula is advantageous to students who wish to work out individual programs of study. At the same time, this flexibility suggests the need for consultation with advisors so students can make the best use of elective hours and avoid scheduling difficulties that may arise in later semesters. Students may utilize their elective freedom in the physics curricula to specialize in particular areas of physics, to prepare for careers in interdisciplinary areas of science, to compose a preprofessional program, or to gain a background in other technical or nontechnical disciplines. Students should contact their academic advisor for assistance in planning programs of study with emphasis directed toward a particular objective.

Since some students who earn a degree in physics have transferred from other disciplines, the School has planned its degree programs to enable most students to transfer into physics with little or no loss of credit.

A total of 120 credit hours (exclusive of wellness) and a grade-point average of at least 2.0 in physics courses numbered 3000 and higher are requisites for the bachelor’s degree in physics.

Physics: Undergraduate Information (http://www.physics.gatech.edu/content/undergraduate-program)

Undergraduate Admissions (http://www.admission.gatech.edu)

• Bachelor of Science in Applied Physics - General (p. 205)
• Bachelor of Science in Applied Physics - Business Option (p. 204)

Bachelor of Science in Applied Physics - Business Option

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Wellness

Core A - Essential Skills

Core B - Institutional Options
The School of Physics offers two undergraduate degrees, the Bachelor of Science in Physics and the Bachelor of Science in Applied Physics. The degree program in applied physics may be better suited for entry into industry or government upon graduation, preparation for further professional training (medicine, law, dentistry, or business), or preparation for graduate study in some other discipline. The applied physics program differs from the traditional one in that a few courses intended primarily as preparation for graduate study in physics are replaced by courses oriented toward the applications of physics.

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The considerable flexibility inherent in the physics curricula is employed to schedule additional technical or nontechnical courses.

### Bachelor of Science in Applied Physics - General

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<td>MGT 3078</td>
<td>Finance &amp; Investments</td>
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<td>Marketing Management I</td>
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<td>MGT 3660</td>
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<td>MGT 4026</td>
<td>Fin Report &amp; Analysis I</td>
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<td>MGT 4193</td>
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**Total Credit Hours**: 122

Student must have 2.0 in all PHYS classes 3000-level or higher

Pass-fail only allowed for Free Electives, Humanities, and Social Sciences.

1. If PHYS 2231 is taken, extra hour goes toward Free Electives
2. BIOL 4478, CHEM 3411, CHEM 3412, CHEM 3511, EAS 2750, EAS 4300, EAS 4430, ECE 4501, MATH 2106 MATH 3215, MATH 3235, MATH 4320, MATH 4347, MATH 4348, MATH 4581, NRE 3301, NRE 4610
3. Minimum of one class in PHYS 3211, PHYS 3226, PHYS 4322
4. Maximum of six credit hours below 3000-level
5. Maximum of nine credit hours PHYS 2699 or PHYS 4699
with advisors so students can make the best use of elective hours and avoid scheduling difficulties that may arise in later semesters. Students may utilize their elective freedom in the physics curricula to specialize in particular areas of physics, to prepare for careers in interdisciplinary areas of science, to compose a preprofessional program, or to gain a background in other technical or nontechnical disciplines. Students should contact their academic advisor for assistance in planning programs of study with emphasis directed toward a particular objective.

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<tr>
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<td>or APPH 10</td>
<td>Sci of Phys Act &amp; Health</td>
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<td><strong>Core A - Essential Skills</strong></td>
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<td>English Composition II</td>
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<td>MATH 1552</td>
<td>Integral Calculus</td>
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<td><strong>Core B - Institutional Options</strong></td>
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<td>CS 1301</td>
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<td><strong>Core C - Humanities</strong></td>
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<td><strong>Core D - Science, Math, &amp; Technology</strong></td>
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<td>PHYS 2212</td>
<td>Intro Physics II</td>
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<td>MATH 1553</td>
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<td>or MATH 1561</td>
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</tr>
<tr>
<td>or MATH 1562</td>
<td>LinearAlg w Abstract Vec Sp</td>
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<td><strong>Core E - Social Sciences</strong></td>
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<td>HIST 2112</td>
<td>United States since 1877</td>
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<td>POL 1101</td>
<td>Government of the U.S.</td>
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<td>PUBP 3000</td>
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<td><strong>Core F - Courses Related to Major</strong></td>
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<td>PHYS 2213</td>
<td>Intro to Modern Physics</td>
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<td>PHYS 3201</td>
<td>Classical Mechanics I</td>
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<td>PHYS 3122</td>
<td>Electro &amp; Magnetostatics</td>
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<td>PHYS 3123</td>
<td>Electrodynamics</td>
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<td>PHYS 3141</td>
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<td>PHYS 3143</td>
<td>Quantum Mechanics I</td>
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<td>PHYS 3266</td>
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<td>PHYS 4206</td>
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<td>PHYS 4321</td>
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<td>PHYS 4601</td>
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<td>PHYS 4602</td>
<td>Senior Seminar II</td>
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<td>Any PHYS or Technical Electives</td>
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<td><strong>Free Electives</strong></td>
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<td>Free Electives</td>
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</table>

Student must have 2.0 in all PHYS classes 3000-level or higher

Pass-fail only allowed for Free Electives, Humanities, and Social Sciences.

1 If PHYS 2231 is taken, extra hour goes toward Free Electives
2 BIOL 4478, CHEM 3411, CHEM 3412, CHEM 3511, EAS 2750, EAS 4300, EAS 4430, ECE 4501, MATH 2106, MATH 3215, MATH 3235, MATH 4320, MATH 4347, MATH 4348, MATH 4581, NRE 3301, NRE 4610
3 Minimum of one class in PHYS 3211, PHYS 3226, PHYS 4322
4 Maximum of six credit hours below 3000-level
5 Maximum of nine credit hours PHYS 2699 or PHYS 4699
6 If PHYS 2232 is taken, extra hour goes toward Free Electives

**Bachelor of Science in Architecture**

The Bachelor of Science in Architecture (B.S. Arch) offers a rigorous and distinguished architectural education profile for our students around technology in all areas – design, history, theory, and communication. It is defined by a knowledge of how to think about and apply technology in architecture. Our program offers flexibility in the design studio sequence to allow coordinated interdisciplinary work with other schools at Georgia Tech. We build our academic foundation on studio classes, history and theory, and a deliberate blend of technology and design. We offer incubator workshops to all our students, from Freshmen through Seniors, which allow them to follow their intellectual passions and hone in-demand skills. Our students graduate with a broad-based undergraduate education grounded in design, science, and technology.

The Bachelor of Science in Architecture program prepares students for graduate-level studies in architecture, for graduate study in related fields, or a variety of careers related to architecture, the building industry, or government service.

**Grade Requirements**

Students must maintain a minimum 2.0 grade-point average in each year's grouping of architectural design studio courses (e.g., ARCH 2011, ARCH 2012, etc.) in order to enter the next sequence of studio courses. Each sequence of design studio courses must be started in the fall
semester. A maximum of 9 credit hours may be taken on a pass/fail basis. Only courses taken as free electives within the undergraduate curriculum are eligible for pass/fail credit. See Institute regulations regarding pass/fail courses (p. 160).

Students who complete both the Bachelor of Science in Architecture (BS Arch) and Master of Architecture (M.Arch.) in the Georgia Tech School of Architecture may apply up to 6 credit hours of graduate coursework toward both degrees. In order to qualify for this option, the student must complete the undergraduate degree with a cumulative grade-point average of 3.5 or higher and complete the master's degree within a four-year period from the award date of the bachelor's degree.

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<tr>
<td>or CS 1315 Intro Media Computation</td>
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<td>PHYS 2211</td>
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<td>Lab Science</td>
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<tr>
<td>INTA 1200</td>
<td>American Government</td>
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<td>PUBP 3000</td>
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<td>ARCH 4126</td>
<td>Paris Urban History</td>
<td>3</td>
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<tr>
<td>or HTS 301 City in American Hist</td>
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<td>Any SS (p. 97)</td>
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<tr>
<td>ARCH 1009</td>
<td>Fundamentals Of Arch I</td>
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<td>ARCH 1010</td>
<td>Fundamentals Of Arch II</td>
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<tr>
<td>ARCH 1060</td>
<td>Intro-Design &amp; Built Env</td>
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<td>ARCH 2011</td>
<td>Arch Design Studio I</td>
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<td>ARCH 2111</td>
<td>History of Arch I</td>
<td>2</td>
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<td>ARCH 2012</td>
<td>Arch Design Studio II</td>
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<td>ARCH 2112</td>
<td>History of Arch II</td>
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<td>ARCH 2211</td>
<td>Construction Tech I</td>
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<td>ARCH 2472</td>
<td>Arch Modeling &amp; Media 2</td>
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<td>ARCH 2474</td>
<td>Arch Modeling &amp; Media 3</td>
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<tr>
<td>ARCH 3231</td>
<td>Environmental Systems I</td>
<td>3</td>
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</table>

Pass-fail only allowed for Free Electives.

1. No ARCH courses allowed.
2. If PHYS 2231 is taken, excess hour applies to Free Electives.
4. Minimum grade of C average required for ARCH 3011 and ARCH 3012.
5. Limit 3 credit hours of ARCH undergraduate research. Excess apply to Free Electives.
6. Students may also complete a 10 credit hour concentration approved by faculty. Please consult with your advisor on course selection.

**International Plan**

The International Plan (IP) in the School of Architecture is a challenging and coherent academic program for undergraduate students who will develop an introductory level of global competence within the study of architecture. The International Plan is an intensive degree-long program designed to prepare students with the ability to:

1. assimilate comfortably in a constantly evolving international context within the profession of architecture,
2. value how architecture is practiced in different global contexts,
3. function effectively in a multi-national academic and work environment, and
4. understand the complexity of the global economy and the importance of developing a sensibility to international relations.

While many students gain some exposure to these aspects of today's world through the patchwork of traditional international opportunities such as study abroad and international internships, IP is designed to develop a deeper level of competency in these areas within the study of architecture.

The requirements of IP are:

1. Proficiency in a Foreign Language
2. Globally Focused Courses
3. International Experience, and
4. A Capstone Course

IP students in the School of Architecture can fulfill the International Experience requirement of the International Plan by participation in a university-approved international program with the approval of the School of Architecture.

Undergraduate students in the School of Architecture must hold a minimum 2.5 GPA at the time of application to be eligible for the
International Plan. Students must maintain a minimum 3.0 grade-point average in each year’s grouping of architectural design studio courses (e.g., ARCH 2011, ARCH 2012, etc.) in order to maintain eligibility for IP. Each sequence of design studio courses must be started in the fall semester.

For more information on IP visit www.arch.gatech.edu/international-education (http://www.arch.gatech.edu/international-education).

**Bachelor of Science in Biochemistry**

The Bachelor of Science in Biochemistry degree program consists of a combination of requirements and electives that ensure a strong foundation in the chemical and biological sciences while providing the flexibility to tailor the curriculum to satisfy specific interests or career goals. This program may be of interest to students who plan careers in research, teaching, or in a life/health science profession (medicine, pharmacy, dentistry). The judicious use of free electives also enables the student to achieve considerable knowledge of other disciplines at Georgia Tech, such as chemical and biomolecular engineering, bioinformatics (computing), biomedical engineering, and biology. The biochemistry curriculum enables majors who are interested in medical, dental, or law school to meet admission requirements of these schools. Successful completion of the Pre-Health Science Option is noted on the student’s transcript.

Chemistry Website (http://www.chemistry.gatech.edu)

- Bachelor of Science in Biochemistry - General (p. 211)
- Bachelor of Science in Biochemistry - Business Option (p. 208)
- Bachelor of Science in Biochemistry - Pre-health Option (p. 212)

**International Plan**

The BS in Chemistry (International Plan) and BS in Biochemistry (International Plan) are offered to undergraduate students seeking to understand their majors in a global perspective. Students in this program must demonstrate proficiency in a foreign language; complete coursework in a country/regional elective, international relations, and global economics; and participate study or research abroad experience (usually in the junior year). While abroad, students are required to complete in a supervised research experience with a faculty member in chemistry and biochemistry at the host institution. Upon successful completion of degree requirements for the International Plan, a "International Plan" designator is indicated on the diploma. If interested in participating in the International Plan as part of the BS in Chemistry or BS in Biochemistry, students should visit: www.internationalplan.gatech.edu (http://www.internationalplan.gatech.edu).

Chemistry Website (http://www.chemistry.gatech.edu)

**Research Option**

The BS in Chemistry (Research Option) and BS in Biochemistry (Research Option) are offered for students who wish to participate in a research problem under the supervision of one of the fifty members of faculty and adjunct faculty in the School. Participants in the Research Option learn how to address a research problem from experiment design and execution to interpretation of results. There is an expectation that undergraduates who contribute to completed studies will be co-authors on submissions to high-quality scholarly journals. Research projects are available in the traditional areas of chemistry (analytical, biological, inorganic, organic, physical, and polymer chemistry) as well as highly interdisciplinary research areas, such as nanochemistry, polymer and materials chemistry, environmental chemistry and sensors, medicinal chemistry, molecular biophysics, and computational chemistry.

To pursue the Research Option in the School of Chemistry and Biochemistry, students should obtain a research project with a faculty member in the department and apply online via www.undergradresearch.gatech.edu (http://www.undergradresearch.gatech.edu). Successful completion of the Research Option requires the following:

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<tr>
<th>Code</th>
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<th>Credit Hours</th>
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<tr>
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<td>LMC 4702</td>
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</tr>
<tr>
<td></td>
<td>which students complete their thesis)</td>
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<tr>
<td>Total Credit Hours</td>
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<td>11</td>
</tr>
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</table>

1. supervised research with faculty over three or more semesters
2. approval of proposal on project by a committee of two or more faculty
3. submission of an approved thesis

Successful completion of the Research Option is noted on the student’s transcript. Students completing this option often pursue graduate studies in the chemical or biological sciences or research careers in industrial or governmental laboratories.

Chemistry Website (http://www.chemistry.gatech.edu)

**Bachelor of Science in Biochemistry - Business Option**

<table>
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<tr>
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<td>MATH 1552</td>
<td>Integral Calculus</td>
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<td>CS 1301</td>
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<td>Intro Physics II</td>
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</table>
MATH 1551  Differential Calculus  2
MATH 1553  Intro to Linear Algebra  2

**Core E - Social Sciences**

Select one of the following:  3

- HIST 2111  United States to 1877
- HIST 2112  United States since 1877
- INTA 1200  American Government
- POL 1101  Government of the U.S.
- PUBP 3000  US Constitutional Issues
- ECON 2106  Prin of Microeconomics  3
- Any SS (p. 97)  6

**Core F - Courses Related to Major**

- CHEM 1211K  Chemical Principles I  4
- CHEM 1212K  Chemical Principles II  4
- CHEM 2380  Synthesis Lab I  2
- MATH 2551  Multivariable Calculus  4
- CHEM 1214  Quantitative Analysis  4
- CHEM 2311  Organic Chemistry I  3
- CHEM 2312  Organic Chemistry II  3
  or CHEM 23 Organic/Bioorganic Chem
- CHEM 3211  Analytical Chemistry  5
- CHEM 3371  Organic Chem Lab  2
- CHEM 3411  Physical Chemistry I  3
- CHEM 4511  Biochemistry I  3
- CHEM 4512  Biochemistry II  3
- CHEM 4521  Biophysical Chemistry  3
- CHEM 4581  Biochemistry Lab I  3
- CHEM 4582  Biochemistry Lab II  3
- CHEM 4601  Chemistry Seminar  2

**Biology Electives**  2

Select two of the following:  6

- BIOL 2344  Genetics
- BIOL 3450  Cell Molecular Biol
- BIOL 4668  Eukaryotic Mol Genetics
- BIOL 3380  Intro Microbiology
- BIOL 4340  Medical Microbiology
- BIOL 4401  Exper Dgn&Statis Methods
- BIOL 4418  Microbial Physiology
- BIOL 4440  Plant Physiology
- BIOL 4464  Developmental Biology
- BIOL 4570  Immunology & Immunocom
- BIOL 4608  Prokaryotic Mole Genetics
- CHEM 4765Drug Design,Devlpmnt&Delivery

**Business Option**

- ACCT 2101  Accounting I  3
  or MGT 300  Financ & Managerial Acct
- MGT 3101  Organizational Behavior  3
- MGT 3155  prin of Management
- PSYC 2220  Industrial/Organizational Psych

Select two of the following:  6

- MGT 3062  Financial Management
- MGT 3078  Finance & Investments
- MGT 3300  Marketing Management I
- MGT 3660  International Business
- MGT 4015  Adv Managerial Acct
- MGT 4026  Fin Report & Analysis I
- MGT 4028  Fin Analy&Rpt-Tech Firms
- MGT 4030  International Accounting
- MGT 4190  Strategic Quality Mgt
- MGT 4191  Entrepreneurship Forum
- MGT 4192  IMPACT Forum
- MGT 4193  Serv Lead Values Systems
- MGT 4194  Social Entrepreneurship
- MGT 4303  Personal Sell& Sales Mgt
- MGT 4304  Strategic Brand Mgt
- MGT 4307  Strategic Marketing
- MGT 4335  International Marketing
- MGT 4610  Law, Mgt, & Economics
- MGT 4670  Entrepreneurship

**Free Electives**

Free Electives  12

Total Credit Hours  122

1  VIP courses may be used only as free electives.
2  Courses may be applied toward completion of a minor.
3  MATH 1554 or MATH 1564 may be used in place of MATH 1553.

**Wellness**

- APPH 1040  Sci Foundation of Health  2
  or APPH 10  Sci of Phys Act & Health

**Core A - Essential Skills**

- ENGL 1101  English Composition I  3
- ENGL 1102  English Composition II  3
- MATH 1552  Integral Calculus  4

**Core B - Institutional Options**

- CS 1301  Intro to Computing  3
  or CS 1315  Intro Media Computation
  or CS 1371  Computing for Engineers

**Core C - Humanities**

- Any HUM (p. 93)  6

**Core D - Science, Math, & Technology**

- PHYS 2211  Intro Physics I  4
- PHYS 2212  Intro Physics II  4
- MATH 1551  Differential Calculus  2
- MATH 1553  Intro to Linear Algebra  2

**Core E - Social Sciences**

Select one of the following:  3

- HIST 2111  United States to 1877
- HIST 2112  United States since 1877
- INTA 1200  American Government
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<td>LMC 4702</td>
<td>US Rsch Thesis Writing (take during the term in which students complete their thesis)</td>
<td>1</td>
</tr>
</tbody>
</table>

Total Credit Hours: 11

1. supervised research with faculty over three or more semesters
2. approval of proposal on project by a committee of two or more faculty
3. submission of an approved thesis

Successful completion of the Research Option is noted on the student’s transcript. Students completing this option often pursue graduate studies in the chemical or biological sciences or research careers in industrial or governmental laboratories.

Chemistry Website (http://www.chemistry.gatech.edu)

**Bachelor of Science in Biochemistry - General**

The Bachelor of Science in Biochemistry degree program consists of a combination of requirements and electives that ensure a strong foundation in the chemical and biological sciences while providing the flexibility to tailor the curriculum to satisfy specific interests or career goals. This program may be of interest to students who plan careers in research, teaching, or in a life/health science profession (medicine, pharmacy, dentistry). The judicious use of free electives also enables the student to achieve considerable knowledge of other disciplines at Georgia Tech, such as chemical and biomolecular engineering, bioinformatics (computing), biomedical engineering, and biology. The biochemistry curriculum enables majors who are interested in medical, dental, or law school to meet admission requirements of these schools. Successful completion of the Pre-Health Science Option is noted on the student’s transcript.

Chemistry Website (http://www.chemistry.gatech.edu)

**Core C - Humanities**

<table>
<thead>
<tr>
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<tbody>
<tr>
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**Core D - Science, Math, & Technology**

<table>
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<tr>
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<td>Intro Physics II</td>
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<td>MATH 1551</td>
<td>Differential Calculus</td>
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<tr>
<td>MATH 1553</td>
<td>Intro to Linear Algebra</td>
<td>2</td>
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**Core E - Social Sciences**

Select one of the following:

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<tbody>
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<td>3</td>
</tr>
<tr>
<td>HIST 2112</td>
<td>United States since 1877</td>
<td>3</td>
</tr>
<tr>
<td>INTA 1200</td>
<td>American Government</td>
<td>3</td>
</tr>
<tr>
<td>POL 1101</td>
<td>Government of the U.S.</td>
<td>3</td>
</tr>
<tr>
<td>PUBP 3000</td>
<td>US Constitutional Issues</td>
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Any SS (p. 97): 9

**Core F - Courses Related to Major**

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<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
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<td>Chemical Principles I</td>
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</tr>
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<td>CHEM 1212K</td>
<td>Chemical Principles II</td>
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<tr>
<td>CHEM 2380</td>
<td>Synthesis Lab I</td>
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<td>MATH 2551</td>
<td>Multivariable Calculus</td>
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<td>BIOL 1510</td>
<td>Biological Principles</td>
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**Major Requirements**

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<td>CHEM 2214</td>
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<td>4</td>
</tr>
<tr>
<td>CHEM 2311</td>
<td>Organic Chemistry I</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 2312</td>
<td>Organic Chemistry II</td>
<td>3</td>
</tr>
<tr>
<td>or CHEM 2313</td>
<td>Organic/Bioorganic Chem</td>
<td>3</td>
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<tr>
<td>CHEM 3211</td>
<td>Analytical Chemistry</td>
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<td>CHEM 3371</td>
<td>Organic Chem Lab</td>
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<td>CHEM 3411</td>
<td>Physical Chemistry I</td>
<td>3</td>
</tr>
<tr>
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<td>CHEM 4521</td>
<td>Biophysical Chemistry</td>
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<td>CHEM 4581</td>
<td>Biochemistry Lab I</td>
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<tr>
<td>CHEM 4582</td>
<td>Biochemistry Lab II</td>
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</tr>
<tr>
<td>CHEM 4601</td>
<td>Chemistry Seminar</td>
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**Biology Electives**

Select two of the following: 6

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<td>BIOL 3450</td>
<td>Cell Molecular Biol</td>
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<td>BIOL 4668</td>
<td>Eukaryotic Mol Genetics</td>
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Select one of the following: 3

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<tr>
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<th>Credit Hours</th>
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<td>BIOL 3450</td>
<td>Cell Molecular Biol</td>
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</tr>
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<td>BIOL 4015</td>
<td>Cancer Bio/Tech</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 4340</td>
<td>Medical Microbiology</td>
<td>3</td>
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<tr>
<td>BIOL 4401</td>
<td>Exper Dgn&amp;Statis Methods</td>
<td>3</td>
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<td>BIOL 4418</td>
<td>Microbial Physiology</td>
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<td>Plant Physiology</td>
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</tr>
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<td>BIOL 4464</td>
<td>Developmental Biology</td>
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<tr>
<td>BIOL 4570</td>
<td>Immunology &amp; Immunochem</td>
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<tr>
<td>BIOL 4608</td>
<td>Prokaryotic Mole Genetics</td>
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<td>CHEM 4765Drug Design,Devlpmnt&amp;Delivery</td>
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**Wellness**

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</tr>
<tr>
<td>APPH 10 Sci of Phys Act &amp; Health</td>
<td>APPH 10 Sci of Phys Act &amp; Health</td>
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**Core A - Essential Skills**

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<td>ENGL 1102</td>
<td>English Composition II</td>
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<tr>
<td>MATH 1552</td>
<td>Integral Calculus</td>
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**Core B - Institutional Options**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>CS 1301</td>
<td>Intro to Computing</td>
<td>3</td>
</tr>
<tr>
<td>or CS 1315</td>
<td>Intro Media Computation</td>
<td>3</td>
</tr>
<tr>
<td>or CS 1371</td>
<td>Computing for Engineers</td>
<td>3</td>
</tr>
</tbody>
</table>
Research Option

The Research Option requires the following:

- Online via www.undergradresearch.gatech.edu
- Students should obtain a research project with a faculty member in the department and apply.
- Materials chemistry, environmental chemistry and sensors, medicinal chemistry, inorganic, organic, physical, and polymer chemistry.
- Courses may be applied toward completion of a minor.
- Students should obtain a research project with a faculty member.
- Students should visit: www.internationalplan.gatech.edu
- Successful completion of the Research Option is noted on the student’s transcript.

International Plan

The BS in Chemistry (International Plan) and BS in Biochemistry (International Plan) are offered to undergraduate students seeking to understand their majors in a global perspective. Students in this program must demonstrate proficiency in a foreign language; complete coursework in a country/regional elective, international relations, and global economics; and participate study or research abroad experience (usually in the junior year). While abroad, students are required to complete in a supervised research experience with a faculty member in chemistry and biochemistry at the host institution. Upon successful completion of degree requirements for the International Plan, a "International Plan" designator is indicated on the transcript. Students completing this option often pursue graduate studies in the chemical or biological sciences or research careers in industrial or governmental laboratories.

Chemistry Website (http://www.chemistry.gatech.edu)

Bachelor of Science in Biochemistry - Pre-Health Option

The Bachelor of Science in Biochemistry degree program consists of a combination of requirements and electives that ensure a strong foundation in the chemical and biological sciences while providing the flexibility to tailor the curriculum to satisfy specific interests or career goals. This program may be of interest to students who plan careers in research, teaching, or in a life/health science profession (medicine, pharmacy, dentistry). The judicious use of free electives also enables the student to achieve considerable knowledge of other disciplines at Georgia Tech, such as chemical and biomolecular engineering, bioinformatics (computing), biomedical engineering, and biology. The biochemistry curriculum enables majors who are interested in medical, dental, or law school to meet admission requirements of these schools.

Chemistry Website (http://www.chemistry.gatech.edu)

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td></td>
<td>Wellness</td>
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<tr>
<td></td>
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<tr>
<td>or</td>
<td>APPH 10 Sci of Phys Act &amp; Health</td>
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</tr>
<tr>
<td></td>
<td>Core A - Essential Skills</td>
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<tr>
<td></td>
<td>ENGL 1101 English Composition I</td>
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<td>ENGL 1102 English Composition II</td>
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<td></td>
<td>MATH 1552 Integral Calculus</td>
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<td></td>
<td>Core B - Institutional Options</td>
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<td></td>
<td>CS 1301 Intro to Computing</td>
<td>3</td>
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<tr>
<td>or</td>
<td>CS 1315 Intro Media Computation</td>
<td></td>
</tr>
<tr>
<td>or</td>
<td>CS 1371 Computing for Engineers</td>
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<tr>
<td></td>
<td>Core C - Humanities</td>
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<tr>
<td></td>
<td>Any HUM (p. 93)</td>
<td>6</td>
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<td>Core D - Science, Math, &amp; Technology</td>
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<tr>
<td></td>
<td>PHYS 2211 Intro Physics I</td>
<td>4</td>
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<tr>
<td></td>
<td>PHYS 2212 Intro Physics II</td>
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<td>MATH 1551 Differential Calculus</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>MATH 1553 Intro to Linear Algebra</td>
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<td></td>
<td>Core E - Social Sciences</td>
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<td>Select one of the following:</td>
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<tr>
<td></td>
<td>HIST 2111 United States to 1877</td>
<td></td>
</tr>
<tr>
<td></td>
<td>HIST 2112 United States since 1877</td>
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<td></td>
<td>INTA 1200 American Government</td>
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1. Supervised research with faculty over three or more semesters
2. Approval of proposal on project by a committee of two or more faculty
3. Submission of an approved thesis

Successful completion of the Research Option is noted on the student’s transcript.

<table>
<thead>
<tr>
<th>Code</th>
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<th>Credit Hours</th>
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<tr>
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<td>Select one of the following research options:</td>
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<tr>
<td></td>
<td>CHEM Research Assistantship</td>
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<td></td>
<td>APPH 1040 Sci Foundation of Health</td>
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<tr>
<td>or</td>
<td>APPH 10 Sci of Phys Act &amp; Health</td>
<td></td>
</tr>
<tr>
<td></td>
<td>LMC 4701 US Rsch Proposal Writing (complete</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>during the first or second semester of</td>
<td></td>
</tr>
<tr>
<td></td>
<td>research)</td>
<td></td>
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<td></td>
<td>LMC 4702 US Rsch Thesis Writing (take during</td>
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<tr>
<td></td>
<td>the term in which students complete their</td>
<td></td>
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<tr>
<td></td>
<td>thesis)</td>
<td></td>
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<tr>
<td></td>
<td>Total Credit Hours</td>
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### Core F - Courses Related to Major

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<tbody>
<tr>
<td>CHEM 1211K</td>
<td>Chemical Principles I</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 1212K</td>
<td>Chemical Principles II</td>
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<td>BIOL 1510</td>
<td>Biological Principles</td>
<td>4</td>
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<tr>
<td>BIOL 1520</td>
<td>Intro to Organismal Biol</td>
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### Major Requirements

<table>
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<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 2214</td>
<td>Quantitative Analysis</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 2311</td>
<td>Organic Chemistry I</td>
<td>3</td>
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<td>Organic Chemistry II</td>
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<td>CHEM 2313</td>
<td>Organic/Bioorganic Chem</td>
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<td>CHEM 3211</td>
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<td>CHEM 3371</td>
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<td>CHEM 3411</td>
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<td>CHEM 4582</td>
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### Pre-Health Electives

Select 15 credits from the following:

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<td>APPH 3755</td>
<td>Human Physiology</td>
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<td>APPH 3756</td>
<td>Physiology Lab</td>
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<td>APPH 4400</td>
<td>Human Neuroanatomy</td>
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<td>BIOL 2344</td>
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<td>BIOL 2345</td>
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<td>BIOL 3381</td>
<td>Intro Microbiology Lab</td>
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<td>BIOL 3450</td>
<td>Cell Molecular Biol</td>
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<td>BIOL 4015</td>
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<td>BIOL 4464</td>
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</tr>
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<td>BIOL 4570</td>
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<tr>
<td>BMED 3600</td>
<td>Physio Cell &amp; Mol Syst</td>
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<td>CHEM 4521</td>
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<tr>
<td>CHEM 4765</td>
<td>Drug Design,Devlpmnt&amp;Delivery</td>
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</table>

### Free Electives

Free Electives

- Total Credit Hours: 122

Pass-fail only allowed for Free Electives.

1. It is suggested that students select pre-health preparation courses (SOC and PSYC).
2. It is suggested that students select pre-health preparation courses (APPH, BIOL, HTS, LMC, PSYC).
3. VIP courses may be used only as free electives.
4. Courses may be applied toward completion of a minor.
5. MATH 1554 or MATH 1564 may be used in place of MATH 1553.

### International Plan

The BS in Chemistry (International Plan) and BS in Biochemistry (International Plan) are offered to undergraduate students seeking to understand their majors in a global perspective. Students in this program must demonstrate proficiency in a foreign language; complete coursework in a country/regional elective, international relations, and global economics; and participate study or research abroad experience (usually in the junior year). While abroad, students are required to complete in a supervised research experience with a faculty member in chemistry and biochemistry at the host institution. Upon successful completion of degree requirements for the International Plan, a "International Plan" designator is indicated on the diploma. If interested in participating in the International Plan as part of the BS in Chemistry or BS in Biochemistry, students should visit: www.internationalplan.gatech.edu (http://www.internationalplan.gatech.edu).

### Research Option

The BS in Chemistry (Research Option) and BS in Biochemistry (Research Option) are offered for students who wish to participate in a research problem under the supervision of one of the fifty members of faculty and adjunct faculty in the School. Participants in the Research Option learn how to address a research problem from experiment design and execution to interpretation of results. There is an expectation that undergraduates who contribute to completed studies will be co-authors on submissions to high-quality scholarly journals. Research projects are available in the traditional areas of chemistry (analytical, biological, inorganic, organic, physical, and polymer chemistry) as well as highly interdisciplinary research areas, such as nanochemistry, polymer and materials chemistry, environmental chemistry and sensors, medicinal chemistry, molecular biophysics, and computational chemistry.

To pursue the Research Option in the School of Chemistry and Biochemistry, students should obtain a research project with a faculty member in the department and apply online via www.undergradresearch.gatech.edu (http://www.undergradresearch.gatech.edu). Successful completion of the Research Option requires the following:

**Code** | **Title** | **Credit Hours**
--- | --- | ---
CHEM 4698/4699 | Research Assistantship | 9
LMC 4701 | US Rsch Proposal Writing (complete during the first or second semester of research) | 1
LMC 4702 | US Rsch Thesis Writing (take during the term in which students complete their thesis) | 1

Total Credit Hours: 11

1. supervised research with faculty over three or more semesters
2. approval of proposal on project by a committee of two or more faculty members
3. submission of an approved thesis
Successful completion of the Research Option is noted on the student's transcript. Students completing this option often pursue graduate studies in the chemical or biological sciences or research careers in industrial or governmental laboratories.

Chemistry Website (http://www.chemistry.gatech.edu)

Bachelor of Science in Biology

The undergraduate curriculum for the Bachelor of Science in Biology degree is designed to prepare students for employment in academia, government, or industry; for graduate studies in the biological sciences or science teaching; or for admission to medical, dental, or veterinary schools. The theme of the curriculum is systems biology, employing a systems approach in solving biological problems. All students participate in research through undergraduate research courses. The School also offers the International Plan, Business Option, a minor in biology, and several certificates.

Biology Undergraduate Programs (http://www.biology.gatech.edu/undergraduate-program)

- Bachelor of Science in Biology - General (p. 215)
- Bachelor of Science in Biology - Business Option (p. 214)

Bachelor of Science in Biology - Business Option

The undergraduate curriculum for the Bachelor of Science in Biology degree is designed to prepare students for employment in academia, government, or industry; for graduate studies in the biological sciences or science teaching; or for admission to medical, dental, or veterinary schools. The theme of the curriculum is systems biology, employing a systems approach in solving biological problems. All students participate in research through undergraduate research courses. The School also offers the International Plan, Business Option, a minor in biology, and several certificates.

Biology Undergraduate Programs (http://www.biology.gatech.edu/undergraduate-program)

<table>
<thead>
<tr>
<th>Code</th>
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<td>or APPH 1050</td>
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<td>Any HUM (p. 93)</td>
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<td>MATH 1553</td>
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<td>HIST 2111</td>
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<td>Core F - Courses Related to Major</td>
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<td>BIOL 2344</td>
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<td>BIOL 4690</td>
<td>Independent Research Proj</td>
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<td>BIOL 4910</td>
<td>Honors Research Thesis</td>
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<td>CHEM 2380</td>
<td>Synthesis Lab I</td>
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<td>BIOL 2400</td>
<td>Math Models in Biol</td>
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<td>or BIOL 415</td>
<td>Genomics&amp;Appl Bioinfor</td>
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<td>or BIOL 440</td>
<td>Exper Dgn &amp; Statis Methods</td>
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<td>Biology Electives at 3000-level or higher</td>
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<td>ACCT 2101</td>
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<td>or MGT 300</td>
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<td>MGT 3062</td>
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University, Tokyo Technological University, University of Victoria (New Zealand), National University of Singapore, University of Strathclyde (Scotland), and Bilkent University (Turkey). Successful completion of this plan earns students an international designation on their Georgia Tech degree.

**Research Option**

This Research Option enables students to complete nine credit hours of supervised research with a Biology faculty member over multiple semesters. With faculty guidance, students write a brief proposal, perform independent, original research, and write a thesis about their work. The thesis is evaluated by two Biology Faculty members. The first six credit hours of the research option are taken as BIOL 2699/BIOL 4699 (research for credit) or BIOL 2698/BIOL 4698 (research for pay). Students then take either BIOL 4690 or BIOL 4910 in their final semester and two, one-credit-hour writing courses, LMC 4701 and LMC 4702. These writing courses can be counted as Biology electives for Research Option students. Note that LMC 4701 should be taken in the semester prior to enrolling in BIOL 4910/BIOL 4690. The student’s research is presented in BIOL 4460.

### International Plan

Georgia Tech's International Plan, through the Office of International Education (www.oie.gatech.edu/), involves two study abroad experiences and coursework in global studies. The plan offers a challenging and coherent academic program for students to develop global competence within the context of a Biology degree. The requirements include: language proficiency equivalent to two years of college coursework (twelve hrs), one course in international relations (three hrs), global economy (three hrs), focused study of a region (three hrs), an integrative course synthesizing the international experience (three hrs), and two semesters (minimum of 26 weeks) in residence abroad. Georgia Tech biology courses are taught in Australia/New Zealand (www.oie.gatech.edu/sa/programs/) and Spain (www.oie.gatech.edu/sa/programs/) as part of the Study Abroad program. In addition, many biology courses are available through Georgia Tech partner universities abroad (www.oie.gatech.edu/sa/programs/). Some of these universities teach biology courses in English, such as Hong Kong University, Tokyo Technological University, University of Victoria (New Zealand), National University of Singapore, University of Strathclyde (Scotland), and Bilkent University (Turkey). Successful completion of this plan earns students an international designation on their Georgia Tech degree.

### BS/MS Programs

The School of Biological Sciences offers two 5-year BS/MS programs:

- BS in Biology/MS in Biology (http://biosci.gatech.edu/undergrad/5-year-bsms-program-bsbiomsbio-0)
- BS in Biology/MS in Bioinformatics (http://biosci.gatech.edu/undergrad/5-year-bsms-program-bsbiombsinf-0)

### Bachelor of Science in Biology - General

The undergraduate curriculum for the Bachelor of Science in Biology degree is designed to prepare students for employment in academia, government, or industry; for graduate studies in the biological sciences or science teaching; or for admission to medical, dental, or veterinary schools. The theme of the curriculum is systems biology, employing a systems approach in solving biological problems. All students participate...
in research through undergraduate research courses. The School also offers the International Plan, Business Option, a minor in biology, and several certificates.

Biology Undergraduate Programs (http://www.biology.gatech.edu/undergraduate-program)

### Core A - Essential Skills
- **ENGL 1101** English Composition I [3]
- **ENGL 1102** English Composition II [3]
- **MATH 1552** Integral Calculus [4]

### Core B - Institutional Options
- **Select one of the following:**
  - **CS 1301** Intro to Computing [3]
  - **CS 1315** Intro Media Computation [3]
  - **CS 1371** Computing for Engineers [3]

### Core C - Humanities
- **Any HUM** (p. 93) [6]

### Core D - Science, Math, & Technology
- **PHYS 2211** Intro Physics I [4]
- **PHYS 2212** Intro Physics II [4]
- **MATH 1551** Differential Calculus [2]
- **MATH 1553** Intro to Linear Algebra [2]

### Core E - Social Sciences
- **Select one of the following:**
  - **HIST 2111** United States to 1877 [3]
  - **HIST 2112** United States since 1877 [3]
  - **INTA 1200** American Government [3]
  - **POL 1101** Government of the U.S. [3]
  - **PUBP 3000** US Constitutional Issues [3]
- **Any SS** (p. 97) [9]

### Core F - Courses Related to Major
- **BIOL 1510** Biological Principles [4]
- **CHEM 1211K** Chemical Principles I [4]
- **CHEM 1212K** Chemical Principles II [4]
- **CHEM 2311** Organic Chemistry I [3]
- **CHEM 2312** Organic Chemistry II [3]
  - or **CHEM 2316** Organic/Bioorganic Chem [3]

### Major Requirements
- **BIOL 1520** Intro to Organismal Biol [4]
- **BIOL 2335** General Ecology [3]
- **BIOL 3450** Cell Molecular Biol [3]
- **BIOL 2344** Genetics [3]
  - or **BIOL 2355** Honors Genetics [3]
- **Biology Lab** [2]
- **BIOL 3600** Intro Evolutionary Biol [3]
- **BIOL 4460** Comm Biological Research [1]

Select one of the following:
- **BIOL 4590** Research Project Lab [3]
- **BIOL 4690** Independent Research Proj [3]
- **BIOL 4910** Honors Research Thesis [3]

### Non-Biology Courses
- **CHEM 2380** Synthesis Lab I [2]
- **Select one of the following:**
  - **BIOL 2400** Math Models in Biol [3]
  - **BIOL 4150** Genomics & Appl Bioinfor [3]
  - **BIOL 4401** Exp Dgn & Stats Methods [3]

### Biology Electives
- **Biology Electives 3000-level or higher** [2] [21]

### Free Electives
- **Free Electives** [11]
- **Total Credit Hours** [122]

1. Students must complete two of following three lab options: **BIOL 2336** or **BIOL 2344** or **BIOL 2355** or **BIOL 4351**.

2. Students are required to complete 21 credit hours of Biology electives defined as follows:
   - 12 "depth" credit hours must be courses with a "BIOL" prefix, excluding **BIOL 4694-BIOL 4699**. Biology Elective courses that are cross-listed with other departments are included in these 12 depth credit hours.
   - The remaining 9 "breadth" credit hours can be selected from: other BIOL 3000-level and higher courses, **BIOL 4695, BIOL 4697, BIOL 4699**, VIP courses with a Biological Sciences instructor; and the list of approved courses offered in the other departments (MATH 2000-level and higher courses and APHP, BMED, CHEM, EAS, PHYS, PSYC 3000-level and higher courses; EXCEPT for the following: **APHP 3300, APHP 3901-APHP 3904, APPH 4699, BMED 4699, BMED 4900-BMED 4903, CHEM 4601, CHEM 4699, CHEM 4901-CHEM 4903, EAS 4651, EAS 4699, EAS 4900, MATH 2699, MATH 4080, MATH 4090, MATH 4699, MATH 4999, PHYS 4601, PHYS 4602, PHYS 4609, PSYC 4600, PSYC 4601, PSYC 4699, PSYC 4900-PSYC 4910.)

3. Minimum grade of C required.

### International Plan

Georgia Tech’s International Plan, through the Office of International Education (www.oie.gatech.edu/ (http://www.oie.gatech.edu)), involves two study abroad experiences and coursework in global studies. The plan offers a challenging and coherent academic program for students to develop global competence within the context of a Biology degree. The requirements include: language proficiency equivalent to two years of college coursework (twelve hrs), one course in international relations (three hrs), global economy (three hrs), focused study of a region (three hrs), an integrative course synthesizing the international experience (three hrs), and two semesters (minimum of 26 weeks) in residence abroad. Georgia Tech biology courses are taught in English, such as Hong Kong University, Tokyo Technological University, University of Victoria (New Zealand), National University of Singapore, University of Strathclyde (Scotland), and Bilkent University (Turkey). Successful completion of this...
plan earns students an international designation on their Georgia Tech degree.

**Research Option**

This Research Option enables students to complete nine credit hours of supervised research with a Biology faculty member over multiple semesters. With faculty guidance, students write a brief proposal, perform independent, original research, and write a thesis about their work. The thesis is evaluated by two Biology Faculty members. The first six credit hours of the research option are taken as BIOL 2699/BIOL 4699 (research for credit) or BIOL 2698/BIOL 4698 (research for pay). Students then take either BIOL 4690 or BIOL 4910 in their final semester and two, one-credit-hour writing courses, LMC 4701 and LMC 4702. These writing courses can be counted as Biology electives for Research Option students. Note that LMC 4701 should be taken in the semester prior to enrolling in BIOL 4910/BIOL 4690. The student's research is presented in BIOL 4460.

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<td>2698/4698</td>
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In the final semester of study, select the following courses:

- BIOL 4690 Independent Research Proj 3
- or BIOL 4910 Honors Research Thesis
- LMC 4701 US Rsch Proposal Writing 2
  & LMC 4702 and US Rsch Thesis Writing 1

Total Credit Hours 11

1 These writing courses can be counted as Biology electives for Research Option students. Note that LMC 4701 should be taken in the semester prior to enrolling in BIOL 4910/BIOL 4690.

Successful completion of this option earns students a "Research Option in Biology" designation on their Georgia Tech transcripts.

**BS/MS Programs**

The School of Biological Sciences offers two 5-year BS/MS programs:

- BS in Biology/MS in Biology (http://biosci.gatech.edu/undergrad/5-year-bsms-program-bsbiomsbio-0)
- BS in Biology/MS in Bioinformatics (http://biosci.gatech.edu/undergrad/5-year-bsms-program-bsbiolmsbinf-0)

**Bachelor of Science in Biomedical Engineering**

The true integration of the life sciences and engineering is essential in educating a substantial percentage of the next generation of biomedical engineers in order to benefit from the biological revolution and its applications to medicine. This degree program attracts outstanding students who wish to have that integration in their undergraduate education, so that they may be equipped with the tools to be leaders in this field in the 21st Century.

The curriculum includes a solid foundation in fundamental engineering, mathematics, and sciences - biology, chemistry, and physics - as well as grounding in humanities, social sciences, and communication skills. A unique aspect of the curriculum is the incorporation of problem-based learning (PBL) methodologies to foster development of both self-directed learning skills and problem-solving skills in a team-based environment.

**Program Educational Objectives**

The program strives to produce graduates who are expected to demonstrate the following during the first few years after graduation:

1. mathematics, science, and engineering fundamentals expertise at the interface of engineering and the life sciences which enables them to take leadership roles in the field of biomedical engineering;
2. an ability to use their multidisciplinary background to foster communication across professional and disciplinary boundaries with the highest professional and ethical standards; and
3. the ability to recognize the limits of their knowledge and initiate self-directed learning opportunities to be able to continue to identify and create professional opportunities for themselves in the field of biomedical engineering.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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<tr>
<td>APPH</td>
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<td>CS</td>
<td>Computing for Engineers</td>
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</table>
The Georgia Tech Undergrad Co-op Program is a five-year, academic program designed to complement a student's formal education with paid practical work experience directly related to the student's academic major. It is available in all engineering majors, as well as in many majors in other colleges at Georgia Tech.

Co-ops alternate semesters of on-campus study with semesters of full-time employment through their junior year, then continue in school through their senior year. Co-ops are classified as full-time students during each term, regardless of whether they are attending classes on campus or working full-time at an employer location. Most undergrad Co-op students begin the program as freshmen or sophomores. With more than 2,700 students participating, Georgia Tech's program is currently the largest optional co-op program in the United States and has perennially been listed in U.S. News & World Report as one of the "Top Ten" co-op programs in America.

As an integral part of the overall education experience, the co-op program allows students to take on increasing levels of responsibility and to use their job knowledge and classroom learning to make meaningful contributions to the organizations in which they work. Many co-op graduates are hired by their co-op employer, and more than 700 companies or government organizations throughout the United States and abroad currently employ Georgia Tech Undergrad Co-op Program students.

To learn more about Biomedical Engineering Co-op opportunities at Georgia Tech, contact Rob Rogers. Rob is a Development Co-op Advisor with the Georgia Tech Center for Career Discovery and Development, and the point person for BME students. Rob is located in the Bill Moore Student Success Center, 1st Floor. His phone number is (404) 894-1348

### International Plan

The International Plan is a challenging and coherent academic program for undergraduates that develops global competence within the context of a student's major. It is a degree-long program that integrates international studies and experiences into any participating major at Georgia Tech. It helps to prepare Georgia Tech graduates professionally and personally for successful lives in the twenty-first century.

The International Plan is not intended to replace current international programs; it supplements them. Existing study abroad opportunities continue to be offered. It is also not intended to be an add-on to the current degree programs. It is intended to be another curriculum path to earn a degree in which international competence is integrated into the program of study. The Plan can be completed within the normal timeframe of four years of undergraduate study.

The overarching model for the International Plan has four components:

1. **International coursework:** Three courses to include one from each of the following categories:
   a. International relations
   b. Global economics
   c. A course about a specific country or region

2. **International experience:** Two terms abroad (not less than 26 weeks) engaged in any combination of study abroad, research, or internship

3. **Second language proficiency:** All students in the program are expected to reach at least the proficiency level equivalent to two years of college-level language study. Students who use the language to study, conduct research, or participate in an internship during their international experience are expected to attain a higher level of proficiency. Language proficiency is determined by testing (not course credits).

4. **Culminating course:** A capstone course in the major designed to tie the international studies and experiences together with the student's major. The senior design project (i.e. BMED) will be used to satisfy this requirement. The design project must incorporate a significant element of the international experience (e.g. foreign client, location of work, project customers, motivation, regulatory issues, etc).

Completion of the International Plan is recognized by a designation on the student's diploma indicating completion of the degree with global competence.
For additional information about the International Plan visit www.oie.gatech.edu/internationalplan (http://www.internationalplan.gatech.edu).

**Research Option**

The Research Option is intended for students who seek a concentrated research experience, culminating in an undergraduate thesis, integrated into their undergraduate studies in biomedical engineering. Students are strongly encouraged at the end of their experience to work with their faculty mentor to develop a journal publication or conference presentation on the research in addition to the actual thesis. Students who complete this option receive a designation on their transcript.

Students may be able to satisfy the additional requirements imposed for the Research Option designation through appropriate choices of electives without additional credit hours to complete the degree. The Research Option designation may be pursued separately, or in combination with the Cooperative Plan and/or the International Plan.

**Research Option Requirements**

1. Complete at least nine credit hours of undergraduate research (i.e. BMED 2698, BMED 2699, BMED 4698, or BMED 4699) spanning typically at least three terms. The research may be for either pay or credit, and at least six credit hours must be on the same research project, broadly defined.
2. Take the course LMC 4701, typically in the second semester of research. The research proposal outlining the research topic and project for the thesis will be written for this course. The proposal must be approved by a faculty advisor and one other faculty member.
3. Take the course LMC 4702 during the thesis-writing semester. The thesis documenting the results of the research will be written as part of this course. It must be approved by two faculty members and will be archived in the Georgia Tech Library.

**Bachelor of Science in Building Construction**

**The B.S. in Building Construction is deactivated. Please contact the academic department for questions.**

The Georgia Tech School of Building Construction (BC) is a technology and management-centered course of study that prepares students for leadership roles in the construction industry. The curriculum is designed to teach students the basic principles and practices of construction management, project delivery, building science, and technology. Students are taught to manage the functions and processes of every aspect of the construction industry. The curriculum provides a well-rounded course of study conducted by award-winning faculty and staff and offers hands-on experience and guidance by industry professionals.

Undergraduate Studies Information (http://www.bc.gatech.edu/content/undergraduate-certificate)

**Bachelor of Science in Business Administration**

Students with a broad interest in business and management activities and operating problems would profit from the Bachelor of Science in Business Administration degree program. The program builds upon knowledge of the functional, environmental, behavioral, and legal aspects of business and provides analytical and conceptual tools for analyzing complicated problems. It prepares the student for business and managerial responsibilities and decision making. The large number of elective hours allows the student to tailor a program to his or her individual educational objectives. Students must complete a concentration of electives in one of the following areas:

- Accounting
- Finance
- General Management
- Information Technology Management
- Leadership and Organizational Change
- Marketing
- Operations and Supply Chain Management
- Strategy and Innovation

The new BS Business Administration degree replaces the BS Management degree previously offered by the College of Business. Starting summer 2011, all new freshmen and transfer students will be admitted to the B.S. Business Administration (BSBA) degree as the B.S. Management (BSM) degree will no longer be offered to new students. Current Tech students who submit change of major forms to join the College of Business after January 17, 2011 will have the BSBA degree, as the BSM degree will no longer be available to new change of major students. Current BSM students can change their majors to BSBA, but are not required to change majors.

**Change of Major Policy**

The College of Business requires a 2.3 cumulative GPA for any non-College of Business students requesting a change of major to Business Administration if the student has completed sixty credits (junior standing) or more. There is no GPA requirement for freshmen and sophomores (less than sixty credits) requesting a major change. This policy was approved by the College of Business faculty in April 2007. All students seeking a major change to Business Administration must attend a "change of major" meeting. Contact the College of Business Undergraduate Program Office (http://mgt.gatech.edu/programs/under) for dates and times of upcoming meetings.

Current Georgia Tech students who submit change of major forms to join the College of Business after January 17, 2011 will have the BS Business Administration degree, as the BS Management degree will no longer be available to new change of major students. Students who submit change of major forms before January 17, 2011 will have the BS Management degree. BS Management students may choose to stay in the BSM degree or may change into the BSBA degree. Once a student changes majors to BSBA, he or she cannot return to the BSM degree.

The BSBA and BSM degrees have different degree requirements. Students joining the BSBA degree must complete all BSBA degree requirements, including one of the newly approved management concentrations and several other courses not currently required of all BSM students. Current BSM students MUST attend a change of major meeting to change their majors to BSBA so they understand the requirements of the new degree which are different than the BSM requirements.
Current BSM students who decide to continue pursuing the BSM degree should review previous Georgia Tech catalogs and the College of Business website to see the BSM requirements.

- Bachelor of Science in Business Administration - Accounting (p. 220)
- Bachelor of Science in Business Administration - Finance (p. 221)
- Bachelor of Science in Business Administration - General Management (p. 223)
- Bachelor of Science in Business Administration - IT Management (p. 225)
- Bachelor of Science in Business Administration - Leadership and Organizational Change (p. 227)
- Bachelor of Science in Business Administration - Marketing (p. 229)
- Bachelor of Science in Business Administration - Operations and Supply Chain Management (p. 230)
- Bachelor of Science in Business Administration - Strategy and Innovation (p. 189)

**Bachelor of Science in Business Administration - Accounting**

Students with a broad interest in business and management activities and operating problems would profit from the Bachelor of Science in Business Administration degree program. The program builds upon knowledge of the functional, environmental, behavioral, and legal aspects of business and provides analytical and conceptual tools for analyzing complicated problems. It prepares the student for business and managerial responsibilities and decision making. The large number of elective hours allows the student to tailor a program to his or her individual educational objectives. Students must complete a concentration of electives in one of the following areas:

- Accounting
- Finance
- General Management
- Information Technology Management
- Leadership and Organizational Change
- Marketing
- Operations and Supply Chain Management
- Strategy and Innovation

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**Change of Major Policy**

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The BSBA and BSM degrees have different degree requirements. Students joining the BSBA degree must complete all BSBA degree requirements, including one of the newly approved management concentrations and several other courses not currently required of all BSM students. Current BSM students MUST attend a change of major meeting to change their majors to BSBA so they understand the requirements of the new degree which are different than the BSM requirements.

Current BSM students who decide to continue pursuing the BSM degree should review previous Georgia Tech catalogs and the College of Business website to see the BSM requirements.

**Change of Major Policy**

The College of Business requires a 2.3 cumulative GPA for any non-College of Business students requesting a change of major to Business Administration if the student has completed sixty credits (junior standing) or more. There is no GPA requirement for freshmen and sophomores (less than sixty credits) requesting a major change. This policy was approved by the College of Business faculty in April 2007. All students seeking a major change to Business Administration must attend a "change of major" meeting. Contact the College of Business Undergraduate Program Office (http://mgt.gatech.edu/programs/under) for dates and times of upcoming meetings.

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The BSBA and BSM degrees have different degree requirements. Students joining the BSBA degree must complete all BSBA degree requirements, including one of the newly approved management concentrations and several other courses not currently required of all BSM students. Current BSM students MUST attend a change of major meeting to change their majors to BSBA so they understand the requirements of the new degree which are different than the BSM requirements.

Current BSM students who decide to continue pursuing the BSM degree should review previous Georgia Tech catalogs and the College of Business website to see the BSM requirements.

**Code** | **Title** | **Credit Hours**
--- | --- | ---
**Wellness**
APPH 1040 | Sci Foundation of Health | 2
or APPH 10 | Sci of Phys Act & Health | 2
**Core A - Essential Skills**
ENGL 1101 | English Composition I | 3
ENGL 1102 | English Composition II | 3
MATH 1552 | Integral Calculus | 4
or MATH 17 | Survey of Calculus | 4
**Core B - Institutional Options**
CS 1301 | Intro to Computing | 3
or CS 1315 | Intro Media Computation | 3
**Core C - Humanities**
Any HUM (p. 93) | | 6
**Core D - Science, Math, & Technology**
Lab Science | | 4
Lab Science | | 4
MATH 1551 | Differential Calculus | 4
& MATH 1553 | Intro to Linear Algebra | 4
or MATH 17 | Finite Mathematics | 4
**Core E - Social Sciences**
Select one of the following:
HIST 2111 | United States to 1877 | 3
Pass-fail only allowed for Free Electives.

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<thead>
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<th>Course Title</th>
<th>Credit Hours</th>
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<td>INTA 1200</td>
<td>American Government</td>
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<tr>
<td>POL 1101</td>
<td>Government of the U.S.</td>
<td></td>
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<tr>
<td>PUBP 3000</td>
<td>US Constitutional Issues</td>
<td></td>
</tr>
<tr>
<td>ECON 2105</td>
<td>Prin of Macroeconomics</td>
<td>3</td>
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<tr>
<td>ECON 2106</td>
<td>Prin of Microeconomics</td>
<td>3</td>
</tr>
<tr>
<td>Any SS (p. 97)</td>
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**Core F - Courses Related to Major**

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<tr>
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<td>ACCT 2102</td>
<td>Accounting II</td>
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<td>MGT 2106</td>
<td>Legal Aspects-Business</td>
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<td>MGT 2200</td>
<td>Information Technology</td>
<td>3</td>
</tr>
<tr>
<td>MGT 2250</td>
<td>Management Statistics</td>
<td>3</td>
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<tr>
<td>MGT 2255</td>
<td>Quant. Anlys. for Bus.</td>
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**Major Requirements**

<table>
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<tr>
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<th>Course Title</th>
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<td>LMC 3403</td>
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</tr>
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<td>MGT 3062</td>
<td>Financial Management</td>
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<tr>
<td>MGT 3101</td>
<td>Organizational Behavior</td>
<td>3</td>
</tr>
<tr>
<td>MGT 3102</td>
<td>Mgt Hum Res-Reg Environ</td>
<td>3</td>
</tr>
<tr>
<td>MGT 3300</td>
<td>Marketing Management I</td>
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<tr>
<td>MGT 3501</td>
<td>Operations Management</td>
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<tr>
<td>MGT 3599</td>
<td>Career Develmt Workshop</td>
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<td>MGT 3660</td>
<td>International Business</td>
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<td>MGT 3659</td>
<td>Foundations of Strategy</td>
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**Accounting Concentration**

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<td>MGT 4010</td>
<td>Business Taxation</td>
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<td>MGT 4026</td>
<td>Fin Report &amp; Analysis I</td>
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</tr>
<tr>
<td>MGT 4027</td>
<td>Fin Report &amp; Analysis II</td>
<td>3</td>
</tr>
<tr>
<td>MGT 4041</td>
<td>Audit&amp;Fin Control Sys</td>
<td>3</td>
</tr>
<tr>
<td>MGT 4015</td>
<td>Adv Managerial Acct</td>
<td>3</td>
</tr>
<tr>
<td>MGT 4028</td>
<td>Fin Analy &amp; Rpt-Tech Firms</td>
<td>3</td>
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<tr>
<td>MGT 4030</td>
<td>International Accounting</td>
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<tr>
<td>MGT 4043</td>
<td>Advanced Fin Reporting</td>
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<tr>
<td>MGT 4045</td>
<td>Sem-Advanced Accounting</td>
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<tr>
<td>MGT 4047</td>
<td>Ethics &amp; Accounting</td>
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**Non-MGT Electives**

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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
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<tr>
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**Free Electives**

<table>
<thead>
<tr>
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<th>Course Title</th>
<th>Credit Hours</th>
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<tr>
<td>Free Electives</td>
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</table>

Total Credit Hours 122

Pass-fail only allowed for Free Electives.

1 Any courses except for MGT or ACCT.

2 Maximum 3 credit hours of internship; Maximum 9 credit hours of undergraduate research; Maximum 3 credit hours of Special Problems/Independent Study.

3 Minimum grade of C required.

4 Consult your Academic Advisor for approval to use one Special Problems MGT 4910 course (3 credit hours) for a concentration elective. Course must be taught by a College of Business Accounting faculty member.

**International Plan**

The International Plan (http://www.internationalplan.gatech.edu) degree option is available to all College of Business undergraduate students. This option has been specifically designed to increase the international competence of our students through foreign language instruction, selected international courses, overseas residential experience, and a capstone, culminating course. This international competence is characterized by a graduate’s ability to communicate in a second world language, discuss substantively the major international socioeconomic processes, assimilate into foreign lifestyles and work environments, and communicate with confidence the specifics of management and business in a global context. Given the ever-increasing pace of globalization of business, this option should help students prepare for the business world of the future. All College of Business students should seek advising through the College of Business Undergraduate Programs Office (http://mgt.gatech.edu).

**Bachelor of Science in Business Administration - Finance**

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- Accounting
- Finance
- General Management
- Information Technology Management
- Leadership and Organizational Change
- Marketing
- Operations and Supply Chain Management
- Strategy and Innovation

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<tr>
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<td>APPH 1040</td>
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<tr>
<td>or APPH 10</td>
<td>Sci of Phys Act &amp; Health</td>
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<td>ENGL 1101</td>
<td>English Composition I</td>
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<td>ENGL 1102</td>
<td>English Composition II</td>
<td>3</td>
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<tr>
<td>MATH 1552</td>
<td>Integral Calculus</td>
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<tr>
<td>or MATH 17</td>
<td>Survey of Calculus</td>
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<tr>
<td>CS 1301</td>
<td>Intro to Computing</td>
<td>3</td>
</tr>
<tr>
<td>or CS 1315</td>
<td>Intro Media Computation</td>
<td></td>
</tr>
<tr>
<td>Any HUM (p. 93)</td>
<td></td>
<td>6</td>
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<tr>
<td>Lab Science</td>
<td></td>
<td>4</td>
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<tr>
<td>Lab Science</td>
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<td>4</td>
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<td>MATH 1551</td>
<td>Differential Calculus</td>
<td>4</td>
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<td>&amp; MATH 1553</td>
<td>and Intro to Linear Algebra</td>
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<tr>
<td>or MATH 17</td>
<td>Finite Mathematics</td>
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<td>HIST 2111</td>
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<td>HIST 2112</td>
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**Core F - Courses Related to Major**

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<tr>
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<tbody>
<tr>
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<tr>
<td>ACCT 2102</td>
<td>Accounting II</td>
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<td>MGT 2106</td>
<td>Legal Aspects-Business</td>
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<td>MGT 2200</td>
<td>Information Technology</td>
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<td>MGT 2250</td>
<td>Management Statistics</td>
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<tr>
<td>MGT 2255</td>
<td>Quant. Anlys. for Bus.</td>
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**Major Requirements**

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<tr>
<td>MGT 3076</td>
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<td>MGT 3079</td>
<td>Mgt of Fin Institutions</td>
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<td>MGT 4070</td>
<td>International Finance</td>
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<td>MGT 4067</td>
<td>Fncl Mkts Trading &amp; Struct</td>
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Select two of the following: 3,4

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<tr>
<td>MGT 3084</td>
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<td>MGT 4026</td>
<td>Fin Report &amp; Analysis I</td>
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<tr>
<td>MGT 4066</td>
<td>Corporate Restructuring</td>
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<td>MGT 4068</td>
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**Non-MGT Electives**

Non-MGT Electives 1

<table>
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<th>Code</th>
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**Free Electives**

Free Electives 2

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
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Total Credit Hours 122

Pass-fail only allowed for Free Electives.

1 Any courses except for MGT or ACCT.

2 Maximum 3 credit hours of internship; Maximum 9 credit hours of undergraduate research; Maximum 3 credit hours of Special Problems/Independent Study.

3 Minimum grade of C required.

4 Consult your Academic Advisor for approval to use one Special Problems MGT 4910 course (3 credit hours) for a concentration elective. Course must be taught by a College of Business Finance faculty member.

**International Plan**

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**Bachelor of Science in Business Administration - General Management**

Students with a broad interest in business and management activities and operating problems would profit from the Bachelor of Science in Business Administration degree program. The program builds upon knowledge of the functional, environmental, behavioral, and legal aspects of business and provides analytical and conceptual tools for analyzing complicated problems. It prepares the student for business and managerial responsibilities and decision making. The large number of elective hours allows the student to tailor a program to his or her individual educational objectives. Students must complete a concentration of electives in one of the following areas:

- Accounting
- Finance
- General Management
- Information Technology Management
- Leadership and Organizational Change
- Marketing
- Operations and Supply Chain Management
- Strategy and Innovation

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Current BSM students who decide to continue pursuing the BSM degree should review previous Georgia Tech catalogs and the College of Business website to see the BSM requirements.

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<td>ENGL 1101</td>
<td>English Composition I</td>
<td>3</td>
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<td>ENGL 1102</td>
<td>English Composition II</td>
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<tr>
<td>MATH 1552</td>
<td>Integral Calculus</td>
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<td>or MATH 17 Survey of Calculus</td>
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<td>Any HUM (p. 93)</td>
<td>6</td>
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<tr>
<td>Lab Science</td>
<td>4</td>
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**Major Requirements**

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**General Management Concentration**

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<td>MGT 4066</td>
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<td>MGT 4102</td>
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<td>MGT 4116</td>
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<td>MGT 4191</td>
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<td>MGT 4194</td>
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<td>MGT 4304</td>
<td>Strategic Brand Mgt</td>
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<td>MGT 4308</td>
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<td>MGT 4331</td>
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<td>MGT 4332</td>
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<td>MGT 4352</td>
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<td>MGT 4401</td>
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<td>MGT 4670</td>
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<td>MGT 4803</td>
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<td>MGT 4910</td>
<td>Special Problems</td>
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**Non-MGT Electives**

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<tr>
<td>MGT 4803</td>
<td>must have a title of Business Analytics, Business Forecasting, Business and Government Regulation, Business Programming, Corporate Governance, Employment, Benefits, and Compensation Law, Innovation and Entrepreneurial Behavior, or International HR, or Law for Entrepreneurs, or Leadership: Managing Professionals, or Management of Healthcare Operations, or Legal Issues in Sports Management or Managerial Economics, or Motivation and Rewards, or Project Management, or Sales Management.</td>
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</table>

**International Plan**

The International Plan (http://www.internationalplan.gatech.edu) degree option is available to all College of Business undergraduate students. This option has been specifically designed to increase the international competence of our students through foreign language instruction, selected international courses, overseas residential experience, and a capstone, culminating course. This international competence is
characterized by a graduate's ability to communicate in a second world language, discuss substantively the major international socioeconomic processes, assimilate into foreign lifestyles and work environments, and communicate with confidence the specifics of management and business in a global context. Given the ever-increasing pace of globalization of business, this option should help students prepare for the business world of the future. All College of Business students should seek advising through the College of Business Undergraduate Programs Office (http://mgt.gatech.edu).

**Bachelor of Science in Business Administration - Information Technology Management**

Students with a broad interest in business and management activities and operating problems would profit from the Bachelor of Science in Business Administration degree program. The program builds upon knowledge of the functional, environmental, behavioral, and legal aspects of business and provides analytical and conceptual tools for analyzing complicated problems. It prepares the student for business and managerial responsibilities and decision making. The large number of elective hours allows the student to tailor a program to his or her individual educational objectives. Students must complete a concentration of electives in one of the following areas:

- Accounting
- Finance
- General Management
- Information Technology Management
- Leadership and Organizational Change
- Marketing
- Operations and Supply Chain Management
- Strategy and Innovation

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**Change of Major Policy**

The College of Business requires a 2.3 cumulative GPA for any non-College of Business students requesting a change of major to Business Administration if the student has completed sixty credits (junior standing) or more. There is no GPA requirement for freshmen and sophomores (less than sixty credits) requesting a major change. This policy was approved by the College of Business faculty in April 2007. All students seeking a major change to Business Administration must attend a "change of major" meeting. Contact the College of Business Undergraduate Program Office (http://mgt.gatech.edu/programs/under) for dates and times of upcoming meetings.

Current Georgia Tech students who submit change of major forms to join the College of Business after January 17, 2011 will have the BS Business Administration degree, as the BS Management degree will no longer be available to new change of major students. Students who submit change of major forms before January 17, 2011 will have the BS Management degree. BS Management students may choose to stay in the BSM degree or may change into the BSBA degree. Once a student changes majors to BSBA, he or she cannot return to the BSM degree.

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### Bachelor of Science in Business Administration - Leadership and Organizational Change

**Major Requirements**

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**IT Management Concentration**

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**Non-MGT Electives**

Non-MGT Electives 2

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**Free Electives**

Free Electives 4

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</table>

Total Credit Hours 122

Pass-fail only allowed for Free Electives.

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1. MGT 4803 must have a title of Spreadsheet Modeling for Decision Support or Foundations of Internet Policy and Governance.

2. Any courses except for MGT or ACCT.

3. Minimum grade of C required.

4. Maximum 3 credit hours of internship; Maximum 9 credit hours of undergraduate research; Maximum 3 credit hours of Special Problems/Independent Study.

5. Students may apply unused Group A elective courses toward Group B electives.

### International Plan

The International Plan (http://www.internationalplan.gatech.edu) degree option is available to all College of Business undergraduate students. This option has been specifically designed to increase the international competence of our students through foreign language instruction, selected international courses, overseas residential experience, and a capstone, culminating course. This international competence is characterized by a graduate's ability to communicate in a second world language, discuss substantively the major international socioeconomic processes, assimilate into foreign lifestyles and work environments, and communicate with confidence the specifics of management and business in a global context. Given the ever-increasing pace of globalization of business, this option should help students prepare for the business world of the future. All College of Business students should seek advising through the College of Business Undergraduate Programs Office (http://mgtp.gatech.edu).

### Bachelor of Science in Business Administration - Leadership and Organizational Change

Students with a broad interest in business and management activities and operating problems would profit from the Bachelor of Science in Business Administration degree program. The program builds upon knowledge of the functional, environmental, behavioral, and legal aspects of business and provides analytical and conceptual tools for analyzing complicated problems. It prepares the student for business and managerial responsibilities and decision making. The large number of elective hours allows the student to tailor a program to his or her individual educational objectives. Students must complete a concentration of electives in one of the following areas:

- Accounting
- Finance
- General Management
- Information Technology Management
- Leadership and Organizational Change
- Marketing
- Operations and Supply Chain Management
- Strategy and Innovation

The new BS Business Administration degree replaces the BS Management degree previously offered by the College of Business. Starting summer 2011, all new freshmen and transfer students will be admitted to the B.S. Business Administration (BSBA) degree as the B.S. Management (BSM) degree will no longer be offered to new students. Current Tech students who submit change of major forms to join the College of Business after January 17, 2011 will have the BSBA degree, as the BSM degree will no longer be available to new change of major...
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**Change of Major Policy**

The College of Business requires a 2.3 cumulative GPA for any non-College of Business students requesting a change of major to Business Administration if the student has completed sixty credits (junior standing) or more. There is no GPA requirement for freshmen and sophomores (less than sixty credits) requesting a major change. This policy was approved by the College of Business faculty in April 2007. All students seeking a major change to Business Administration must attend a “change of major” meeting. Contact the College of Business Undergraduate Program Office (http://mgt.gatech.edu/programs/under) for dates and times of upcoming meetings.

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The BSBA and BSM degrees have different degree requirements. Students joining the BSBA degree must complete all BSBA degree requirements, including one of the newly approved management concentrations and several other courses not currently required of all BSM students. Current BSM students MUST attend a change of major meeting to change their majors to BSBA so they understand the requirements of the new degree which are different than the BSM requirements.

Current BSM students who decide to continue pursuing the BSM degree should review previous Georgia Tech catalogs and the College of Business website to see the BSM requirements.

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<tr>
<th>Code</th>
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<tbody>
<tr>
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<td>ENGL 1101</td>
<td>English Composition I</td>
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<td>ENGL 1102</td>
<td>English Composition II</td>
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<td>MATH 1552</td>
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<td>or MATH 17 Survey of Calculus</td>
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<td>CS 1301</td>
<td>Intro to Computing</td>
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<td>or CS 1315</td>
<td>Intro Media Computation</td>
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<td>Any HUM (p. 93)</td>
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<td>Lab Science</td>
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<td>Lab Science</td>
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<tr>
<td>MATH 1551</td>
<td>Differential Calculus</td>
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<tr>
<td>&amp; MATH 1553 and Intro to Linear Algebra</td>
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<tr>
<td>or MATH 17 Finite Mathematics</td>
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<td>Select one of the following:</td>
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<td>HIST 2111</td>
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<td>HIST 2112</td>
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<td>INTA 1200</td>
<td>American Government</td>
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<td>POL 1101</td>
<td>Government of the U.S.</td>
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<td>PUBP 3000</td>
<td>US Constitutional Issues</td>
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<td>ECON 2105</td>
<td>Prin of Macroeconomics</td>
<td>3</td>
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<td>ECON 2106</td>
<td>Prin of Microeconomics</td>
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<td>Any SS (p. 97)</td>
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<td>ACCT 2101</td>
<td>Accounting I</td>
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<td>ACCT 2102</td>
<td>Accounting II</td>
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<td>MGT 2106</td>
<td>Legal Aspects-Business</td>
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<td>MGT 2200</td>
<td>Information Technology</td>
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<td>MGT 2250</td>
<td>Management Statistics</td>
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<td>MGT 2255</td>
<td>Quant. Anlys. for Bus.</td>
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<td>LMC 3403</td>
<td>Tech Communication</td>
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<td>MGT 3062</td>
<td>Financial Management</td>
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<td>MGT 3101</td>
<td>Organizational Behavior</td>
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<td>MGT 3102</td>
<td>Mgt Hum Res-Reg Environ</td>
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<tr>
<td>MGT 3300</td>
<td>Marketing Management I</td>
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<td>MGT 3501</td>
<td>Operations Management</td>
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<td>MGT 3599</td>
<td>Career Develmnt Workshop</td>
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<td>MGT 3660</td>
<td>International Business</td>
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<tr>
<td>MGT 3659</td>
<td>Foundations of Strategy</td>
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</tbody>
</table>

**Leadership and Organizational Change Concentration**

Select four of the following: 1,3

- MGT 3103 Leadership-Changing Env
- MGT 3118 Cross-Cultural Mgt
- MGT 3607 Business Ethics
- MGT 4102 Management Consulting
- MGT 4117 Global Workforce Mgt
- MGT 4119 Leading Teams
- MGT 4803 Special Topics

Select two of the following: 2,3

- MGT 3744 Mang Prod Serv Tech Dev
- MGT 4116 Gend, Race, Ethn Org Behav
- MGT 4192 IMPACT Forum
- MGT 4193 Serv Lead Values Systems
- MGT 4194 Social Entrepreneurship
- MGT 4670 Entrepreneurship
- MGT 4803 Special Topics

Non-MGT Electives

- Non-MGT Electives 4

Free Electives

- Free Electives 5

Total Credit Hours 122

Pass-fail only allowed for Free Electives.

1. MGT 4803 must have a title of Innovation and Entrepreneurial Behavior, or Leadership: Managing Professionals, or Motivation and Rewards or Strategic Management of Human Assets.
2. MGT 4803 must have a title of Employment, Benefits, and Compensation Law.
3. Minimum grade of C required.
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<td>Wellness</td>
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<td>APPH 1040</td>
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<tr>
<td>or APPH 10</td>
<td>Sci of Phys Act &amp; Health</td>
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<td>Core A - Essential Skills</td>
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<td>ENGL 1101</td>
<td>English Composition I</td>
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<td>ENGL 1102</td>
<td>English Composition II</td>
<td>3</td>
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<td>Core B - Institutional Options</td>
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<td>MATH 1552</td>
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<td>or MATH 173</td>
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<td>CS 1301</td>
<td>Intro to Computing</td>
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<td>or CS 1315</td>
<td>Intro Media Computation</td>
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<td>Core C - Humanities</td>
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<td>Core D - Science, Math, &amp; Technology</td>
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<td>or MATH 173</td>
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<td>Core E - Social Sciences</td>
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<td>Any SS</td>
<td>(p. 97)</td>
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<td>Core F - Courses Related to Major</td>
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<td>MGT 2255</td>
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<td>LMC 3403</td>
<td>Tech Communication</td>
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<td>MGT 3102</td>
<td>Mgt Hum Res-Reg Environ</td>
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<td>MGT 3300</td>
<td>Marketing Management I</td>
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MGT 3501 Operations Management 3
MGT 3599 Career Develmt Workshop 1
MGT 3660 International Business 3
MGT 3659 Foundations of Strategy 3

Marketing Concentration

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<tr>
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<th>Title</th>
<th>Credits</th>
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<td>MGT 3310</td>
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Select five of the following: 1,2,3,5

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<tr>
<td>MGT 4304</td>
<td>Strategic Brand Mgt</td>
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<tr>
<td>MGT 4308</td>
<td>Adv &amp; Prom: Integ Mktg Comm</td>
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<td>MGT 4309</td>
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<td>MGT 4331</td>
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<td>MGT 4335</td>
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<td>MGT 4803</td>
<td>Special Topics</td>
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Non-MGT Electives

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<th>Course</th>
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<tbody>
<tr>
<td>MGT 4803</td>
<td>Pricing Strategy &amp; Analytics or Marketing Practicum</td>
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Free Electives

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<tr>
<th>Course</th>
<th>Title</th>
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<tr>
<td>MGT 4910</td>
<td>Marketing Practicum</td>
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Total Credit Hours 122

Pass-fail only allowed for Free Electives.

1 MGT 4803 must have title of Pricing Strategy & Analytics or Marketing Practicum
2 Any courses except for MGT or ACCT.
3 Minimum grade of C required.
4 Maximum 3 credit hours of internship; Maximum 9 credit hours of undergraduate research; Maximum 3 credit hours of Special Problems/Independent Study.
5 Consult your Academic Advisor for approval to use one Special Problems MGT 4910 course (3 credit hours) for a concentration elective. Course must be taught by a College of Business Marketing faculty member.
6 Scheller College of Business recommends students complete MGT 4058. It can be used to fulfill free elective requirements.

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Bachelor of Science in Business Administration - Operations and Supply Chain Management

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The College of Business requires a 2.3 cumulative GPA for any non-College of Business students requesting a change of major to Business Administration if the student has completed sixty credits (junior standing) or more. There is no GPA requirement for freshmen and sophomores (less than sixty credits) requesting a major change. This policy was approved by the College of Business faculty in April 2007. All students seeking a major change to Business Administration must attend a “change of major” meeting. Contact the College of Business Undergraduate Program Office (http://mgt.gatech.edu/programs/undergrad) for dates and times of upcoming meetings.

Current Georgia Tech students who submit change of major forms to join the College of Business after January 17, 2011 will have the BS Business Administration degree, as the BS Management degree will no longer be available to new change of major students. Students who submit change of major forms before January 17, 2011 will have the BS Management degree. BS Management students may choose to stay in the BSM degree or may change into the BSBA degree. Once a student changes majors to BSBA, he or she cannot return to the BSM degree.

The BSBA and BSM degrees have different degree requirements. Students joining the BSBA degree must complete all BSBA degree requirements, including one of the newly approved management
concentrations and several other courses not currently required of all BSM students. Current BSM students MUST attend a change of major meeting to change their majors to BSBA so they understand the requirements of the new degree which are different than the BSM requirements.

Current BSM students who decide to continue pursuing the BSM degree should review previous Georgia Tech catalogs and the College of Business website to see the BSM requirements.

### Code | Title | Credit Hours
---|---|---
| | **Wellness** | 
APPH 1040 | Sci Foundation of Health | 2 |
or APPH 10 | Sci of Phys Act & Health |
| | **Core A - Essential Skills** | 
ENGL 1101 | English Composition I | 3 |
ENGL 1102 | English Composition II | 3 |
MATH 1552 | Integral Calculus | 4 |
or MATH 17 | Survey of Calculus |
| | **Core B - Institutional Options** | 
CS 1301 | Intro to Computing | 3 |
or CS 1315 | Intro Media Computation |
| | **Core C - Humanities** | 
Any HUM (p. 93) | | 6 |
| | **Core D - Science, Math, & Technology** | 
Lab Science | 4 |
Lab Science | 4 |
MATH 1551 | Differential Calculus | 4 |
&MATH 1553 | and Intro to Linear Algebra | |
or MATH 17 | Finite Mathematics |
| | **Core E - Social Sciences** | 
Select one of the following: | 3 |
HIST 2111 | United States to 1877 | |
HIST 2112 | United States since 1877 | |
INTA 1200 | American Government | |
POL 1101 | Government of the U.S. | |
PUBP 3000 | US Constitutional Issues | |
ECON 2105 | Prin of Macroeconomics | 3 |
ECON 2106 | Prin of Microeconomics | 3 |
Any SS (p. 97) | | 3 |
| | **Core F - Courses Related to Major** | 
ACCT 2101 | Accounting I | 3 |
ACCT 2102 | Accounting II | 3 |
MGT 2106 | Legal Aspects-Business | 3 |
MGT 2200 | Information Technology | 3 |
MGT 2250 | Management Statistics | 3 |
MGT 2255 | Quant. Anlys. for Bus. | 3 |
| | **Major Requirements** | 
LMC 3403 | Tech Communication | 3 |
MGT 3062 | Financial Management | 3 |
MGT 3101 | Organizational Behavior | 3 |
MGT 3102 | Mgt Hum Res-Reg Environ | 3 |
MGT 3300 | Marketing Management I | 3 |
| | **Operations and Supply Chain Management Concentration** | 
Select four of the following: | 12 |
MGT 3510 | Management of Technology | |
MGT 3744 | Mangn Prod Serv Tech Dev | |
MGT 4352 | Operations Resource Plan | |
MGT 4353 | Operations Strategy | |
MGT 4360 | Global Operations | |
MGT 4366 | Service Operations Mgt | |
MGT 4401 | Supply Chain Modeling | |
| | **Non-MGT Electives** | 
Non-MGT Electives | 2 | 6 |
| | **Free Electives** | 
Free Electives | 4 | 10 |
| | **Total Credit Hours** | | 122 |

Pass-fail only allowed for Free Electives.

1. MGT 4803 must have title of Management of Healthcare Operations.
2. Any courses except for MGT or ACCT.
3. Minimum grade of C required.
4. Maximum 3 credit hours of internship; Maximum 9 credit hours of undergraduate research; Maximum 3 credit hours of Special Problems/Independent Study.
5. Consult your Academic Advisor for approval to use one Special Problems MGT 4910 course (3 credit hours) for a concentration elective. Course must be taught by a College of Business Operations faculty member.

### International Plan

The International Plan (http://www.internationalplan.gatech.edu) degree option is available to all College of Business undergraduate students. This option has been specifically designed to increase the international competence of our students through foreign language instruction, selected international courses, overseas residential experience, and a capstone, culminating course. This international competence is characterized by a graduate's ability to communicate in a second world language, discuss substantively the major international socioeconomic processes, assimilate into foreign lifestyles and work environments, and communicate with confidence the specifics of management and business in a global context. Given the ever-increasing pace of globalization of business, this option should help students prepare for the business world of the future. All College of Business students should...
seek advising through the College of Business Undergraduate Programs Office (http://mgt.gatech.edu).

**Bachelor of Science in Chemical and Biomolecular Engineering**

The Bachelor of Science in Chemical and Biomolecular Engineering provides the basics of biomolecular engineering but allows flexibility for the student to pursue other areas of chemical engineering such as microelectronics, materials, and the environment.

The curriculum has two options. The Biotechnology Option is for students who wish to focus their education on the biomolecular aspects of chemical and biomolecular engineering. This option includes the core chemical engineering courses, specialized biomolecular engineering courses, biochemistry, and technical electives focused in the biotechnology area. The Standard Option provides the basics of biomolecular engineering but allows much more flexibility for the student to pursue other areas of chemical engineering such as microelectronics, materials, and the environment. Special opportunities exist for students wishing to pursue minors or certificates in fields of particular interest, and students are encouraged to explore the frontiers of knowledge through involvement in faculty-directed research.

**Program Objectives**

The mission of the School of Chemical and Biomolecular Engineering is to provide students with the intellectual basis to be educated citizens, to prepare them for successful professional careers, and to advance the science and technology that form the basis of chemical and biomolecular engineering. In pursuit of this mission, the School has adopted the following:

**Program Educational Objectives**

1. Graduates will demonstrate proficiency in the principles and methods essential to modern chemical and biomolecular engineering.
2. Graduates will demonstrate broadened perspectives regarding social issues and responsibilities, ethics, and professionalism.
3. Graduates will be recognized for excellence and leadership and selected for high-quality industrial, academic, government, and other professional positions.
4. Graduates will demonstrate an understanding of the global nature of engineering practice and business activities.
5. Graduates will understand the importance of further professional growth through continuing education and research.

**Program Outcomes**

In pursuit of its educational objectives, the School has adopted the following program outcomes:

1. Students will demonstrate the ability to apply knowledge of mathematics, science, and engineering.
2. Students will demonstrate the ability to design and conduct experiments, as well as to analyze and interpret data.
3. Students will demonstrate the ability to design a system, component, product, and/or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
4. Students will demonstrate an ability to lead and function on multidisciplinary teams.
5. Students will demonstrate an ability to identify, formulate, and solve engineering problems.
6. Students will demonstrate an understanding of professional and ethical responsibility.
7. Students will demonstrate the ability to communicate effectively.
8. Students will demonstrate a breadth in education that facilitates understanding the impact of engineering solutions in a global, economic, environmental, and societal context.
9. Students will demonstrate recognition of the need for and an ability to engage in lifelong learning.
10. Students will demonstrate knowledge of contemporary issues, especially as related to chemical engineering practice.
11. Students will demonstrate the ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.
12. Students will have an understanding of the chemical engineering profession as obtained through professional organizations, cooperative education, internships, undergraduate research, and/or required laboratory courses.
13. Students will have a thorough grounding in the basic sciences including chemistry, physics, and biology appropriate to the program objectives.
14. Students will demonstrate knowledge in the applications of these basic sciences to enable graduates to design, analyze, and control physical, chemical, and biological processes consistent with the program's educational objectives.

**Wellness**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>APPH 1040</td>
<td>Sci Foundation of Health</td>
<td>2</td>
</tr>
<tr>
<td>or APPH 10 10 Sci of Phys Act &amp; Health</td>
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**Core A - Essential Skills**

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<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>ENGL 1101</td>
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<td>ENGL 1102</td>
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<tr>
<td>MATH 1552</td>
<td>Integral Calculus ³</td>
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**Core B - Institutional Options**

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<tbody>
<tr>
<td>CS 1371</td>
<td>Computing for Engineers</td>
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**Core C - Humanities**

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<tr>
<th>Code</th>
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**Core D - Science, Math, & Technology**

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<tr>
<td>PHYS 2211</td>
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</tr>
<tr>
<td>PHYS 2212</td>
<td>Intro Physics II ²</td>
<td>4</td>
</tr>
<tr>
<td>MATH 1551</td>
<td>Differential Calculus ³</td>
<td>2</td>
</tr>
<tr>
<td>MATH 1553</td>
<td>Intro to Linear Algebra ³</td>
<td>2</td>
</tr>
<tr>
<td>or MATH 1554</td>
<td>Linear Algebra</td>
<td></td>
</tr>
<tr>
<td>or MATH 156</td>
<td>Linear Alg w Abstract Vec Sp</td>
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**Core E - Social Sciences**

Select one of the following:

<table>
<thead>
<tr>
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<tr>
<td>HIST 2111</td>
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<td>3</td>
</tr>
<tr>
<td>HIST 2112</td>
<td>United States since 1877</td>
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<tr>
<td>INTA 1200</td>
<td>American Government</td>
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<tr>
<td>POL 1101</td>
<td>Government of the U.S.</td>
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<tr>
<td>PUBP 3000</td>
<td>US Constitutional Issues</td>
<td></td>
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<tr>
<td>ECON 2100</td>
<td>Economics and Policy</td>
<td>3</td>
</tr>
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<td>Any SS (p. 97)</td>
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Core F - Courses Related to Major
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<thead>
<tr>
<th>Course</th>
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<tbody>
<tr>
<td>BIOL 1510</td>
<td>Biological Principles</td>
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<tr>
<td>CHEM 1211K</td>
<td>Chemical Principles I</td>
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<tr>
<td>CHEM 2380</td>
<td>Synthesis Lab I</td>
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<td>MATH 2551</td>
<td>Multivariable Calculus</td>
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<td>Differential Equations</td>
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Major Requirements

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<tbody>
<tr>
<td>CHBE 2100</td>
<td>Chem Process Principles</td>
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<tr>
<td>CHBE 2120</td>
<td>ChE Numerical Mthds</td>
</tr>
<tr>
<td>CHBE 2130</td>
<td>Chem Eng Thermo I</td>
</tr>
<tr>
<td>CHBE 3130</td>
<td>Chem Eng Thermo II</td>
</tr>
<tr>
<td>CHBE 3200</td>
<td>Transport Processes I</td>
</tr>
<tr>
<td>CHBE 3210</td>
<td>Transport Processes II</td>
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<tr>
<td>CHBE 3225</td>
<td>Separations Processes</td>
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<tr>
<td>CHBE 4200</td>
<td>Unit Operations Lab</td>
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<tr>
<td>CHBE 4300</td>
<td>Kinetics &amp; Reactor Dsgn</td>
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<tr>
<td>CHBE 4411</td>
<td>Process Control</td>
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<tr>
<td>CHBE 4412</td>
<td>Process Control Lab</td>
</tr>
<tr>
<td>CHBE 4510</td>
<td>Proc &amp; Prod Design &amp; Econ</td>
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<td>CHBE 4515</td>
<td>Chemical Process Safety</td>
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<tr>
<td>CHBE 4520</td>
<td>Capstone CHBE Design</td>
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CHBE Electives

<table>
<thead>
<tr>
<th>Course</th>
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<tr>
<td>CHBE Electives</td>
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CHBE Technical Electives

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<tbody>
<tr>
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<tr>
<td>3000-level Technical Elective or higher</td>
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Other Engineering and Science Requirements

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<th>Title</th>
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<tbody>
<tr>
<td>CHEM 1212K</td>
<td>Chemical Principles II</td>
</tr>
<tr>
<td>CHEM 2311</td>
<td>Organic Chemistry I</td>
</tr>
<tr>
<td>CHEM 2312</td>
<td>Organic Chemistry II</td>
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Select two of the following:

<table>
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<tr>
<th>Course</th>
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<tbody>
<tr>
<td>CHEM 3111</td>
<td>Inorganic Chemistry</td>
</tr>
<tr>
<td>CHEM 3281</td>
<td>Instrumental Analysis</td>
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<tr>
<td>CHEM 3412</td>
<td>Physical Chemistry II</td>
</tr>
<tr>
<td>CHEM 3511</td>
<td>Survey of Biochemistry</td>
</tr>
<tr>
<td>CHEM 4311</td>
<td>Adv Organic Chem</td>
</tr>
<tr>
<td>CHEM 4341</td>
<td>Applied Spectroscopy</td>
</tr>
<tr>
<td>CHEM 4511</td>
<td>Biochemistry I</td>
</tr>
<tr>
<td>MSE 2001</td>
<td>Prin &amp; Appl Engr Materials</td>
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</table>

Free Electives

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Free Electives (up to 2)</td>
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</tr>
</tbody>
</table>

Total Credit Hours 132

Pass-fail only allowed for Free Electives, Humanities electives, and undesignated Social Sciences electives.

CHBE Electives must be chosen from the following list: CHBE 4020, CHBE 4310, CHBE 4535, CHBE 4752, CHBE 4757, CHBE 4760, CHBE 4763, CHBE 4764, CHBE 4765, CHBE 4770, CHBE 4775, CHBE 4776, CHBE 4791, CHBE 4793, CHBE 4794, CHBE 4803 (must be titled “Microfluidics and NanoFluidics,” “Surfaces and Colloids,” or “Data-Driven Modeling and Analysis for Chemical and Biomolecular Systems”).

Students should consult with their advisor regarding Technical Elective options. Technical Electives must be chosen from the following list: AE 4451, AE 4461, AE 4883, BMED 2400, BMED 3400, BMED 3510, BMED 4477, BMED 4751, BMED 4784, CEE 2040, CEE 2300, CEE 4300, CEE 4330, CEE 4620, CHBE 4020, CHBE 4310, CHBE 4535, CHBE 4752, CHBE 4757, CHBE 4763, CHBE 4764, CHBE 4765, CHBE 4770, CHBE 4775, CHBE 4791, CHBE 4793, CHBE 4794, CHBE 4803 (must include title of “Data-Driven Modeling & Anal. for Ch,” “Microfluidics/BioMEMS,” “Surface & Colloid Chemistry & Engineering”), CHBE 6120, CHBE 6794, COE 2001, COE 3001, COE 3002, ECE 2025, ECE 2030, ECE 3025, ECE 3040, ECE 3065, ECE 3071, ECE 3080, ECE 3710, ECE 3741, ISYE 2027, ISYE 2028, ISYE 3025, ISYE 3039, ISYE 3133, ISYE 3232, ISYE 4803 (must include title of “EDA Supply Chain Econ.,” or “Regression/Forecasting”), ME 2202, ME 3057, ME 4011, MSE 2021, MSE 3002, MSE 4751, MSE 4803 (must include title of “Biologically Inspired Design,” or “Fund. of Nanomater. & Struct.”), NRE 3301, NRE 4328, NRE 4610, NRE 4803 (must include title of “Nuclear & Radiation Technol.,” “Probabilistic Risk Assessment”), or NRE 6501.

Phys 2XXX (AP credit) not allowed.

Cooperative Option

Since 1912, Georgia Tech has offered a five-year Undergraduate Cooperative Program to those students who wish to combine career-related experience with classroom studies. The program is the fourth oldest of its kind in the world and the largest optional co-op program in the country. Traditionally, 35 to 40 percent of chemical and biomolecular engineering students participate in the program each year at Georgia Tech.

Students alternate between industrial assignments and classroom studies until they complete four or five semesters of work. Co-op students with chemical and biomolecular engineering majors complete the same coursework on campus that is completed by regular four-year students. Most co-op students begin the program as sophomores and are classified as full-time students regardless of whether they are attending classes on campus or are working full time at an employer’s location.

Students who participate in the program have the opportunity to develop career interests, become more confident in their career choices, and develop human relation skills through their work experience. Graduates of the program receive a bachelor’s degree with a Cooperative Plan designation.

International Plan

The International Plan is a challenging and coherent academic program for undergraduates emphasizing global competence within the context of the aerospace engineering major. This program has specific language requirements. There are also coursework requirements related to history, global economy, international culture, and residential foreign experience. Refer to www.internationalplan.gatech.edu (http://www.internationalplan.gatech.edu) for the general requirements of the International Plan. These requirements may be satisfied by carefully
selecting the humanities, social sciences, and free elective hours available in the program, in consultation with a faculty advisor.

**Research Option**

The Chemical and Biomolecular Engineering undergraduate program offers an undergraduate Research Option that allows students to participate in undergraduate research and complete an undergraduate thesis. The words "Research Option" will appear on the transcript of each student completing the requirements to indicate that the student has had substantial, in-depth research experience.

**BS/MS Chemical and Biomolecular Engineering**

The program seeks to engage undergraduate students at Georgia Tech who indicate an interest in, and ability for, additional education beyond the BS degree. Students with significant AP credit will be especially well positioned to take full advantage of this opportunity.

Students in the BS/MS Program will remain undergraduates until they meet the requirements for the BS degree; after which, their status will change to graduate student.

Students are eligible to apply for the program after completion of thirty semester credit hours at Georgia Tech (i.e., at the end of freshman year). As a practical matter, it is recommended that students apply to the program immediately after completion of CHBE 3110. Students must have a Georgia Tech GPA of 3.5 or higher for admission into the program.

Admission into the program will be based on academic performance at Georgia Tech, as well as the potential for advanced study and/or research as assessed from the essay and recommendation letter.

Continuation in the program will require the student to maintain a GPA of 3.0 or higher. This GPA requirement should not deter students from taking challenging courses. The program will not penalize students who opt out after receiving the BS degree. Additionally, students participating in the program will be eligible for the six credit hour Graduate Course Option (http://www.catalog.gatech.edu/academics/graduate/masters-degrees/graduate-course-option).

Additional Information (http://www.chbe.gatech.edu/programs/bs-ms)

**Bachelor of Science in Chemistry**

The School of Chemistry and Biochemistry has a vibrant program of study leading to a Bachelor of Science in Chemistry. The flexibility of the curriculum allows students to study fundamental areas of chemistry while tailoring their degree with technical and free electives to produce a well-rounded experience in preparation for a variety of career opportunities. Students may pursue tailored tracks towards the BS in Chemistry, including those allowing specialization in: pre-health science, biochemistry, business, polymers, and materials options. There are also tremendous opportunities to gain valuable research experience in state-of-the-art laboratories. In addition to coursework requirements, students in the program often participate in a variety of experiential programs, including: undergraduate research, Cooperative work, study abroad, summer internship, and serving as an undergraduate teaching assistant.

Faculty in the school are committed to undergraduate education and several have won awards for excellence in teaching. With a faculty to student ratio of approximately 1:6, the School prides itself on the close contact that it maintains with its undergraduate students. The high quality of the curriculum and faculty is part of the reason chemistry graduates receive job offers at the highest salary levels for BS chemists. Graduates of the BS in Chemistry pursue careers such diverse field as forensics, environmental science, nanoscience, biotechnology, pharmaceuticals in industry or governmental organizations; or they may continue their education in the chemical or biological sciences, or in medicine, pharmacy, dentistry, and law. Chemistry, especially with the biochemistry option (or the stand-alone BS in Biochemistry degree) is a superb preparation for medical school.

Chemistry Website (http://www.chemistry.gatech.edu)

- Bachelor of Science in Chemistry · General (p. 238)
- Bachelor of Science in Chemistry · Biochemistry Option (p. 235)
- Bachelor of Science in Chemistry · Business Option (p. 236)
- Bachelor of Science in Chemistry · Materials Option (p. 239)
- Bachelor of Science in Chemistry · Polymer Option (p. 241)
- Bachelor of Science in Chemistry · Pre-health Option (p. 242)

**International Plan**

The BS in Chemistry (International Plan) and BS in biochemistry (International Plan) are offered to undergraduate students seeking to understand their majors in a global perspective. Students in this program must demonstrate proficiency in a foreign language; complete coursework in a country/regional elective, international relations, and global economics; and participate study or research abroad experience (usually in the junior year). While abroad, students are required to complete a supervised research experience with a faculty member in chemistry or biochemistry at the host institution. Upon successful completion of degree requirements for the International Plan, a "International Plan" designator is indicated on the diploma. If interested in participating in the International Plan as part of the BS in Chemistry or BS in Biochemistry, students should visit: www.internationalplan.gatech.edu (http://www.internationalplan.gatech.edu).

**Research Option**

The BS in Chemistry (Research Option) and BS in Biochemistry (Research Option) are offered for students who wish to participate in a research problem under the supervision of one of the fifty members of faculty and adjunct faculty in the School. Participants in the Research Option learn how to address a research problem from experiment design and execution to interpretation of results. There is an expectation that undergraduates who contribute to completed studies will be co-authors on submissions to high-quality scholarly journals. Research projects are available in the traditional areas of chemistry (analytical, biological, inorganic, organic, physical, and polymer chemistry) as well as highly interdisciplinary research areas, such as nanotechnology, polymer and materials chemistry, environmental chemistry and sensors, medicinal chemistry, molecular biophysics, and computational chemistry.

To participate in the Research Option in the School of Chemistry and Biochemistry, students should find a research project with a faculty member in the department and apply online via www.undergradresearch.gatech.edu (http://www.undergradresearch.gatech.edu). Successful completion of the Research Option requires the following:

<table>
<thead>
<tr>
<th>Code</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>9</td>
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</table>

Select one of the following Research Options:

1. Bachelor of Science in Chemistry - Pre-health Option (p. 242)
Chemistry Website (http://www.chemistry.gatech.edu)

**Bachelor of Science in Chemistry - Biochemistry Option**

The School of Chemistry and Biochemistry has a vibrant program of study leading to a Bachelor of Science in Chemistry. The flexibility of the curriculum allows students to study fundamental areas of chemistry while tailoring their degree with technical and free electives to produce a well-rounded experience in preparation for a variety of career opportunities. Students may pursue tailored tracks towards the BS in Chemistry, including those allowing specialization in: pre-health science, biochemistry, business, polymers, and materials options. There are also tremendous opportunities to gain valuable research experience in state-of-the-art laboratories. In addition to coursework requirements, students in the program often participate in a variety of experiential programs, including: undergraduate research, Cooperative work, study abroad, summer internship, and serving as an undergraduate teaching assistant.

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Successful completion of the Research Option is noted on the student's transcript. Students completing this degree may pursue graduate studies in the chemical or biological sciences or research careers in industrial or governmental laboratories.

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>CHEM 4698/4699</td>
<td>Research Assistantship</td>
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<tr>
<td>LMC 4701</td>
<td>US Rsch Proposal Writing (complete during the first or second semester of research)</td>
<td>1</td>
</tr>
<tr>
<td>LMC 4702</td>
<td>US Rsch Thesis Writing (take during the term in which students complete their thesis)</td>
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**Core B - Institutional Options**

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<td>ENGL 1101</td>
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<td>ENGL 1102</td>
<td>English Composition II</td>
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**Core C - Humanities**

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<tbody>
<tr>
<td>MATH 1552</td>
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**Core D - Science, Math, & Technology**

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**Core E - Social Sciences**

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**Core F - Courses Related to Major**

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<td>Chemical Principles II</td>
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<td>MATH 2551</td>
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<td>BIOL 1510</td>
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**Major Requirements**

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<td>CHEM 4581</td>
<td>Biochemistry Lab I</td>
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<td>CHEM 4601</td>
<td>Chemistry Seminar</td>
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<tr>
<td>Biochemistry Lab Elective</td>
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<tr>
<td>CHEM 4582</td>
<td>Biochemistry Lab II</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 4765</td>
<td>Drug Design, Devlpmnt&amp;Delivery</td>
<td>3</td>
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<tr>
<td>BIOL 4418</td>
<td>Microbial Physiology</td>
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<tr>
<td>BIOL 4401</td>
<td>Exper Dgn&amp;Statis Methods</td>
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**Biochemistry Option**

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<tr>
<td>BIOL 3380</td>
<td>Intro Microbiology</td>
<td>3</td>
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<td>BIOL 3450</td>
<td>Cell Molecular Biol</td>
<td>3</td>
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<tr>
<td>BIOL 4340</td>
<td>Medical Microbiology</td>
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<td>BIOL 418</td>
<td>Microbial Physiology</td>
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<td>Exper Dgn&amp;Statis Methods</td>
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</table>
Bachelor of Science in Chemistry - Business Option

**Research Option**

The following options are available:

- **Chemistry Website** ([http://www.chemistry.gatech.edu](http://www.chemistry.gatech.edu))
- **Research Assistantship**
  - CHEM 4698/4699
  - LMC 4701 US Rsch Proposal Writing (complete during the first or second semester of research)  
  - LMC 4702 US Rsch Thesis Writing (take during the term in which students complete their thesis)

**Total Credit Hours** 11

1. supervised research with a chemistry or biochemistry faculty over three or more semesters
2. approval of this proposal on project by a committee of two or more faculty
3. submission of an approved thesis

Successful completion of the Research Option is noted on the student's transcript. Students completing this degree may pursue graduate studies in the chemical or biological sciences or research careers in industrial or governmental laboratories.

**International Plan**

The BS in Chemistry (International Plan) and BS in Biochemistry (International Plan) are offered to undergraduate students seeking to understand their majors in a global perspective. Students in this program must demonstrate proficiency in a foreign language; complete coursework in a country/regional elective, international relations, and global economics; and participate study or research abroad experience (usually in the junior year). While abroad, students are required to complete a supervised research experience with a faculty member in chemistry or biochemistry at the host institution. Upon successful completion of degree requirements for the International Plan, a "International Plan" designator is indicated on the diploma. If interested in participating in the International Plan as part of the BS in Chemistry or BS in Biochemistry, students should visit: www.internationalplan.gatech.edu ([http://www.internationalplan.gatech.edu](http://www.internationalplan.gatech.edu)).

**Bachelor of Science in Chemistry - Business Option**

The School of Chemistry and Biochemistry has a vibrant program of study leading to a Bachelor of Science in Chemistry. The flexibility of the curriculum allows students to study fundamental areas of chemistry while tailoring their degree with technical and free electives to produce a well-rounded experience in preparation for a variety of career opportunities. Students may pursue tailored tracks towards the BS in Chemistry, including those allowing specialization in: pre-health science, biochemistry, business, polymers, and materials options. There are also tremendous opportunities to gain valuable research experience in state-of-the-art laboratories. In addition to coursework requirements, students in the program often participate in a variety of experiential programs, including: undergraduate research, Cooperative work, study abroad, summer internship, and serving as an undergraduate teaching assistant.

Faculty in the school are committed to undergraduate education and several have won awards for excellence in teaching. With a faculty to student ratio of approximately 1:6, the School prides itself on the close contact that it maintains with its undergraduate students. The high quality of the curriculum and faculty is part of the reason chemistry graduates receive job offers at the highest salary levels for BS chemists. Graduates of the BS in Chemistry pursue careers such diverse field as forensics, environmental science, nanoscience, biotechnology, pharmaceuticals in industry or governmental organizations; or they may continue their education in the chemical or biological sciences, or in medicine, pharmacy, dentistry, and law. Chemistry, especially with the biochemistry option (or the stand-alone BS in Biochemistry degree) is a superb preparation for medical school.

**Chemistry Website ([http://www.chemistry.gatech.edu](http://www.chemistry.gatech.edu))**

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**Core A - Essential Skills**

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<tr>
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<tr>
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<td>ENGL 1102</td>
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<td>Course Code</td>
<td>Course Title</td>
<td>Credit Hours</td>
</tr>
<tr>
<td>------------</td>
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</tr>
<tr>
<td>MATH 1552</td>
<td>Integral Calculus</td>
<td>4</td>
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</table>

**Core B - Institutional Options**

- CS 1301: Intro to Computing
- or CS 1315: Intro Media Computation
- or CS 1371: Computing for Engineers

**Core C - Humanities**

- Any HUM (p. 93) 6

**Core D - Science, Math, & Technology**

- PHYS 2211: Intro Physics I 4
- PHYS 2212: Intro Physics II 4
- MATH 1551: Differential Calculus 2
- MATH 1553: Intro to Linear Algebra 5

**Core E - Social Sciences**

Select one of the following:

- HIST 2111: United States to 1877
- HIST 2112: United States since 1877
- INTA 1200: American Government
- PUBP 3000: US Constitutional Issues
- ECON 2106: Prin of Microeconomics

Any SS (p. 97) 6

**Core F - Courses Related to Major**

- CHEM 1211K: Chemical Principles I 4
- CHEM 1212K: Chemical Principles II 4
- CHEM 2380: Synthesis Lab I 2
- MATH 2551: Multivariable Calculus 4
- BIOL 1510: Biological Principles 4

**Major Requirements**

- CHEM 2214: Quantitative Analysis 4
- CHEM 2311: Organic Chemistry I 3
- CHEM 2312: Organic Chemistry II 3
- or CHEM 23 Organic/Bioorganic Chem
- CHEM 3111: Inorganic Chemistry 3
- CHEM 3211: Analytical Chemistry 5
- CHEM 3380: Synthesis Lab II 3
- CHEM 3411: Physical Chemistry I 3
- CHEM 3412: Physical Chemistry II 3
- CHEM 3481: Physical Chem Lab I 2

**Additional Major Required**

- Research Experience 2
- COOP 4000: Co-op Work Assignment
- CHEM 4694: Intern Assistantship
- CHEM 4695: Undergraduate Internship
- CHEM 4698: Research Assistantship
- CHEM 4699: Undergraduate Research
- INTN 4000: Professional Internship
- CHEM 3511: Survey of Biochemistry 3
- or CHEM 45 Biochemistry I
- or CHEM 45 Biochemistry II
- CHEM 4000- or 6000-level 1

**Business Option**

- ACCT 2101: Accounting I 3
- MGT 300: Financ & Managerial Acct
- MGT 3101: Organizational Behavior
- or MGT 315: Pri of Management
- or PSYC 22: Industrial/Organizational Psy

Select two of the following:

- MGT 3062: Financial Management
- MGT 3078: Finance & Investments
- MGT 3300: Marketing Management I
- MGT 3660: International Business
- MGT 4015: Adv Managerial Acct
- MGT 4026: Fin Report & Analysis I
- MGT 4028: Fin Analy&Rpt-Tech Firms
- MGT 4030: International Accounting
- MGT 4190: Strategic Quality Mgt
- MGT 4191: Entrepreneurship Forum
- MGT 4192: IMPACT Forum
- MGT 4193: Serv Lead Values Systems
- MGT 4194: Social Entrepreneurship
- MGT 4303: Personal Sell&S Sales Mgt
- MGT 4304: Strategic Brand Mgt
- MGT 4307: Strategic Marketing
- MGT 4335: International Marketing
- MGT 4610: Law, Mgt, & Economics
- MGT 4670: Entrepreneurship

**Free Electives**

Free Electives 3,4 10

Total Credit Hours 122

Pass-fail only allowed for Free Electives.

1. CHEM 4699 not allowed.
2. If CHEM 4694, CHEM 4698, COOP 4000, or INTN 4000 are selected, then 2 hours of free electives must be taken.
3. Courses may be applied toward completion of a minor.
4. VIP courses may be used only as free electives.
5. MATH 1554 or MATH 1564 may be used in place of MATH 1553.

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The BS in Chemistry (International Plan) and BS in biochemistry (International Plan) are offered to undergraduate students seeking to understand their majors in a global perspective. Students in this program must demonstrate proficiency in a foreign language; complete coursework in a country/regional elective, international relations, and global economics; and participate study or research abroad experience (usually in the junior year). While abroad, students are required to complete a supervised research experience with a faculty member in chemistry or biochemistry at the host institution. Upon successful completion of degree requirements for the International Plan, a "International Plan" designator is indicated on the diploma. If interested in participating in the International Plan as part of the BS in Chemistry or BS in Biochemistry, students should visit: www.internationalplan.gatech.edu (http://www.internationalplan.gatech.edu).
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The BS in Chemistry (Research Option) and BS in Biochemistry (Research Option) are offered for students who wish to participate in a research problem under the supervision of one of the fifty members of faculty and adjunct faculty in the School. Participants in the Research Option learn how to address a research problem from experiment design and execution to interpretation of results. There is an expectation that undergraduates who contribute to completed studies will be co-authors on submissions to high-quality scholarly journals. Research projects are available in the traditional areas of chemistry (analytical, biological, inorganic, organic, physical, and polymer chemistry) as well as highly interdisciplinary research areas, such as nanomaterials, polymer and materials chemistry, environmental chemistry and sensors, medicinal chemistry, molecular biophysics, and computational chemistry.

To participate in the Research Option in the School of Chemistry and Biochemistry, students should find a research project with a faculty member in the department and apply online via www.undergradresearch.gatech.edu (http://www.undergradresearch.gatech.edu). Successful completion of the Research Option requires the following:

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Total Credit Hours 11

1 supervised research with a chemistry or biochemistry faculty over three or more semesters
2 approval of this proposal on project by a committee of two or more faculty
3 submission of an approved thesis

Successful completion of the Research Option is noted on the student’s transcript. Students completing this degree may pursue graduate studies in the chemical or biological sciences or research careers in industrial or governmental laboratories.

Bachelor of Science in Chemistry - General

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CHEM 3211  Analytical Chemistry 5
CHEM 3380  Synthesis Lab II 3
CHEM 3411  Physical Chemistry I 3
CHEM 3412  Physical Chemistry II 3
CHEM 3481  Physical Chem Lab I 2

Additional Major Requirements
Research Experience 2
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- CHEM 4694 Intern Assistantship
- CHEM 4695 Undergraduate Internship
- CHEM 4698 Research Assistantship
- CHEM 4699 Undergraduate Research
- INTN 4000 Professional Internship
CHEM 3511  Survey of Biochemistry 3
or CHEM 45 Biochemistry I
or CHEM 45 Biochemistry II
CHEM 4000 or 6000-level Electives 1 6
3000-level Technical Electives 2, 4 6

Free Electives
Free Electives 4, 5 13
Total Credit Hours 122

Pass-fail only allowed for Free Electives.

1. CHEM 4695 and CHEM 4699 not allowed.
2. Courses must be 3000-level or higher, and from the Colleges of Computing, Engineering, or Sciences and MATH 2552, SLS 3110, or SLS 3210. - Limit 3 credit hours of CHEM 4699.
3. If CHEM 4694, CHEM 4698, COOP 4000, or INTN 4000 are selected, then 2 hours of free electives must be taken.
4. Courses may be applied toward completion of a minor.
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Materials Option

Research Experience 2

- COOP 4000 Co-op Work Assignment
- CHEM 4694 Intern Assistantship
- CHEM 4695 Undergraduate Internship
- CHEM 4698 Research Assistantship
- CHEM 4699 Undergraduate Research
- INTN 4000 Professional Internship

CHEM 3511 Survey of Biochemistry or CHEM 45 Biochemistry I or CHEM 45 Biochemistry II

MSE 2001 Prin&Appl-Engr Materials 3

Select three of the following: 1,3

- MSE 2021 Math Characterization
- MSE 3001 Chemical Thermo-Material
- MSE 3002 Strct Trans-Met,Cer&Poly
- MSE 3003 Course MSE 3003 Not Found
- MSE 3012 Thermal&Transport Props
- MSE 3015 Elec, Optical&Magnet Prop
- MSE 3021 Materials Laboratory I
- MSE 4002 Cer Mate-Prop,Proces&App
- MSE 4010 Environ Degradation
- MSE 4020 Course MSE 4020 Not Found
- MSE 4022 Materials Laboratory II
- MSE 4325 Thin Film Materials Sci
- MSE 4751 Intro to Biomaterials

Free Electives

- Free Electives 3,4 13

Total Credit Hours 122

Pass-fail only allowed for Free Electives.

1 Six of the nine credits must be 3000-level or higher. Special Topics also allowed with departmental approval.
2 If CHEM 4694, CHEM 4698, COOP 4000, or INTN 4000 are selected, then 2 hours of free electives must be taken.
3 Courses may be applied toward completion of a minor.
4 VIP courses may be used only as free electives.
5 MATH 1554 or MATH 1564 may be used in place of MATH 1553.

International Plan

The BS in Chemistry (International Plan) and BS in biochemistry (International Plan) are offered to undergraduate students seeking to understand their majors in a global perspective. Students in this program must demonstrate proficiency in a foreign language; complete coursework in a country/regional elective, international relations, and global economics; and participate study or research abroad experience (usually in the junior year). While abroad, students are required to complete a supervised research experience with a faculty member in chemistry or biochemistry at the host institution. Upon successful completion of degree requirements for the International Plan, a "International Plan" designator is indicated on the diploma. If interested in
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**Bachelor of Science in Chemistry - Polymer Option**

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**Any SS (p. 97) | (p. 97) | 9            |

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**Pre-Health Option**

Lab Electives: 6

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<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 3380</td>
<td>Synthesis Lab II</td>
<td></td>
</tr>
<tr>
<td>CHEM 4695</td>
<td>Undergraduate Internship</td>
<td></td>
</tr>
<tr>
<td>CHEM 4699</td>
<td>Undergraduate Research</td>
<td></td>
</tr>
<tr>
<td>CHEM 4694</td>
<td>Intern Assistantship</td>
<td></td>
</tr>
<tr>
<td>CHEM 4698</td>
<td>Research Assistantship</td>
<td></td>
</tr>
<tr>
<td>Technical electives</td>
<td>Technical electives</td>
<td>3</td>
</tr>
</tbody>
</table>

Pre-Health Electives: 5

<table>
<thead>
<tr>
<th>Code</th>
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<tbody>
<tr>
<td>APPH 3753</td>
<td>Anatomy</td>
<td></td>
</tr>
<tr>
<td>APPH 3754</td>
<td>Anatomy Lab</td>
<td></td>
</tr>
<tr>
<td>APPH 3755</td>
<td>Human Physiology</td>
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</tr>
<tr>
<td>APPH 3756</td>
<td>Physiology Lab</td>
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</tr>
<tr>
<td>APPH 4400</td>
<td>Human Neuroanatomy</td>
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</tr>
<tr>
<td>BIOL 2344</td>
<td>Genetics</td>
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</tr>
<tr>
<td>BIOL 2345</td>
<td>Genetics Laboratory</td>
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</tr>
<tr>
<td>BIOL 3380</td>
<td>Intro Microbiology</td>
<td></td>
</tr>
<tr>
<td>BIOL 3381</td>
<td>Intro Microbiology Lab</td>
<td></td>
</tr>
<tr>
<td>BIOL 3451</td>
<td>Cell Molecular Biol Lab</td>
<td></td>
</tr>
<tr>
<td>BIOL 4015</td>
<td>Cancer Bio/Tech</td>
<td></td>
</tr>
<tr>
<td>BIOL 4340</td>
<td>Medical Microbiology</td>
<td></td>
</tr>
<tr>
<td>BIOL 4464</td>
<td>Developmental Biology</td>
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<tr>
<td>BIOL 4545</td>
<td>Human Genetics</td>
<td></td>
</tr>
<tr>
<td>BIOL 4570</td>
<td>Immunology &amp; Immunochem</td>
<td></td>
</tr>
<tr>
<td>BIOL 4650</td>
<td>Bioethics</td>
<td></td>
</tr>
<tr>
<td>BMED 3600</td>
<td>Physio Cell &amp; Mol Syst</td>
<td></td>
</tr>
<tr>
<td>CHEM 4521</td>
<td>Biophysical Chemistry</td>
<td></td>
</tr>
<tr>
<td>CHEM 4765</td>
<td>Drug Design,Devlpmnt&amp;Delivery</td>
<td></td>
</tr>
</tbody>
</table>

**Free Electives**

Free Electives 8

Total Credit Hours 122

Georgia Institute of Technology - DRAFT COPY 243
Lab Electives:
Select two of three lab courses. The lab elective may be fulfilled with either CHEM 3380 (3 credits) or CHEM 3481 (2 credits) or one of the following [CHEM 4695 (3 credits) or CHEM 4699 (3 credits) or CHEM 4694 (no credit) or CHEM 4698 (no credit)].

Research or Internship Experience:
Either Undergraduate Research CHEM 4699 (3) or Undergraduate Internship CHEM 4695 (3) are acceptable. If research or an internship is conducted for pay/audit rather than credit (e.g., CHEM 4699 or CHEM 4694), then additional free elective(s) may be substituted to achieve the required earned hours to graduate. The research or internship experience must include a final comprehensive laboratory report. Only one Research or Internship course may be used for the Lab elective requirement. If CHEM 3481 is used, add one free elective.

2 The technical elective requirement may be fulfilled by coursework in Science, Engineering, and Computing at the 3000 level or higher. MATH 2551, MATH 2552, SLS 3110, or SLS 3120 may also be used for a Technical Elective. If a 4 credit hour course is used, one less free elective credit is required.

3 It is suggested students select pre-health preparation courses (SOC or PSYC).

4 It is suggested students select pre-health preparation courses (APPH, BIOL, HTS, LMC, PSYC).

5 Courses may be applied toward completion of a minor.

6 VIP courses may be used only as free electives.

7 Courses taken as pass-fail may only be used in free electives.

8 MATH 1554 or MATH 1564 may be used in place of MATH 1553.

International Plan
The BS in Chemistry (International Plan) and BS in Biochemistry (International Plan) are offered to undergraduate students seeking to understand their majors in a global perspective. Students in this program must demonstrate proficiency in a foreign language; complete coursework in a country/regional elective, international relations, and global economics; and participate study or research abroad experience (usually in the junior year). While abroad, students are required to complete a supervised research experience with a faculty member in chemistry or biochemistry at the host institution. Upon successful completion of degree requirements for the International Plan, a "International Plan" designator is indicated on the diploma. If interested in participating in the International Plan as part of the BS in Chemistry or BS in Biochemistry, students should visit: www.internationalplan.gatech.edu (http://www.internationalplan.gatech.edu).

Research Option
The BS in Chemistry (Research Option) and BS in Biochemistry (Research Option) are offered for students who wish to participate in a research problem under the supervision of one of the fifty members of faculty and adjunct faculty in the School. Participants in the Research Option learn how to address a research problem from experiment design and execution to interpretation of results. There is an expectation that undergraduates who contribute to completed studies will be co-authors on submissions to high-quality scholarly journals. Research projects are available in the traditional areas of chemistry (analytical, biological, inorganic, organic, physical, and polymer chemistry) as well as highly interdisciplinary research areas, such as nanoscience, polymer and materials chemistry, environmental chemistry and sensors, medicinal chemistry, molecular biophysics, and computational chemistry.

To participate in the Research Option in the School of Chemistry and Biochemistry, students should find a research project with a faculty member in the department and apply online via www.undergradresearch.gatech.edu (http://www.undergradresearch.gatech.edu). Successful completion of the Research Option requires the following:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 4698/4699</td>
<td>Research Assistantship</td>
<td>9</td>
</tr>
<tr>
<td>LMC 4701</td>
<td>US Rsch Proposal Writing (complete during the first or second semester of research)</td>
<td>1</td>
</tr>
<tr>
<td>LMC 4702</td>
<td>US Rsch Thesis Writing (take during the term in which students complete their thesis)</td>
<td>1</td>
</tr>
</tbody>
</table>

Successful completion of the Research Option is noted on the student’s transcript. Students completing this degree may pursue graduate studies in the chemical or biological sciences or research careers in industrial or governmental laboratories.

Bachelor of Science in Civil Engineering
The four-year curriculum leading to the Bachelor of Science in Civil Engineering (BS CE) enables the graduate to enter professional practice as an engineer or to continue his or her studies in programs leading to advanced degrees in the following broad fields of specialization:

- construction engineering and management,
- environmental engineering,
- environmental hydraulics,
- geotechnical engineering,
- hydrology,
- materials,
- structural engineering and mechanics,
- transportation, and
- water resources planning and management.

The BS CE degree program is designed to offer depth in course material considered essential for all civil engineers, as well as flexibility in selecting elective courses that offer breadth of topic exposure. Civil engineers contribute to society in numerous ways; thus, the School’s philosophy is to provide the student with a range of electives that meet student interests. Civil engineers must not only be technically proficient, but also be effective in working with people and with professionals in other disciplines.
Program Objectives

Graduates will pursue a diverse range of careers that build on their engineering education. During the initial years of their careers, graduates will:

1. apply technical proficiency in the principles and methods essential to modern civil engineering practice.
2. demonstrate understanding of global, societal, environmental, and sustainability issues related to civil engineering.
3. exhibit effective communication, teamwork, entrepreneurial, and leadership skills.
4. engage in ethical and responsible practice while pursuing professional growth.

Prerequisites and Other Requirements

Although students are not obligated to take the courses during the semester indicated, they must satisfy all prerequisites for a particular course. In addition to campus-wide academic requirements for graduation with a bachelor's degree, the following are also required for the BS CE degree:

A C or better must have been earned in the following:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>MATH 1501</td>
<td>Calculus I</td>
<td>4</td>
</tr>
<tr>
<td>MATH 1502</td>
<td>Calculus II</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 2211</td>
<td>Intro Physics I</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 1310</td>
<td>General Chemistry</td>
<td>4</td>
</tr>
<tr>
<td>COE 2001</td>
<td>Statics</td>
<td>2</td>
</tr>
</tbody>
</table>

The number of quality points earned in CEE courses taken toward the degree must be at least twice the number of credit hours in those courses. If a course is repeated, the latest grade will be included in applying this rule. No CEE course may be repeated for the purpose of satisfying this rule if the original grade was a C or higher.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>APPH 1040</td>
<td>Sci Foundation of Health</td>
<td>2</td>
</tr>
<tr>
<td>or APPH 10</td>
<td>10 Sci of Phys Act &amp; Health</td>
<td></td>
</tr>
</tbody>
</table>

Core A - Essential Skills

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>ENGL 1101</td>
<td>English Composition I</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 1102</td>
<td>English Composition II</td>
<td>3</td>
</tr>
<tr>
<td>MATH 1552</td>
<td>Integral Calculus 3</td>
<td>4</td>
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</table>

Core B - Institutional Options

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
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<tbody>
<tr>
<td>CS 1371</td>
<td>Computing for Engineers</td>
<td>3</td>
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Core C - Humanities

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any HUM (p. 93)</td>
<td></td>
<td></td>
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</table>

Core D - Science, Math, & Technology

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>PHYS 2211</td>
<td>Intro Physics I 2,3</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 2212</td>
<td>Intro Physics II</td>
<td>4</td>
</tr>
<tr>
<td>MATH 1551</td>
<td>Differential Calculus 3</td>
<td>2</td>
</tr>
<tr>
<td>MATH 1553</td>
<td>Intro to Linear Algebra 3</td>
<td>2</td>
</tr>
<tr>
<td>or MATH 156linear Algebra</td>
<td></td>
<td></td>
</tr>
<tr>
<td>or MATH 156LinAlg w Abstract Vec Sp</td>
<td></td>
<td></td>
</tr>
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</table>

Core E - Social Sciences

Select one of the following:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>HIST 2111</td>
<td>United States to 1877</td>
<td></td>
</tr>
<tr>
<td>HIST 2112</td>
<td>United States since 1877</td>
<td></td>
</tr>
<tr>
<td>INTA 1200</td>
<td>American Government</td>
<td></td>
</tr>
<tr>
<td>POL 1101</td>
<td>Government of the U.S.</td>
<td></td>
</tr>
<tr>
<td>PUBP 3000</td>
<td>US Constitutional Issues</td>
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</tr>
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Select one of the following:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>ECON 2100</td>
<td>Economics and Policy</td>
<td>3</td>
</tr>
<tr>
<td>ECON 2101</td>
<td>The Global Economy</td>
<td></td>
</tr>
<tr>
<td>ECON 2105</td>
<td>Prin of Macroeconomics</td>
<td></td>
</tr>
<tr>
<td>ECON 2106</td>
<td>Prin of Microeconomics</td>
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</table>

Any SS (p. 97) 6

Core F - Courses Related to Major

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>COE 2001</td>
<td>Statics</td>
<td>2</td>
</tr>
<tr>
<td>MATH 2551</td>
<td>Multivariable Calculus</td>
<td>4</td>
</tr>
<tr>
<td>MATH 2552</td>
<td>Differential Equations 4</td>
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</tr>
<tr>
<td>CHEM 1310</td>
<td>General Chemistry 3</td>
<td>4</td>
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Select one of the following:

<table>
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<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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<tr>
<td>BIOL 1510</td>
<td>Biological Principles</td>
<td>4</td>
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<tr>
<td>BIOL 1511</td>
<td>Honors Biological Prin</td>
<td></td>
</tr>
<tr>
<td>BIOL 1520</td>
<td>Intro to Organismal Biol</td>
<td></td>
</tr>
<tr>
<td>BIOL 1521</td>
<td>Honors Organismal Biol</td>
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</tr>
<tr>
<td>EAS 2600</td>
<td>Earth Processes</td>
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Ethics Requirement (Civil Engineering approved) 3

Major Requirements

<table>
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<tr>
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<tbody>
<tr>
<td>CEE 1770</td>
<td>Intro to Engr Graphics</td>
<td>3</td>
</tr>
<tr>
<td>CEE 2040</td>
<td>Dynamics</td>
<td>2</td>
</tr>
<tr>
<td>CEE 2300</td>
<td>Environmental Engr Prin</td>
<td>3</td>
</tr>
<tr>
<td>CEE 3000</td>
<td>Civil Engr Systems</td>
<td>3</td>
</tr>
<tr>
<td>CEE 3020</td>
<td>Civil Engr Materials</td>
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</tr>
<tr>
<td>CEE 3040</td>
<td>Fluid Mechanics</td>
<td>3</td>
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Select one of the following:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>CEE 3770</td>
<td>Statistics &amp; Applications</td>
<td>3</td>
</tr>
<tr>
<td>ISYE 3770</td>
<td>Statistics &amp; Applications</td>
<td></td>
</tr>
<tr>
<td>MATH 3670Statistics and Applns</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CEE 4090</td>
<td>Capstone Design</td>
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</table>

College of Engineering Requirements

<table>
<thead>
<tr>
<th>Code</th>
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<th>Credit Hours</th>
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<tbody>
<tr>
<td>COE 3001</td>
<td>Deformable Bodies</td>
<td>3</td>
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</table>

Select one of the following:

<table>
<thead>
<tr>
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<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>CHBE 2130</td>
<td>Chem Eng Thermo I</td>
<td>3</td>
</tr>
<tr>
<td>ME 3322</td>
<td>Thermodynamics</td>
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</tr>
<tr>
<td>MSE 3001</td>
<td>Chemical Thermo-Material</td>
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CE Breadth Electives

Select three of the following:

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>CEE 3051</td>
<td>Intro to Structural Eng</td>
<td>3</td>
</tr>
<tr>
<td>CEE 4100</td>
<td>Construction Engr &amp; Mgt</td>
<td></td>
</tr>
<tr>
<td>CEE 4200</td>
<td>Hydraulic Engineering</td>
<td></td>
</tr>
<tr>
<td>CEE 4300</td>
<td>Environmental Engr Sys</td>
<td></td>
</tr>
<tr>
<td>CEE 4405</td>
<td>Geotechnical Engineering</td>
<td></td>
</tr>
<tr>
<td>CEE 4600</td>
<td>Transportation Plan &amp; Dsgn</td>
<td></td>
</tr>
<tr>
<td>CEE 4200</td>
<td>Hydraulic Engineering</td>
<td>3</td>
</tr>
<tr>
<td>or CEE 4405</td>
<td>Geotechnical Engineering</td>
<td></td>
</tr>
</tbody>
</table>
exposure and learning, and the acquisition of needed skills. This program assignments are designed to include practical training, cross-cultural students typically are juniors and seniors. The international work experience directly related to civil engineering. Participating (www.workabroad.gatech.edu
In addition, there is the Work Abroad Program www.gtip.gatech.edu) hours of coursework at Georgia Tech before they can participate in more work experiences. Students must have completed at least 30 work for one semester, usually in the summer, with an option for career-related experience before graduation. Students generally who do not participate in the Cooperative Program, but want some related experience with classroom studies. The program is the fourth designation.

Cooperative Plan
Since 1912, Georgia Tech has offered a five-year Undergraduate Cooperative Program to those students who wish to combine career-related experience with classroom studies. The program is the fourth oldest of its kind in the world and the largest optional co-op program in the country.

Students alternate between work assignments and classroom studies until they complete four or five semesters of work. Co-op students with a civil engineering major complete the same coursework on campus that is completed by regular four-year students. Most co-op students begin the program as freshmen or sophomores and are classified as full-time students regardless of whether they are attending classes on campus or are full time at an employer's location.

Students who participate in the program have the opportunity to develop career interests, become more confident in their career choices, and develop human relations skills through their work experience. Graduates of the program receive a bachelor's degree with a Cooperative Plan Designation.

The Georgia Tech Internship Program is for civil engineering students who do not participate in the Cooperative Program, but want some career-related experience before graduation. Students generally work for one semester, usually in the summer, with an option for more work experiences. Students must have completed at least 30 hours of coursework at Georgia Tech before they can participate in the program. For more details, visit www.gtip.gatech.edu/ (http://www.gtip.gatech.edu).

In addition, there is the Work Abroad Program (www.workabroad.gatech.edu (http://www.workabroad.gatech.edu)), which complements a student's formal education with paid international work experience directly related to civil engineering. Participating students typically are juniors and seniors. The international work assignments are designed to include practical training, cross-cultural exposure and learning, and the acquisition of needed skills. This program satisfies requirements for the International Plan, which is available to civil engineering students.

For more information about all of the programs in the Center for Career Discovery and Development, visit www.careerdiscovery.gatech.edu (http://careerdiscovery.gatech.edu).

International Plan
The International Plan is a challenging and coherent academic program for undergraduates that develops global competence within the context of a student's major. It is a degree-long program that integrates international studies and experiences into any participating major at Georgia Tech. It helps to prepare Georgia Tech graduates professionally and personally for successful lives in the twenty-first century.

The International Plan is not intended to replace current international programs; it supplements them. Existing study abroad opportunities continue to be offered. It is also not intended to be an add-on to the current degree programs. It is intended to be another curriculum path to earn a degree in which international competence is integrated into the program of study. The plan can be completed within the normal timeframe of four years of undergraduate study.

The overarching model for the International Plan has four components:

1. International coursework: Three courses to include one from each of the following categories:
   a. International relations
   b. Global economics
   c. A course about a specific country or region

2. International experience: Two terms abroad (not less than 26 weeks) engaged in any combination of study abroad, research, or internship

3. Second language proficiency: All students in the program are expected to reach at least the proficiency level equivalent to two years of college-level language study. Students who use the language to study, conduct research, or participate in an internship during their international experience are expected to attain a higher level of proficiency. Language proficiency is determined by testing (not course credits).

4. Culminating course: A capstone course in the major designed to tie the international studies and experiences together with the student's major

Completion of the International Plan is recognized by a designation on the student's diploma indicating completion of the degree with global competence.

For additional information about the International Plan visit www.oie.gatech.edu/internationalplan (http://www.internationalplan.gatech.edu).

Research Option
The Research Option is intended for students who seek a concentrated research experience, culminating in an undergraduate thesis, integrated into their undergraduate studies in civil engineering. In order to graduate with a BSC.E – Research Option degree, the students must:

Complete at least nine units of undergraduate research (over at least two, preferably three terms). Research may be for either pay (CEE 2698 or
CEE 4698) or credit (CEE 2699 or CEE 4699). Research for credit may be used towards the BS CE approved elective requirements.

Write an undergraduate thesis/report of research on their findings. This is usually done during the graduating term. The thesis will be published in the Georgia Tech Library.

Take two 1-hour classes: LMC 4701 (typically taken during the first or second semester of research) and LMC 4702 (taken during the thesis-writing semester).

At least six of the nine required credit hours of research should be on the same topic. A research proposal must be approved by a faculty advisor and one other faculty member. This proposal will be completed in LMC 4701 which serves as a prerequisite for LMC 4702. Completion of Research Option is noted on the student’s transcript.

**Joint BS/MS Degree Program - Civil Engineering**

The joint BS/MS program is designed to attract the best-of-the-best undergraduate students and is especially intended for students who demonstrate an interest in, and ability for, additional education beyond the bachelor’s degree.

Students will be eligible to apply for the program after completion of 30 semester credit hours at Georgia Tech and appropriate progress in their degree program. As a practical matter, students should apply for the program at least three semesters prior to graduation in order to take graduate-level courses prior to receiving their BS degree. Students must have a Georgia Tech GPA of 3.5 or higher for admission into the BS/MS Program in Civil Engineering.

This program is available only to those completing a Bachelor’s degree with the School of Civil and Environmental Engineering.

Students in the joint BS/MS program remain undergraduates until they meet the requirements for the bachelor’s degree, at which point they will receive the BSCE or BSEnvE degree. Their status will then be changed to graduate status. Graduate school application fees and the GRE requirements are waived.

Once admitted, a GPA of at least 3.0 must be maintained to remain in the program. Additionally, students in the BS/MS program are eligible to use the Graduate Course Option (p. 106) even if their cumulative grade-point average is below 3.5 at the time they complete their bachelor’s degree.

**Bachelor of Science in Computational Media**

The Bachelor of Science in Computational Media is a collaborative effort by the College of Computing and the School of Literature, Media, and Communication (LMC). The program offers a thorough education in all aspects of the computer as a medium: the technical, the historical-critical, and the applied. Program graduates will have both significant hands-on and theoretical knowledge of computing and an understanding of visual design and the history of media. Graduates will be uniquely positioned to plan, create, and critique new digital media forms for entertainment, education, and business communication.

The program requires 36 credit hours of courses in computer science and 30 credit hours of courses in LMC (in addition to the humanities requirement). A substantial number of required courses in each unit ensures that every student has basic competence in:

- computational principles;
- the representation and manipulation of digital media, including graphics and sound;
- software design;
- visual and interactive design;
- digital arts; and
- media theory and history.

After completing required courses, students specialize in a specific area of media computing. Typical specialty areas include:

- Interactive games design: This is one of the fastest growing areas of digital media production and is already a $7 billion industry.
- Special effects: As special effects become more complex and focused on computer-generated imagery, employment in this area will increasingly require expertise in both media and computer science.
- Culturally informed program design: As programming work is increasingly outsourced to nations offering lower labor costs, programming that adds value through a sophisticated response to the needs of specific corporate and group cultures will offer job security to American programmers.

Depending on their coursework within the BS program, students will also be qualified to enter graduate studies in computer science, digital arts, digital media studies, and human-computer interface.

- Bachelor of Science in Computational Media - Intelligence - Film, Performance, & Media Studies (p. 248)
- Bachelor of Science in Computational Media - Intelligence - Game Studies (p. 249)
- Bachelor of Science in Computational Media - Intelligence - Interaction Design & Experimental Media (p. 251)
- Bachelor of Science in Computational Media - Intelligence - Narrative Studies (p. 253)
- Bachelor of Science in Computational Media - Media - Film, Performance, & Media Studies (p. 257)
- Bachelor of Science in Computational Media - Media - Game Studies (p. 259)
- Bachelor of Science in Computational Media - Media - Interaction Design & Experimental Media (p. 255)
- Bachelor of Science in Computational Media - Media - Narrative Studies (p. 261)
- Bachelor of Science in Computational Media - People - Film, Performance, & Media Studies (p. 262)
- Bachelor of Science in Computational Media - People - Game Studies (p. 264)
- Bachelor of Science in Computational Media - People - Interaction Design & Experimental Media (p. 266)
- Bachelor of Science in Computational Media - People - Narrative Studies (p. 268)
Bachelor of Science in Computational Media - Intelligence - Film, Performance, & Media Studies

The Bachelor of Science in Computational Media is a collaborative effort by the College of Computing and the School of Literature, Media, and Communication (LMC). The program offers a thorough education in all aspects of the computer as a medium: the technical, the historical-critical, and the applied. Program graduates will have both significant hands-on and theoretical knowledge of computing and an understanding of visual design and the history of media. Graduates will be uniquely positioned to plan, create, and critique new digital media forms for entertainment, education, and business communication.

The program requires 36 credit hours of courses in computer science and 30 credit hours of courses in LMC (in addition to the humanities requirement). A substantial number of required courses in each unit ensures that every student has basic competence in:

- computational principles;
- the representation and manipulation of digital media, including graphics and sound;
- software design;
- visual and interactive design;
- digital arts; and
- media theory and history.

After completing required courses, students specialize in a specific area of media computing. Typical specialty areas include:

- Interactive games design: This is one of the fastest growing areas of digital media production and is already a $7 billion industry.
- Special effects: As special effects become more complex and focused on computer-generated imagery, employment in this area will increasingly require expertise in both media and computer science.
- Culturally informed program design: As programming work is increasingly outsourced to nations offering lower labor costs, culturally informed programming will offer job security to American programmers.

Depending on their coursework within the BS program, students will also be qualified to enter graduate studies in computer science, digital arts, digital media studies, and human-computer interface.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>APPH 1040</td>
<td>Sci Foundation of Health</td>
<td>2</td>
</tr>
<tr>
<td>or APPH 10</td>
<td>Sci of Phys Act &amp; Health</td>
<td></td>
</tr>
<tr>
<td>Core A - Essential Skills</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ENGL 1101</td>
<td>English Composition I</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 1102</td>
<td>English Composition II</td>
<td>3</td>
</tr>
<tr>
<td>MATH 1552</td>
<td>Integral Calculus</td>
<td>4</td>
</tr>
<tr>
<td>Core B - Institutional Options</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CS 1301</td>
<td>Intro to Computing</td>
<td>3</td>
</tr>
<tr>
<td>Core C - Humanities</td>
<td></td>
<td></td>
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<tr>
<td>Any LMC HUM</td>
<td></td>
<td>3</td>
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</tbody>
</table>

Bachelor of Science in Computational Media - Intelligence - Film, Performance, & Media Studies Requirements

All LMC courses require a grade of C or better. Many courses have prerequisites. Please check the catalog at www.gatech.edu/Registrar.

Any LMC HUM 3
Core D - Science, Math, & Technology

<table>
<thead>
<tr>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lab Science</td>
<td>8</td>
</tr>
<tr>
<td>MATH 1551 Differential Calculus</td>
<td>2</td>
</tr>
<tr>
<td>MATH 1554 Linear Algebra</td>
<td>4</td>
</tr>
<tr>
<td>or MATH 156gAlg w Abstract Vec Sp</td>
<td></td>
</tr>
</tbody>
</table>

Core E - Social Sciences

Select one of the following: 3

- HIST 2111 United States to 1877
- HIST 2112 United States since 1877
- INTA 1200 American Government
- POL 1101 Government of the U.S.
- PUBP 3000 US Constitutional Issues

PSYC 1101 General Psychology 3
Any SS (p. 97) 6

Core F - Courses Related to Major

<table>
<thead>
<tr>
<th>Title</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>CS 1331 Intro-Object Orient Prog</td>
<td>3</td>
</tr>
<tr>
<td>CS 1332 Data Struct &amp; Algorithms</td>
<td>3</td>
</tr>
<tr>
<td>CS 2050 Intro Discrete Math CS</td>
<td>3</td>
</tr>
<tr>
<td>CS 2340 Objects and Design</td>
<td>3</td>
</tr>
<tr>
<td>LMC 2700 Intr-Computational Media</td>
<td>3</td>
</tr>
<tr>
<td>MATH 2550 Intro Multivariable Calc</td>
<td>2</td>
</tr>
</tbody>
</table>

Major Requirement

<table>
<thead>
<tr>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 2110 Computer Organiz&amp;Program</td>
<td>4</td>
</tr>
<tr>
<td>CS 4001 Computing &amp; Society</td>
<td>3</td>
</tr>
<tr>
<td>or CS 4726 Privacy Tech Policy Law</td>
<td></td>
</tr>
<tr>
<td>or SLS 311(Tech and Sustain Community</td>
<td></td>
</tr>
</tbody>
</table>

Junior Design Options (Capstone)

Junior Design Option 1, 3, 6

Intelligence Requirements

<table>
<thead>
<tr>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 3510 Dsgn&amp;Analysis-Algorithms</td>
<td>3</td>
</tr>
<tr>
<td>CS 3600 Intro-Artificial Intell</td>
<td>3</td>
</tr>
<tr>
<td>CS 4510 Automata and Complexity</td>
<td>3</td>
</tr>
<tr>
<td>CS 3630 Intro-Perception&amp;Robotic</td>
<td>3</td>
</tr>
<tr>
<td>CS 3790 Intro-Cognitive Science</td>
<td></td>
</tr>
<tr>
<td>or PSYC 30 Sensation &amp; Perception</td>
<td></td>
</tr>
</tbody>
</table>

Select two of the following: 1

- CS 4495 Computer Vision
- CS 4635 Knowledge-Based AI
- CS 4641 Machine Learning
- CS 4649 Robot Intelli Planning
- CS 4646 Mach Learn for Trading
- CS 4650 Natural Language
- CS 4731 Game AI

Film, Performance, & Media Studies Requirements

<table>
<thead>
<tr>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>LMC 2400 Intro to Media Studies</td>
<td>3</td>
</tr>
<tr>
<td>or LMC 2500 Intro to Film</td>
<td></td>
</tr>
<tr>
<td>or LMC 2600 Intro to Perform Studies</td>
<td></td>
</tr>
</tbody>
</table>

Select four of the following: 1

- LMC 3206 Communication & Culture
- LMC 3252 Film and Television
- LMC 3254 Film History
LMC 3256  Major Filmmakers
LMC 3257  Global Cinema
LMC 3258  Documentary Film
LMC 3259  Experimental Film
LMC 3314  Tech of Representation
LMC 3352  Film Technology
LMC 3362  Sci, Tech & Performance

CM or Media Courses 1,2  12

Total Credit Hours  122

Pass-Fail is allowed for courses in core areas C, D, E and Free.

1  Minimum grade of C required.
2  CM or LMC courses include 2700-, 3700-, and 4700-level courses, as well as 3250-level courses, and LMC 2400, LMC 2500, LMC 3206, LMC 3314, LMC 3362, LMC 3406, and LMC 3853
3  Junior Design Options are as follows (students must pick one option and may not change):
   • Option 1 - LMC 3432, LMC 3431, CS 3311, CS 3312.
   • Option 2 - ECE VIP courses and LMC 3403.
   • Option 3 - Satisfy Georgia Tech Research Option.
   • Option 4 - CS 2701 (3 hours), CS 4699-I2P (3 hours), LMC 3403 (3 hours) = 9 hours OR CS 4699-I2P (6 hours), LMC 3403 (3 hours) = 9 hours

Six credits of the Junior Design option are used as Major Requirements and the overage credits of research/VIP (5 credit hours / 2 credit hours) may be used as free electives. Students completing VIP for their junior design requirement will be required to complete at least three semesters of VIP. (VIP 1 + VIP 2 + VIP 3) (for a total of 5 credit hours) + LMC 3403 = 8 hours of VIP credit. Students using CREATE-X for junior design take at least 6 hours of CREATE-X Start-Ip Lab and Idea 2 Prototype (I2P) and 3 of the 6 hours must be I2P. Students take these 6 hours with LMC 3403 (3 hours) for a total of 9 hours. Extra three hours for CREATE-X option can be used in free electives.

4  Two credit hours of MATH 1554 may count along with MATH 2550 to give Area F 18 credit hours.

Cooperative Programs

The College of Computing participates in the undergraduate and graduate Cooperative Programs.

See links below for further Information.

Undergraduate Cooperative Plan (p. 83)
Graduate Cooperative Plan (p. 83)

International Plan

The Computational Media (CM) International Plan follows the Institute model to develop a global competence within the student's major program of study. It thus integrates international studies and experiences with work in all aspects of the computer as a medium, preparing graduates to plan, create, and critique new digital media forms within an international professional environment.

As in the basic CM program, students following the International Plan will take credit 36 hours of courses in CS and 30 credit hours of courses in LMC (in addition to the basic humanities requirement). Students will also:

1. take three international courses, including one from each of the following categories: International Relations, Global Economics, and a course on a specific country or region;
2. spend two terms abroad engaged in any combination of study abroad, research, or internship;
3. demonstrate language proficiency equivalent to two years of college-level language study (to be determined by testing); and
4. complete a CM capstone course that links international studies with the major.

Research Option

The CM Research Plan follows the Institute model to allow students to incorporate research experiences into the major program of study. Students will complete nine hours of credit research work on various aspects of the computer as a medium, working in such areas as computational principles, the representation and manipulation of digital media, software design, visual and interactive design, digital art, and media theory and history.

As in the basic CM program, students following the Research Plan will take 36 credit hours of courses in CS and 30 credit hours of courses in LMC (in addition to the basic humanities requirement). CM students can complete the Research Option with nine CS or LMC research hours. Students cannot have a mix of both count towards the Research Option. The breakdown of hours is as follows:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>LMC 4701</td>
<td>US Rsch Proposal Writing</td>
<td>1</td>
</tr>
<tr>
<td>LMC 4702</td>
<td>US Rsch Thesis Writing</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Total Credit Hours</td>
<td>11</td>
</tr>
</tbody>
</table>

BS/MS Computational Media and Digital Media

Students who want to pursue the five-year BS/MS combination in CM and DM must apply to the school of LMC after completing at least 75 hours of work towards the CM degree. Applicants should have a cumulative GPA of at least 3.5. This GPA must be maintained for the student to take graduate level courses. Students must start the program in the Fall to be on track with other MS students.

Students admitted to the program will take a total of twelve credit hours of graduate course work during their final undergraduate year; six credit hours of that work, in DM courses, will count towards two 4000 level LMC courses (6 hours) and will count for both undergraduate and graduate credit. During the summer term after their fourth year, students will participate in an approved internship program. During their fifth year, students will take a total of 24 credit hours, including either LMC 6800 or LMC 7000, and with no more than three courses taken outside of the DM program.

Bachelor of Science in Computational Media - Intelligence - Game Studies

The Bachelor of Science in Computational Media is a collaborative effort by the College of Computing and the School of Literature, Media, and Communication (LMC). The program offers a thorough education in all aspects of the computer as a medium: the technical, the historical-
critical, and the applied. Program graduates will have both significant hands-on and theoretical knowledge of computing and an understanding of visual design and the history of media. Graduates will be uniquely positioned to plan, create, and critique new digital media forms for entertainment, education, and business communication.

The program requires 36 credit hours of courses in computer science and 30 credit hours of courses in LMC (in addition to the humanities requirement). A substantial number of required courses in each unit ensures that every student has basic competence in:

- computational principles;
- the representation and manipulation of digital media, including graphics and sound;
- software design;
- visual and interactive design;
- digital arts; and
- media theory and history.

After completing required courses, students specialize in a specific area of media computing. Typical specialty areas include:

- Interactive games design: This is one of the fastest growing areas of digital media production and is already a $7 billion industry.
- Special effects: As special effects become more complex and focused on computer-generated imagery, employment in this area will increasingly require expertise in both media and computer science.
- Culturally informed program design: As programming work is increasingly outsourced to nations offering lower labor costs, programming that adds value through a sophisticated response to the needs of specific corporate and group cultures will offer job security to American programmers.

Depending on their coursework within the BS program, students will also be qualified to enter graduate studies in computer science, digital arts, digital media studies, and human-computer interface.

### Code Title Credit Hours

**Wellness**

<table>
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<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>APPH 1040</td>
<td>Sci Foundation of Health</td>
<td>2</td>
</tr>
<tr>
<td>or APPH 10</td>
<td>Sci of Phys Act &amp; Health</td>
<td></td>
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</table>

**Core A - Essential Skills**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>ENGL 1101</td>
<td>English Composition I</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 1102</td>
<td>English Composition II</td>
<td>3</td>
</tr>
<tr>
<td>MATH 1552</td>
<td>Integral Calculus</td>
<td>4</td>
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</table>

**Core B - Institutional Options**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>CS 1301</td>
<td>Intro to Computing</td>
<td>3</td>
</tr>
<tr>
<td>or CS 1315</td>
<td>Intro Media Computation</td>
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**Core C - Humanities**

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<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any HUM (p. 93)</td>
<td></td>
<td>3</td>
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<tr>
<td>Any LMC HUM</td>
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**Core D - Science, Math, & Technology**

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<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>Lab Science</td>
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<td>8</td>
</tr>
<tr>
<td>MATH 1551</td>
<td>Differential Calculus</td>
<td>2</td>
</tr>
<tr>
<td>MATH 1554</td>
<td>Linear Algebra</td>
<td>4</td>
</tr>
<tr>
<td>or MATH 156B &amp; Alg w Abstract Vec Sp</td>
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<td></td>
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</table>

**Core E - Social Sciences**

Select one of the following:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>HIST 2111</td>
<td>United States to 1877</td>
<td></td>
</tr>
<tr>
<td>HIST 2112</td>
<td>United States since 1877</td>
<td></td>
</tr>
<tr>
<td>INTA 1200</td>
<td>American Government</td>
<td></td>
</tr>
<tr>
<td>POL 1101</td>
<td>Government of the U.S.</td>
<td></td>
</tr>
<tr>
<td>PUBP 3000</td>
<td>US Constitutional Issues</td>
<td></td>
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<tr>
<td>PSYC 1101</td>
<td>General Psychology</td>
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</table>

Any SS (p. 97) 6

**Core F - Courses Related to Major**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>CS 1331</td>
<td>Intro-Object Orient Prog</td>
<td>3</td>
</tr>
<tr>
<td>CS 1332</td>
<td>Data Struct &amp; Algorithms</td>
<td>3</td>
</tr>
<tr>
<td>CS 2050</td>
<td>Intro Discrete Math CS</td>
<td>3</td>
</tr>
<tr>
<td>CS 2340</td>
<td>Objects and Design</td>
<td>3</td>
</tr>
<tr>
<td>LMC 2700</td>
<td>Intr-Computational Media</td>
<td>3</td>
</tr>
<tr>
<td>MATH 2550</td>
<td>Intro Multivariable Calc</td>
<td>2</td>
</tr>
</tbody>
</table>

**Major Requirements**

<table>
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<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>CS 2110</td>
<td>Computer Organiz&amp;Program</td>
<td>4</td>
</tr>
<tr>
<td>CS 4001</td>
<td>Computing &amp; Society</td>
<td>3</td>
</tr>
<tr>
<td>or CS 4726</td>
<td>Privacy Tech Policy Law</td>
<td></td>
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<tr>
<td>or SLS 311</td>
<td>Tech and Sustain Community</td>
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**Junior Design Options (Capstone)**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>Junior Design Option</td>
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</table>

**Intelligence Requirements**

Select one of the following:

<table>
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<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 3510</td>
<td>Dsgn&amp;Analysis-Algorithms</td>
<td>3</td>
</tr>
<tr>
<td>CS 3600</td>
<td>Intro-Artificial Intell</td>
<td>3</td>
</tr>
<tr>
<td>CS 4510</td>
<td>Automata and Complexity</td>
<td>3</td>
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Select two of the following:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 4495</td>
<td>Computer Vision</td>
<td>6</td>
</tr>
<tr>
<td>CS 4635</td>
<td>Knowledge-Based AI</td>
<td></td>
</tr>
<tr>
<td>CS 4641</td>
<td>Machine Learning</td>
<td></td>
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<tr>
<td>CS 4646</td>
<td>Mach Learn for Trading</td>
<td></td>
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<tr>
<td>CS 4649</td>
<td>Robot Intelli Planning</td>
<td></td>
</tr>
<tr>
<td>CS 4650</td>
<td>Natural Language</td>
<td></td>
</tr>
<tr>
<td>CS 4731</td>
<td>Game AI</td>
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</table>

**Game Studies Requirements**

Select three of following:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>LMC 4720</td>
<td>Interactive Narrative</td>
<td>9</td>
</tr>
<tr>
<td>LMC 4725</td>
<td>Game Design</td>
<td></td>
</tr>
<tr>
<td>LMC 4731</td>
<td>Game AI</td>
<td></td>
</tr>
<tr>
<td>CM or Media Courses</td>
<td></td>
<td>18</td>
</tr>
</tbody>
</table>

Total Credit Hours 122

1 Minimum grade of C required.

2 CM or LMC courses include 2700-, 3700-, and 4700-level courses, as well as 3250-level courses, and LMC 2400, LMC 2500, LMC 3206, LMC 3314, LMC 3362, LMC 3406, and LMC 3853
6 Junior Design Options are as follows (students must pick one option and may not change):

- Option 1 - LMC 3432, LMC 3431, CS 3311, CS 3312.
- Option 2 - CS 4980 or LMC 4699 (4 credit hours), LMC 4701, LMC 4702.
- Option 3 - ECE VIP courses and LMC 3403.

Six credits of the Junior Design option are used as Major Requirements and the average credits of research/VIP (5 credit hours/2 credit hours) may be used as free electives. Students completing VIP for their junior design requirement will be required to complete at least four semesters of VIP. (VIP 1 + VIP 2 + VIP 3) for a total of 5 credit hours + VIP 4 (3 credit hours) = 8 hours of VIP credit. VIP 4 must be taken after 90 credit hours at the 4000 level and be on the same project as 2 of VIP 1-3s.

4 Two credits of MATH 1554 may count along with MATH 2550 to give Area F 18 credit hours.

Cooperative Programs
The College of Computing participates in the undergraduate and graduate Cooperative Programs.

See links below for further Information.

Undergraduate Cooperative Plan (p. 83)
Graduate Cooperative Plan (p. 83)

International Plan
The Computational Media (CM) International Plan follows the Institute model to develop a global competence within the student’s major program of study. It thus integrates international studies and experiences with work in all aspects of the computer as a medium, preparing graduates to plan, create, and critique new digital media forms within an international professional environment.

As in the basic CM program, students following the International Plan will take credit 36 hours of courses in CS and 30 credit hours of courses in LMC (in addition to the basic humanities requirement). Students will also:

1. take three international courses, including one from each of the following categories: International Relations, Global Economics, and a course on a specific country or region;
2. spend two terms abroad engaged in any combination of study abroad, research, or internship;
3. demonstrate language proficiency equivalent to two years of college-level language study (to be determined by testing); and
4. complete a CM capstone course that links international studies with the major.

Research Option
The CM Research Plan follows the Institute model to allow students to incorporate research experiences into the major program of study. Students will complete nine hours of credit research work on various aspects of the computer as a medium, working in such areas as computational principles, the representation and manipulation of digital media, software design, visual and interactive design, digital art, and media theory and history.

As in the basic CM program, students following the Research Plan will take 36 credit hours of courses in CS and 30 credit hours of courses in LMC (in addition to the basic humanities requirement). CM students can complete the Research Option with nine CS or LMC research hours. Students cannot have a mix of both count towards the Research Option. The breakdown of hours is as follows:

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<th>Code</th>
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<tr>
<td></td>
<td>Undergraduate Research</td>
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</tr>
<tr>
<td>LMC 4701</td>
<td>US Rsch Proposal Writing</td>
<td>1</td>
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<td>LMC 4702</td>
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BS/MS Computational Media and Digital Media
Students who want to pursue the five-year BS/MS combination in CM and DM must apply to the school of LMC after completing at least 75 hours of work towards the CM degree. Applicants should have a cumulative GPA of at least 3.5. This GPA must be maintained for the student to take graduate level courses. Students must start the program in the Fall to be on track with other MS students.

Students admitted to the program will take a total of twelve credit hours of graduate course work during their final undergraduate year; six credit hours of that work, in DM courses, will count towards two 4000 level LMC courses (6 hours) and will count for both undergraduate and graduate credit. During the summer term after their fourth year, students will participate in an approved internship program. During their fifth year, students will take a total of 24 credit hours, including either LMC 6800 or LMC 7000, and with no more than three courses taken outside of the DM program.

Bachelor of Science in Computational Media - Intelligence - Interaction Design & Experimental Media
The Bachelor of Science in Computational Media is a collaborative effort by the College of Computing and the School of Literature, Media, and Communication (LMC). The program offers a thorough education in all aspects of the computer as a medium: the technical, the historical-critical, and the applied. Program graduates will have both significant hands-on and theoretical knowledge of computing and an understanding of visual design and the history of media. Graduates will be uniquely positioned to plan, create, and critique new digital media forms for entertainment, education, and business communication.

The program requires 36 credit hours of courses in computer science and 30 credit hours of courses in LMC (in addition to the humanities requirement). A substantial number of required courses in each unit ensures that every student has basic competence in:

- computational principles;
- the representation and manipulation of digital media, including graphics and sound;
- software design;
- visual and interactive design;
- digital arts; and
- media theory and history.
After completing required courses, students specialize in a specific area of media computing. Typical specialty areas include:

- Interactive games design: This is one of the fastest growing areas of digital media production and is already a $7 billion industry.
- Special effects: As special effects become more complex and focused on computer-generated imagery, employment in this area will increasingly require expertise in both media and computer science.
- Culturally informed program design: As programming work is increasingly outsourced to nations offering lower labor costs, programming that adds value through a sophisticated response to the needs of specific corporate and group cultures will offer job security to American programmers.

Depending on their coursework within the BS program, students will also be qualified to enter graduate studies in computer science, digital arts, digital media studies, and human-computer interface.

### Code Title Credit Hours

#### Wellness
- APPH 1040 Sci Foundation of Health 2
- or APPH 10 Sci of Phys Act & Health

#### Core A - Essential Skills
- ENGL 1101 English Composition I 3
- ENGL 1102 English Composition II 3
- MATH 1552 Integral Calculus 4

#### Core B - Institutional Options
- CS 1301 Intro to Computing 1 3

#### Core C - Humanities
- Any HUM 3
- Any LMC HUM 3

#### Core D - Science, Math, & Technology
- Lab Science 8
- MATH 1551 Differential Calculus 2
- MATH 1554 Linear Algebra 4
  - or MATH 1564Alg w Abstract Vec Sp

#### Core E - Social Sciences
- Select one of the following: 3
  - HIST 2111 United States to 1877
  - HIST 2112 United States since 1877
  - INTA 1200 American Government
  - POL 1101 Government of the U.S.
  - PUBP 3000 US Constitutional Issues
- PSYC 1101 General Psychology 3
- Any SS (p. 97) 6

#### Core F - Courses Related to Major
- CS 1331 Intro-Object Orient Prog 1 3
- CS 1332 Data Struct & Algorithms 1 3
- CS 2050 Intro Discrete Math CS 1 3
- CS 2340 Objects and Design 1 3
- LMC 2700 Intr-Computational Media 1 3
- MATH 2550 Intro Multivariable Calc 4 2

#### Major Requirement
- CS 2110 Computer Organiz&Program 1 4

#### Intelligence Requirements
- CS 2110 Computing & Society 3
- or CS 4726 Privacy Tech Policy Law
- or SLS 311Tech and Sustain Community

#### Junior Design Options (Capstone)
- Junior Design Option 1,3 6

#### Interaction Design & Experimental Media Requirements
- LMC 2720 Prin of Visual Design 1 3
- LMC 3710 Prin Interaction Design 1 3
- or LMC 4733Experimental Digital Art

- Select three of the following: 1
  - LMC 2730 Construct-Moving Image
  - LMC 3206 Communication & Culture
  - LMC 3406 Video Production
  - LMC 3705 Prin Information Design
  - LMC 3710 Prin Interaction Design
  - LMC 4730 Experimental Digital Art

- CM or Media Courses 1,2 12

Total Credit Hours 122

Pass/Fail is allowed for courses in core areas C, D, E and Free.

1. Minimum grade of C required.
2. CM or LMC courses include 2700-, 3700-, and 4700-level courses, as well as 3250-level courses, and LMC 2400, LMC 2500, LMC 3206, LMC 3314, LMC 3362, LMC 3406, and LMC 3853
3. Junior Design Options are as follows (students must pick one option and may not change):
   - Option 1 - LMC 3432, LMC 3431, CS 3311,CS 3312.
   - Option 2 - CS 4980 or LMC 4699 (4 credit hours), LMC 4701,LMC 4702.
   - Option 3 - ECE VIP courses and LMC 4303.

Six credits of the Junior Design option are used as Major Requirements and the overage credits of research/VIP (5 credit hours/2 credit hours) may be used as free electives. Students completing VIP for their junior design requirement will be required to complete at least four semesters of VIP. (VIP 1 + VIP 2 + VIP 3) (for a total of 5 credit hours) + VIP 4 (3 credit hours) = 8 hours of VIP credit. VIP 4 must be taken after 90 credit hours at the 4000 level and be on the same project as 2 of VIP 1-3s.
Cooperative Programs

The College of Computing participates in the undergraduate and graduate Cooperative Programs.

See links below for further information.

Undergraduate Cooperative Plan (p. 83)

Graduate Cooperative Plan (p. 83)

International Plan

The Computational Media (CM) International Plan follows the Institute model to develop a global competence within the student’s major program of study. It thus integrates international studies and experiences with work in all aspects of the computer as a medium, preparing graduates to plan, create, and critique new digital media forms within an international professional environment.

As in the basic CM program, students following the International Plan will take credit 36 hours of courses in CS and 30 credit hours of courses in LMC (in addition to the basic humanities requirement). Students will also:

1. take three international courses, including one from each of the following categories: International Relations, Global Economics, and a course on a specific country or region;
2. spend two terms abroad engaged in any combination of study abroad, research, or internship;
3. demonstrate language proficiency equivalent to two years of college-level language study (to be determined by testing); and
4. complete a CM capstone course that links international studies with the major.

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The CM Research Plan follows the Institute model to allow students to incorporate research experiences into the major program of study. Students will complete nine hours of credit research work on various aspects of the computer as a medium, working in such areas as computational principles, the representation and manipulation of digital media, software design, visual and interactive design, digital art, and media theory and history.

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BS/MS Computational Media and Digital Media

Students who want to pursue the five-year BS/MS combination in CM and DM must apply to the school of LMC after completing at least 75 hours of work towards the CM degree. Applicants should have a cumulative GPA of at least 3.5. This GPA must be maintained for the student to take graduate level courses. Students must start the program in the Fall to be on track with other MS students.

Students admitted to the program will take a total of twelve credit hours of graduate course work during their final undergraduate year; six credit hours of that work, in DM courses, will count towards two 4000 level LMC courses (6 hours) and will count for both undergraduate and graduate credit. During the summer term after their fourth year, students will participate in an approved internship program. During their fifth year, students will take a total of 24 credit hours, including either LMC 6800 or LMC 7000, and with no more than three courses taken outside of the DM program.

Bachelor of Science in Computational Media - Intelligence - Narrative Studies

The Bachelor of Science in Computational Media is a collaborative effort by the College of Computing and the School of Literature, Media, and Communication (LMC). The program offers a thorough education in all aspects of the computer as a medium: the technical, the historical-critical, and the applied. Program graduates will have both significant hands-on and theoretical knowledge of computing and an understanding of visual design and the history of media. Graduates will be uniquely positioned to plan, create, and critique new digital media forms for entertainment, education, and business communication.

The program requires 36 credit hours of courses in computer science and 30 credit hours of courses in LMC (in addition to the humanities requirement). A substantial number of required courses in each unit ensures that every student has basic competence in:

- computational principles;
- the representation and manipulation of digital media, including graphics and sound;
- software design;
- visual and interactive design;
- digital arts; and
- media theory and history.

After completing required courses, students specialize in a specific area of media computing. Typical specialty areas include:

- Interactive games design: This is one of the fastest growing areas of digital media production and is already a $7 billion industry.
- Special effects: As special effects become more complex and focused on computer-generated imagery, employment in this area will increasingly require expertise in both media and computer science.
- Culturally informed program design: As programming work is increasingly outsourced to nations offering lower labor costs, programming that adds value through a sophisticated response
to the needs of specific corporate and group cultures will offer job security to American programmers.

Depending on their coursework within the BS program, students will also be qualified to enter graduate studies in computer science, digital arts, digital media studies, and human-computer interface.

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<td></td>
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<td>ENGL 1101</td>
<td>English Composition I</td>
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<td>ENGL 1102</td>
<td>English Composition II</td>
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<tr>
<td>MATH 1552</td>
<td>Integral Calculus</td>
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<tr>
<td></td>
<td><strong>Core B - Institutional Options</strong></td>
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<td>CS 1301</td>
<td>Intro to Computing</td>
<td>3</td>
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<tr>
<td></td>
<td><strong>Core C - Humanities</strong></td>
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<td>Any HUM</td>
<td>General Psychology</td>
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<tr>
<td>Any LMC HUM</td>
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<td>3</td>
</tr>
<tr>
<td></td>
<td><strong>Core D - Science, Math, &amp; Technology</strong></td>
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<tr>
<td>Lab Science</td>
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<td>MATH 1551</td>
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<td>MATH 1554</td>
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<td>HIST 2111</td>
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<td>HIST 2112</td>
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<td><strong>Core F - Courses Related to Major</strong></td>
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</tr>
<tr>
<td>CS 1331</td>
<td>Intro-Object Orient Prog 1</td>
<td>3</td>
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<td>CS 1332</td>
<td>Data Struct &amp; Algorithms 1</td>
<td>3</td>
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<td>CS 2050</td>
<td>Intro Discrete Math</td>
<td>3</td>
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<td>CS 2340</td>
<td>Objects and Design</td>
<td>3</td>
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<td>LMC 2700</td>
<td>Intr-Computational Media 1</td>
<td>3</td>
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<tr>
<td>MATH 2550</td>
<td>Intro Multivariable Calc 4</td>
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<td><strong>Major Requirement</strong></td>
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<tr>
<td>CS 2110</td>
<td>Computer Organiz&amp;Program 1</td>
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<td>CS 4001</td>
<td>Computing &amp; Society</td>
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<td>or CS 4726</td>
<td>Privacy Tech Policy Law</td>
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<td>or SLS 311C</td>
<td>Tech and Sustain Community</td>
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<td></td>
<td><strong>Junior Design Options (Capstone)</strong></td>
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<td>Junior Design Option 1,3</td>
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<td><strong>Intelligence Requirements</strong></td>
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<td>CS 3510</td>
<td>Dsgn&amp;Analysis-Algorithms 1</td>
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<td>CS 3600</td>
<td>Intro-Artificial Intel</td>
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<td>CS 4510</td>
<td>Automata and Complexity 1</td>
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<tr>
<td></td>
<td><strong>Narrative Studies Requirements</strong></td>
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<td>LMC 3206</td>
<td>Communication &amp; Culture</td>
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<td>LMC 3710</td>
<td>Prin Interaction Design</td>
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<tr>
<td>CM or Literary Courses 1,2</td>
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<tr>
<td></td>
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<td>122</td>
</tr>
</tbody>
</table>

Pass Fail is allowed for courses in core areas C, D, E and Free.

1 Minimum grade of C required.
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4 Two credits of MATH 1554 may count along with MATH 2550 to give Area F 18 credit hours.

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<td>MATH 1551 Differential Calculus</td>
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<td>INTA 1200 American Government</td>
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<td>POL 1101 Government of the U.S.</td>
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<td></td>
<td>PUBP 3000 US Constitutional Issues</td>
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<td>Any SS (p. 97)</td>
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<td>CS 1332 Data Struct &amp; Algorithms 1</td>
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<td>CS 2050 Intro Discrete Math CS 1</td>
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<td>CS 2340 Objects and Design 1</td>
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<td>LMC 2700 Intr-Computational Media 1</td>
<td>3</td>
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<td>MATH 2550 Intro Multivariable Calc 4</td>
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<td>Major Requirement</td>
<td>CS 2261 Media Device Architetur</td>
<td>4</td>
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<tr>
<td></td>
<td>CS 4001 Computing &amp; Society</td>
<td>3</td>
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<tr>
<td></td>
<td>or CS 4726 Privacy Tech Policy Law</td>
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<tr>
<td></td>
<td>or SLS 3110Tech and Sustain Community</td>
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<td>Junior Design Options (Capstone)</td>
<td>Junior Design Option 1, 3</td>
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<td>CS 3451 Computer Graphics</td>
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<td>Media Requirements</td>
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<td>CS 4455 Video Game Design</td>
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<td>CS 4460 Intro Info Visualization</td>
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<td>CS 4464 Computational Journalism</td>
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<td></td>
<td>CS 4475 Comp Photography</td>
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<tr>
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<td>CS 4480 Digital Video Special FX</td>
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<td>CS 4496 Computer Animation</td>
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<td></td>
<td>CS 4590 Computer Audio</td>
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<tr>
<td>Interaction Design &amp; Experimental Media Requirements</td>
<td>LMC 2720 Prin of Visual Design 1</td>
<td>3</td>
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<tr>
<td></td>
<td>LMC 3710 Prin Interaction Design 1</td>
<td>3</td>
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<tr>
<td></td>
<td>or LMC 473 Experimental Digital Art</td>
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<tr>
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<td>Select three of the following: 1</td>
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<td>LMC 2730 Construct-Moving Image</td>
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<td>LMC 3206 Communication &amp; Culture</td>
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<td></td>
<td>LMC 3406 Video Production</td>
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<td></td>
<td>LMC 3705 Prin Information Design</td>
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<td>LMC 3710 Prin Interaction Design</td>
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<tr>
<td></td>
<td>LMC 4730 Experimental Digital Art</td>
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<td>CM or Media Courses 1, 2</td>
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<td>Free Electives</td>
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</table>

**Free Electives** 9

**Total Credit Hours** 122

Pass Fail is allowed for courses in core areas C, D, E and Free.

1. Minimum grade of C required.
2. CM or LMC courses include 2700-, 3700-, and 4700-level courses, as well as 3250-level courses, and LMC 2400, LMC 2500, LMC 3206, LMC 3314, LMC 3362, LMC 3406, and LMC 3853
3. Junior Design Options are as follows (students must pick one option and may not change):
   - Option 1 - LMC 3432, LMC 3431, CS 3311, CS 3312.
   - Option 2 - CS 4980 or LMC 4699 (4 credit hours), LMC 4701, LMC 4702.
   - Option 3 - ECE VIP courses and LMC 3403.

Six credits of the Junior Design option are used as Major Requirements and the overage credits of research/VIP (5 credit hours/2 credit hours) may be used as free electives. Students completing VIP for their junior design requirement will be required to complete at least four semesters of VIP. (VIP 1 + VIP 2 + VIP 3) (for a total of 5 credit hours) + VIP 4 (3 credit hours) = 8 hours of VIP credit. VIP 4 must be taken after 90 credit hours at the 4000 level and be on the same project as 2 of VIP 1-3s.

4. Two credit hours of MATH 1554 may count along with MATH 2550 to give Area F 18 credit hours.

**Cooperative Programs**

The College of Computing participates in the undergraduate and graduate Cooperative Programs.

See links below for further Information.

Undergraduate Cooperative Plan (p. 83)

Graduate Cooperative Plan (p. 83)

**International Plan**

The Computational Media (CM) International Plan follows the Institute model to develop a global competence within the student’s major program of study. It thus integrates international studies and experiences with work in all aspects of the computer as a medium, preparing graduates to plan, create, and critique new digital media forms within an international professional environment.

As in the basic CM program, students following the International Plan will take credit 36 hours of courses in CS and 30 credit hours of courses in LMC (in addition to the basic humanities requirement). Students will also:

1. take three international courses, including one from each of the following categories: International Relations, Global Economics, and a course on a specific country or region;
2. spend two terms abroad engaged in any combination of study abroad, research, or internship;
3. demonstrate language proficiency equivalent to two years of college-level language study (to be determined by testing); and
4. complete a CM capstone course that links international studies with the major.

**Research Option**

The CM Research Plan follows the Institute model to allow students to incorporate research experiences into the major program of study.
Students will complete nine hours of credit research work on various aspects of the computer as a medium, working in such areas as computational principles, the representation and manipulation of digital media, software design, visual and interactive design, digital art, and media theory and history.

As in the basic CM program, students following the Research Plan will take 36 credit hours of courses in CS and 30 credit hours of courses in LMC (in addition to the basic humanities requirement). CM students can complete the Research Option with nine CS or LMC research hours. Students cannot have a mix of both count towards the Research Option. The breakdown of hours is as follows:

<table>
<thead>
<tr>
<th>Code</th>
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<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Undergraduate Research</td>
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</tr>
<tr>
<td>LMC 4701</td>
<td>US Rsch Proposal Writing</td>
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<td>LMC 4702</td>
<td>US Rsch Thesis Writing</td>
<td>1</td>
</tr>
<tr>
<td>Total Credit Hours</td>
<td></td>
<td>11</td>
</tr>
</tbody>
</table>

**BS/MS Computational Media and Digital Media**

Students who want to pursue the five-year BS/MS combination in CM and DM must apply to the school of LMC after completing at least 75 hours of work towards the CM degree. Applicants should have a cumulative GPA of at least 3.5. This GPA must be maintained for the student to take graduate level courses. Students must start the program in the Fall to be on track with other MS students.

Students admitted to the program will take a total of twelve credit hours of graduate course work during their final undergraduate year; six credit hours of work, in DM courses, will count towards two 4000 level LMC courses (6 hours) and will count for both undergraduate and graduate credit. During the summer term after their fourth year, students will participate in an approved internship program. During their fifth year, students will take a total of 24 credit hours, including either LMC 6800 or LMC 7000, and with no more than three courses taken outside of the DM program.

**Bachelor of Science in Computational Media - Media - Film, Performance, & Media Studies**

The Bachelor of Science in Computational Media is a collaborative effort by the College of Computing and the School of Literature, Media, and Communication (LMC). The program offers a thorough education in all aspects of the computer as a medium: the technical, the historical-critical, and the applied. Program graduates will have both significant hands-on and theoretical knowledge of computing and an understanding of visual design and the history of media. Graduates will be uniquely positioned to plan, create, and critique new digital media forms for entertainment, education, and business communication.

The program requires 36 credit hours of courses in computer science and 30 credit hours of courses in LMC (in addition to the humanities requirement). A substantial number of required courses in each unit ensures that every student has basic competence in:

- computational principles;
- the representation and manipulation of digital media, including graphics and sound;
- software design;
- visual and interactive design;
- digital arts; and
- media theory and history.

After completing required courses, students specialize in a specific area of media computing. Typical specialty areas include:

- Interactive games design: This is one of the fastest growing areas of digital media production and is already a $7 billion industry.
- Special effects: As special effects become more complex and focused on computer-generated imagery, employment in this area will increasingly require expertise in both media and computer science.
- Culturally informed program design: As programming work is increasingly outsourced to nations offering lower labor costs, programming that adds value through a sophisticated response to the needs of specific corporate and group cultures will offer job security to American programmers.

Depending on their coursework within the BS program, students will also be qualified to enter graduate studies in computer science, digital arts, digital media studies, and human-computer interface.

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<tr>
<td></td>
<td><strong>Core B - Institutional Options</strong></td>
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<td></td>
<td><strong>Core C - Social Sciences</strong></td>
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<td></td>
<td><strong>Core D - Science, Math, &amp; Technology</strong></td>
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<td></td>
<td><strong>Core E - Courses Related to Major</strong></td>
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<tr>
<td></td>
<td><strong>Core F - Courses Related to Major</strong></td>
<td></td>
</tr>
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**Wellness**

APPH 1040 Sci Foundation of Health
or APPH 10 Sci of Phys Act & Health

**Core A - Essential Skills**

ENGL 1101 English Composition I
ENGL 1102 English Composition II
MATH 1552 Integral Calculus

**Core B - Institutional Options**

CS 1301 Intro to Computing

**Core C - Humanities**

Any HUM
Any LMC HUM

**Core D - Science, Math, & Technology**

Lab Science
MATH 1551 Differential Calculus
MATH 1554 Linear Algebra
or MATH 1560 Linear Alg w Abstract Vec Sp

**Core E - Social Sciences**

Select one of the following:

HIST 2111 United States to 1877
HIST 2112 United States since 1877
INTA 1200 American Government
POL 1101 Government of the U.S.

**Core F - Courses Related to Major**

CS 1331 Intro-Object Orient Prog
CS 1332 Data Struct & Algorithms
CS 2050 Intro Discrete Math CS
Pass/Fail is allowed for courses in core areas C, D, E and Free.

**Total Credit Hours**

1. CS 2340 Objects and Design 1
2. LMC 2700 Intr-Computational Media 1
3. MATH 2550 Intro Multivariable Calc 4

**Major Requirement**

1. CS 2261 Media Device Architecture 4
2. CS 4001 Computing & Society or CS 4726 Privacy Tech Policy Law or SLS 3110 Tech and Sustain Community

**Junior Design Options (Capstone)**

1. Junior Design Option 1,3 6

**Media Requirements**

1. CS 3451 Computer Graphics 1 3
2. Select two of the following: 1
   - CS 4455 Video Game Design
   - CS 4460 Intro Info Visualization
   - CS 4464 Computational Journalism
   - CS 4475 Comp Photography
   - CS 4480 Digital Video Special FX
   - CS 4496 Computer Animation
   - CS 4590 Computer Audio

**Film, Performance, & Media Studies Requirements**

1. Select one of the following: 3
   - LMC 2400 Intro to Media Studies 1
   - LMC 2500 Intro to Film
   - LMC 2600 Intro to Perform Studies

2. Select four of the following: 1
   - LMC 3206 Communication & Culture
   - LMC 3252 Film and Television
   - LMC 3254 Film History
   - LMC 3256 Major Filmmakers
   - LMC 3257 Global Cinema
   - LMC 3258 Documentary Film
   - LMC 3259 Experimental Film
   - LMC 3314 Tech of Representation
   - LMC 3352 Film Technology
   - LMC 3362 Sci, Tech & Performance

3. CM or Media Courses 1,2 12

**Free Electives**

- Free Electives 9

**Total Credit Hours**

122

1. Minimum grade of C required.
2. CM or LMC courses include 2700-, 3700-, and 4700-level courses, as well as 3250-level courses, and LMC 2400, 2500, 3206, 3314, 3354, 3362, 3406, and 3853.
3. Junior Design Options are as follows (students must pick one option and may not change):
   - Option 1 - LMC 3432, LMC 3431, CS 3311, CS 3312.
   - Option 2 - CS 4980 or LMC 4699 (4 credit hours), LMC 4701, LMC 4702.
   - Option 3 - ECE VIP courses and LMC 4303.

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VIP 4 must be taken after 90 credit hours at the 4000 level and be on the same project as 2 of VIP 1-3s.

4. Two credit hours of MATH 1554 may count along with MATH 2550 to give Area F 18 credit hours.

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**Graduate Cooperative Plan** (p. 83)

**International Plan**

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1. take three international courses, including one from each of the following categories: International Relations, Global Economics, and a course on a specific country or region;
2. spend two terms abroad engaged in any combination of study abroad, research, or internship;
3. demonstrate language proficiency equivalent to two years of college-level language study (to be determined by testing); and
4. complete a CM capstone course that links international studies with the major.

**Research Option**

The CM Research Plan follows the Institute model to allow students to incorporate research experiences into the major program of study. Students will complete nine hours of credit research work on various aspects of the computer as a medium, working in such areas as computational principles, the representation and manipulation of digital media, software design, visual and interactive design, digital art, and media theory and history.

As in the basic CM program, students following the Research Plan will take 36 credit hours of courses in CS and 30 credit hours of courses in LMC (in addition to the basic humanities requirement). CM students
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<td>LMC 4702</td>
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<td>Total Credit Hours</td>
<td>11</td>
</tr>
</tbody>
</table>

BS/MS Computational Media and Digital Media

Students who want to pursue the five-year BS/MS combination in CM and DM must apply to the school of LMC after completing at least 75 hours of work towards the CM degree. Applicants should have a cumulative GPA of at least 3.5. This GPA must be maintained for the student to take graduate level courses. Students must start the program in the Fall to be on track with other MS students.

Students admitted to the program will take a total of twelve credit hours of graduate course work during their final undergraduate year; six credit hours of that work, in DM courses, will count towards two 4000 level LMC courses (6 hours) and will count for both undergraduate and graduate credit. During the summer term after their fourth year, students will participate in an approved internship program. During their fifth year, students will take a total of 24 credit hours, including either LMC 6800 or LMC 7000, and with no more than three courses taken outside of the DM program.

Bachelor of Science in Computational Media - Media - Game Studies

The Bachelor of Science in Computational Media is a collaborative effort by the College of Computing and the School of Literature, Media, and Communication (LMC). The program offers a thorough education in all aspects of the computer as a medium: the technical, the historical-critical, and the applied. Program graduates will have both significant hands-on and theoretical knowledge of computing and an understanding of visual design and the history of media. Graduates will be uniquely positioned to plan, create, and critique new digital media forms for entertainment, education, and business communication.

The program requires 36 credit hours of courses in computer science and 30 credit hours of courses in LMC (in addition to the humanities requirement). A substantial number of required courses in each unit ensures that every student has basic competence in:

- computational principles;
- the representation and manipulation of digital media, including graphics and sound;
- software design;
- visual and interactive design;
- digital arts; and
- media theory and history.

After completing required courses, students specialize in a specific area of media computing. Typical specialty areas include:

- Interactive games design: This is one of the fastest growing areas of digital media production and is already a $7 billion industry.
- Special effects: As special effects become more complex and focused on computer-generated imagery, employment in this area will increasingly require expertise in both media and computer science.
- Culturally informed program design: As programming work is increasingly outsourced to nations offering lower labor costs, programming that adds value through a sophisticated response to the needs of specific corporate and group cultures will offer job security to American programmers.

Depending on their coursework within the BS program, students will also be qualified to enter graduate studies in computer science, digital arts, digital media studies, and human-computer interface.

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<td>1</td>
</tr>
<tr>
<td></td>
<td>Total Credit Hours</td>
<td>11</td>
</tr>
</tbody>
</table>

**Wellness**

- APHP 1040 Sciences Foundation of Health
- APHP 1060 Science of Phys Act & Health

**Core A - Essential Skills**

- ENGL 1101 English Composition I
- ENGL 1102 English Composition II
- MATH 1552 Integral Calculus

**Core B - Institutional Options**

- CS 1301 Intro to Computing
- CS 2340 Objects and Design
- LMC 2700 Intro-Computational Media
- MATH 2550 Intro Multivariable Calculus

**Core C - Humanities**

- Any HUM
- Any LMC HUM

**Core D - Science, Math, & Technology**

- Lab Science
- MATH 1551 Differential Calculus
- MATH 1554 Linear Algebra
- MATH 1564 LinAlg w Abstract Vec Sp

**Core E - Social Sciences**

- Select one of the following:
  - HIST 2111 United States to 1877
  - HIST 2112 United States since 1877
  - INTA 1200 American Government
  - POL 1101 Government of the U.S.

**Core F - Courses Related to Major**

- CS 1331 Intro-Object Orient Prog
- CS 1332 Data Struct & Algorithms
- CS 2050 Intro Discrete Math CS
- CS 2340 Objects and Design
- LMC 2700 Intro-Computational Media
- MATH 2550 Intro Multivariable Calculus

**Major Requirement**

- CS 2261 Media Device Architectur
- CS 4001 Computing & Society
- or CS 4726 Privacy Tech Policy Law
- or SLS 3110Tech and Sustain Community

**Junior Design Options (Capstone)**
program of study. It thus integrates international studies and experiences with work in all aspects of the computer as a medium, preparing graduates to plan, create, and critique new digital media forms within an international professional environment.

As in the basic CM program, students following the International Plan will take credit 36 hours of courses in CS and 30 credit hours of courses in LMC (in addition to the basic humanities requirement). Students will also:

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3. demonstrate language proficiency equivalent to two years of college-level language study (to be determined by testing); and
4. complete a CM capstone course that links international studies with the major.

Research Option
The CM Research Plan follows the Institute model to allow students to incorporate research experiences into the major program of study. Students will complete nine hours of credit research work on various aspects of the computer as a medium, working in such areas as computational principles, the representation and manipulation of digital media, software design, visual and interactive design, digital art, and media theory and history.

As in the basic CM program, students following the Research Plan will take 36 credit hours of courses in CS and 30 credit hours of courses in LMC (in addition to the basic humanities requirement). CM students can complete the Research Option with nine CS or LMC research hours. Students cannot have a mix of both count towards the Research Option. The breakdown of hours is as follows:

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LMC 7000, and with no more than three courses taken outside of the DM program.

**Bachelor of Science in Computational Media - Media - Narrative Studies**

The Bachelor of Science in Computational Media is a collaborative effort by the College of Computing and the School of Literature, Media, and Communication (LMC). The program offers a thorough education in all aspects of the computer as a medium: the technical, the historical-critical, and the applied. Program graduates will have both significant hands-on and theoretical knowledge of computing and an understanding of visual design and the history of media. Graduates will be uniquely positioned to plan, create, and critique new digital media forms for entertainment, education, and business communication.

The program requires 36 credit hours of courses in computer science and 30 credit hours of courses in LMC (in addition to the humanities requirement). A substantial number of required courses in each unit ensures that every student has basic competence in:

- computational principles;
- the representation and manipulation of digital media, including graphics and sound;
- software design;
- visual and interactive design;
- digital arts; and
- media theory and history.

After completing required courses, students specialize in a specific area of media computing. Typical specialty areas include:

- Interactive games design: This is one of the fastest growing areas of digital media production and is already a $7 billion industry.
- Special effects: As special effects become more complex and focused on computer-generated imagery, employment in this area will increasingly require expertise in both media and computer science.
- Culturally informed program design: As programming work is increasingly outsourced to nations offering lower labor costs, programming that adds value through a sophisticated response to the needs of specific corporate and group cultures will offer job security to American programmers.

Depending on their coursework within the BS program, students will also be qualified to enter graduate studies in computer science, digital arts, digital media studies, and human-computer interface.

### Code | Title | Credit Hours
--- | --- | ---
**Wellness**
APPH 1040 | Sci Foundation of Health | 2
or APPH 10 | Sci of Phys Act & Health | 2
**Core A - Essential Skills**
ENGL 1101 | English Composition I | 3
ENGL 1102 | English Composition II | 3
MATH 1552 | Integral Calculus | 4
**Core B - Institutional Options**
CS 1301 | Intro to Computing | 3
**Core C - Humanities**
Any HUM (p. 93) | 3
Any LMC HUM | 3
**Core D - Science, Math, & Technology**
Lab Science | 8
MATH 1551 | Differential Calculus | 2
MATH 1554 | Linear Algebra | 4
or MATH 1564 | LinAlg w Abstract Vec Sp | 2
**Core E - Social Sciences**
Select one of the following: | 3
HIST 2111 | United States to 1877 | 3
HIST 2112 | United States since 1877 | 3
INTA 1200 | American Government | 3
POL 1101 | Government of the U.S. | 3
PUBP 3000 | US Constitutional Issues | 3
Any SS (p. 97) | 9
**Core F - Courses Related to Major**
CS 1331 | Intro-Object Orient Prog | 3
CS 1332 | Data Struct & Algorithms | 3
CS 2050 | Intro Discrete Math CS | 3
CS 2340 | Objects and Design | 3
LMC 2700 | Intr-Computational Media | 3
MATH 2550 | Intro Multivariable Calc | 2
**Major Requirement**
CS 2261 | Media Device Architect | 4
CS 4001 | Computing & Society | 3
or CS 4726 | Privacy Tech Policy Law | 3
or SLS 3110Tech and Sustain Community | 3
**Junior Design Options (Capstone)**
Junior Design Option | 1,3 | 6
**Media Requirements**
CS 3451 | Computer Graphics | 3
Select two of the following: | 3
CS 4455 | Video Game Design | 1
CS 4460 | Intro Info Visualization | 1
CS 4464 | Computational Journalism | 1
CS 4475 | Comp Photography | 1
CS 4480 | Digital Video Special FX | 1
CS 4496 | Computer Animation | 1
CS 4590 | Computer Audio | 1
**Narrative Studies Requirements**
LMC 3202 | Studies in Fiction | 3
LMC 4720 | Interactive Narrative | 3
Select two of the following: | 1
LMC 2730 | Construct-Moving Image | 1
LMC 3206 | Communication & Culture | 1
LMC 3710 | Prin Interaction Design | 1
CM or LMC Literary Courses | 1,2 | 15
**Free Electives**
Free Electives | 9
**Total Credit Hours**
122

Pass Fail is allowed for courses in core areas C, D, E and Free.
Computational principles, the representation and manipulation of digital media, software design, visual and interactive design, digital art, and media theory and history.

As in the basic CM program, students following the Research Plan will take 36 credit hours of courses in CS and 30 credit hours of courses in LMC (in addition to the basic humanities requirement). CM students can complete the Research Option with nine CS or LMC research hours. Students cannot have a mix of both count towards the Research Option. The breakdown of hours is as follows:

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</tbody>
</table>

BS/MS Computational Media and Digital Media

Students who want to pursue the five-year BS/MS combination in CM and DM must apply to the school of LMC after completing at least 75 hours of work towards the CM degree. Applicants should have a cumulative GPA of at least 3.5. This GPA must be maintained for the student to take graduate level courses. Students must start the program in the Fall to be on track with other MS students.

Students admitted to the program will take a total of twelve credit hours of graduate course work during their final undergraduate year; six credit hours of that work, in DM courses, will count towards two 4000 level LMC courses (6 hours) and will count for both undergraduate and graduate credit. During the summer term after their fourth year, students will participate in an approved internship program. During their fifth year, students will take a total of 24 credit hours, including either LMC 6800 or LMC 7000, and with no more than three courses taken outside of the DM program.

Bachelor of Science in Computational Media - People - Film, Performance, & Media Studies

The Bachelor of Science in Computational Media is a collaborative effort by the College of Computing and the School of Literature, Media, and Communication (LMC). The program offers a thorough education in all aspects of the computer as a medium: the technical, the historical-critical, and the applied. Program graduates will have both significant hands-on and theoretical knowledge of computing and an understanding of visual design and the history of media. Graduates will be uniquely positioned to plan, create, and critique new digital media forms for entertainment, education, and business communication.

The program requires 36 credit hours of courses in computer science and 30 credit hours of courses in LMC (in addition to the humanities requirement). A substantial number of required courses in each unit ensures that every student has basic competence in:

• computational principles;
• the representation and manipulation of digital media, including graphics and sound;
• software design;

Cooperative Programs

The College of Computing participates in the undergraduate and graduate Cooperative Programs.

See links below for further Information.

Undergraduate Cooperative Plan (p. 83)
Graduate Cooperative Plan (p. 83)

International Plan

The Computational Media (CM) International Plan follows the Institute model to develop a global competence within the student’s major program of study. It thus integrates international studies and experiences with work in all aspects of the computer as a medium, preparing graduates to plan, create, and critique new digital media forms within an international professional environment.

As in the basic CM program, students following the International Plan will take credit 36 hours of courses in CS and 30 credit hours of courses in LMC (in addition to the basic humanities requirement). Students will also:

1. take three international courses, including one from each of the following categories: International Relations, Global Economics, and a course on a specific country or region;
2. spend two terms abroad engaged in any combination of study abroad, research, or internship;
3. demonstrate language proficiency equivalent to two years of college-level language study (to be determined by testing); and
4. complete a CM capstone course that links international studies with the major.

Research Option

The CM Research Plan follows the Institute model to allow students to incorporate research experiences into the major program of study. Students will complete nine hours of credit research work on various aspects of the computer as a medium, working in such areas as computational principles, the representation and manipulation of digital media, software design, visual and interactive design, digital art, and media theory and history.

Six credits of the Junior Design option are used as Major Requirements and the average credits of research/VIP (5 credit hours/2 credit hours) may be used as free electives. Students completing VIP for their junior design requirement will be required to complete at least four semesters of VIP. (VIP 1 + VIP 2 + VIP 3) (for a total of 5 credit hours) + VIP 4 (3 credit hours) = 8 hours of VIP credit. VIP 4 must be taken after 90 credit hours at the 4000 level and be on the same project as 2 of VIP 1-3s.

Two credit hours of MATH 1554 may count along with MATH 2550 to give Area F 18 credit hours.
• visual and interactive design;
• digital arts; and
• media theory and history.

After completing required courses, students specialize in a specific area of media computing. Typical specialty areas include:

• Interactive games design: This is one of the fastest growing areas of digital media production and is already a $7 billion industry.
• Special effects: As special effects become more complex and focused on computer-generated imagery, employment in this area will increasingly require expertise in both media and computer science.
• Culturally informed program design: As programming work is increasingly outsourced to nations offering lower labor costs, programming that adds value through a sophisticated response to the needs of specific corporate and group cultures will offer job security to American programmers.

Depending on their coursework within the BS program, students will also be qualified to enter graduate studies in computer science, digital arts, digital media studies, and human-computer interface.

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<td>Core B - Institutional Options</td>
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<td>Film, Performance, &amp; Media Studies Requirements</td>
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<td>LMC 3252</td>
<td>Film and Television</td>
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Pass Fail is allowed for courses in core areas C, D, E and Free.

1 Minimum grade of C required.
2 CM or LMC courses include 2700-, 3700-, and 4700-level courses, as well as 3250-level courses, and LMC 2400, LMC 2500, LMC 3206, LMC 3314, LMC 3362, LMC 3406, and LMC 3853.
Junior Design Options are as follows (students must pick one option and may not change):

- Option 1 - LMC 3432, LMC 3431, CS 3311, CS 3312.
- Option 2 - CS 4980 or LMC 4699 (4 credit hours), LMC 4701, LMC 4702.
- Option 3 - ECE VIP courses and LMC 3403.

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Graduate Cooperative Plan (p. 83)

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1. take three international courses, including one from each of the following categories: International Relations, Global Economics, and a course on a specific country or region;
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As in the basic CM program, students following the Research Plan will take 36 credit hours of courses in CS and 30 credit hours of courses in LMC (in addition to the basic humanities requirement). CM students can complete the Research Option with nine CS or LMC research hours. Students cannot have a mix of both count towards the Research Option. The breakdown of hours is as follows:

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<tr>
<th>Code</th>
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<th>Credit Hours</th>
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<tbody>
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<td>LMC 4701</td>
<td>US Rsch Proposal Writing</td>
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<td>LMC 4702</td>
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<td>11</td>
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Students admitted to the program will take a total of twelve credit hours of graduate course work during their final undergraduate year; six credit hours of that work, in DM courses, will count towards two 4000 level LMC courses (6 hours) and will count for both undergraduate and graduate credit. During the summer term after their fourth year, students will participate in an approved internship program. During their fifth year, students will take a total of 24 credit hours, including either LMC 6800 or LMC 7000, and with no more than three courses taken outside of the DM program.

Bachelor of Science in Computational Media - People - Game Studies

The Bachelor of Science in Computational Media is a collaborative effort by the College of Computing and the School of Literature, Media, and Communication (LMC). The program offers a thorough education in all aspects of the computer as a medium: the technical, the historical-critical, and the applied. Program graduates will have both significant hands-on and theoretical knowledge of computing and an understanding of visual design and the history of media. Graduates will be uniquely positioned to plan, create, and critique new digital media forms for entertainment, education, and business communication.

The program requires 36 credit hours of courses in computer science and 30 credit hours of courses in LMC (in addition to the humanities requirement). A substantial number of required courses in each unit ensures that every student has basic competence in:

- computational principles;
- the representation and manipulation of digital media, including graphics and sound;
- software design;
- visual and interactive design;
- digital arts; and
- media theory and history.

After completing required courses, students specialize in a specific area of media computing. Typical specialty areas include:
• Interactive games design: This is one of the fastest growing areas of
digital media production and is already a $7 billion industry.
• Special effects: As special effects become more complex and
focused on computer-generated imagery, employment in this area will
increasingly require expertise in both media and computer science.
• Culturally informed program design: As programming work is
increasingly outsourced to nations offering lower labor costs,
programming that adds value through a sophisticated response
to the needs of specific corporate and group cultures will offer job
security to American programmers.

Depending on their coursework within the BS program, students will also
be qualified to enter graduate studies in computer science, digital arts,
digital media studies, and human-computer interface.

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<th>Code</th>
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<th>Credit Hours</th>
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<td>APPH 1040</td>
<td>Sci Foundation of Health</td>
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<td><strong>Core F - Courses Related to Major</strong></td>
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<td>CS 2050</td>
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Junior Design Option (Capstone)

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</table>

People Requirements

Select one of the following: ¹                  | 3            |
| CS 4460 Intro Info Visualization           |              |
| CS 4470 User Interface Software            |              |
| CS 4605 Mobile&Ubiquitous Comp             |              |
| CS 4625 Intel & Interactive Sys            |              |

Game Studies Requirements

Select 3 of the following: ¹                   | 9            |
| LMC 4720 Interactive Narrative ¹           |              |
| LMC 4725 Game Design                       |              |
| LMC 4731 Game AI                           |              |
| CS 3600 Intro-Artificial Intell ¹           | 3            |
| CM or Media Courses ¹,²                    | 15           |

Free Electives

Select one of the following: ¹                 | 3            |
| CS 4980 Intel & Interactive Sys            |              |
| LMC 2400 Game AI                           |              |
| LMC 3206 Human Language Process            |              |
| LMC 3853 Intro Cognitive Science           |              |
| PSYC 2210 Social Psychology                |              |
| PSYC 2760 Human Language Process           |              |
| PSYC 3040 Sensation & Perception           |              |

Free Electives

Select 2 of the following: ³                   | 6            |
| CS 3750 User Interface Design              |              |
| CS 3790 Intro-Cognitive Science            |              |
| CS 4660 Educational Technology             |              |
| CS 4745 Info&Com Tech&Global Dev           |              |

Select one of the following: ¹                 | 3            |
| CS 4460 Intro Info Visualization           |              |
| CS 4470 User Interface Software            |              |
| CS 4605 Mobile&Ubiquitous Comp             |              |
| CS 4625 Intel & Interactive Sys            |              |

Free Electives

Select 3 of the following: ²                   | 122          |
| PSYC 2015 Research Methods ¹               |              |
| PSYC 2210 Social Psychology                |              |
| PSYC 2760 Human Language Process           |              |
| PSYC 3040 Sensation & Perception           |              |

Pass Fail is allowed for courses in core areas C, D, E and Free.

¹ Minimum grade of C required.
² CM or LMC courses include 2700-, 3700-, and 4700-level courses,
as well as 3250-level courses, and LMC 2400, LMC 2500, LMC 3206,
LMC 3314, LMC 3362, LMC 3406, and LMC 3853.
³ Junior Design Options are as follows (students must pick one option
and may not change):
• Option 1 - LMC 3432, LMC 3431, CS 3311, CS 3312.
• Option 2 - CS 4980 or LMC 4699 (4 credit hours), LMC 4701, LMC 4702.
• Option 3 - ECE VIP courses and LMC 3403.

Six credits of the Junior Design option are used as Major
Requirements and the overlap of credits is research/VIP (5 credit
hours/2 credit hours) may be used as free electives. Students
completing VIP for their junior design requirement will be required to
complete at least four semesters of VIP. (VIP 1 + VIP 2 + VIP 3) (for a
total of 5 credit hours) + VIP 4 (3 credit hours) = 8 hours of VIP credit.
VIP 4 must be taken after 90 credit hours at the 4000 level and be on
the same project as 2 of VIP 1-3s.

Four credits of MATH 1554 may count along with MATH 2550 to
give Area F 18 credit hours.

Cooperative Programs

The College of Computing participates in the undergraduate and graduate
Cooperative Programs.
See links below for further information.

Undergraduate Cooperative Plan (p. 83)
Graduate Cooperative Plan (p. 83)

International Plan
The Computational Media (CM) International Plan follows the Institute model to develop a global competence within the student’s major program of study. It thus integrates international studies and experiences with work in all aspects of the computer as a medium, preparing graduates to plan, create, and critique new digital media forms within an international professional environment.

As in the basic CM program, students following the International Plan will take credit 36 hours of courses in CS and 30 credit hours of courses in LMC (in addition to the basic humanities requirement). Students will also:

1. take three international courses, including one from each of the following categories: International Relations, Global Economics, and a course on a specific country or region;
2. spend two terms abroad engaged in any combination of study abroad, research, or internship;
3. demonstrate language proficiency equivalent to two years of college-level language study (to be determined by testing); and
4. complete a CM capstone course that links international studies with the major.

Research Option
The CM Research Plan follows the Institute model to allow students to incorporate research experiences into the major program of study. Students will complete nine hours of credit research work on various aspects of the computer as a medium, working in such areas as computational principles, the representation and manipulation of digital media, software design, visual and interactive design, digital art, and media theory and history.

As in the basic CM program, students following the Research Plan will take 36 credit hours of courses in CS and 30 credit hours of courses in LMC (in addition to the basic humanities requirement). CM students can complete the Research Option with nine CS or LMC research hours. Students cannot have a mix of both count towards the Research Option. The breakdown of hours is as follows:

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<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Undergraduate Research</td>
<td>9</td>
</tr>
<tr>
<td>LMC 4701</td>
<td>US Rsch Proposal Writing</td>
<td>1</td>
</tr>
<tr>
<td>LMC 4702</td>
<td>US Rsch Thesis Writing</td>
<td>1</td>
</tr>
<tr>
<td></td>
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<td>11</td>
</tr>
</tbody>
</table>

BS/MS Computational Media and Digital Media
Students who want to pursue the five-year BS/MS combination in CM and DM must apply to the school of LMC after completing at least 75 hours of work towards the CM degree. Applicants should have a cumulative GPA of at least 3.5. This GPA must be maintained for the student to take graduate level courses. Students must start the program in the Fall to be on track with other MS students.

Students admitted to the program will take a total of twelve credit hours of graduate course work during their final undergraduate year; six credit hours of that work, in DM courses, will count towards two 4000 level LMC courses (6 hours) and will count for both undergraduate and graduate credit. During the summer term after their fourth year, students will participate in an approved internship program. During their fifth year, students will take a total of 24 credit hours, including either LMC 6800 or LMC 7000, and with no more than three courses taken outside of the CM program.

Bachelor of Science in Computational Media - People - Interaction Design & Experimental Media
The Bachelor of Science in Computational Media is a collaborative effort by the College of Computing and the School of Literature, Media, and Communication (LMC). The program offers a thorough education in all aspects of the computer as a medium: the technical, the historical-critical, and the applied. Program graduates will have both significant hands-on and theoretical knowledge of computing and an understanding of visual design and the history of media. Graduates will be uniquely positioned to plan, create, and critique new digital media forms for entertainment, education, and business communication.

The program requires 36 credit hours of courses in computer science and 30 credit hours of courses in LMC (in addition to the humanities requirement). A substantial number of required courses in each unit ensures that every student has basic competence in:

- computational principles;
- the representation and manipulation of digital media, including graphics and sound;
- software design;
- visual and interactive design;
- digital arts; and
- media theory and history.

After completing required courses, students specialize in a specific area of media computing. Typical specialty areas include:

- Interactive games design: This is one of the fastest growing areas of digital media production and is already a $7 billion industry.
- Special effects: As special effects become more complex and focused on computer-generated imagery, employment in this area will increasingly require expertise in both media and computer science.
- Culturally informed program design: As programming work is increasingly outsourced to nations offering lower labor costs, programming that adds value through a sophisticated response to the needs of specific corporate and group cultures will offer job security to American programmers.

Depending on their coursework within the BS program, students will also be qualified to enter graduate studies in computer science, digital arts, digital media studies, and human-computer interface.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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<td></td>
<td>Wellness</td>
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<tr>
<td>APPH 1040</td>
<td>Sci Foundation of Health</td>
<td></td>
</tr>
<tr>
<td>or APPH 10</td>
<td>Sci of Phys Act &amp; Health</td>
<td></td>
</tr>
</tbody>
</table>
Core A - Essential Skills
ENGL 1101 English Composition I 3
ENGL 1102 English Composition II 3
MATH 1552 Integral Calculus 4

Core B - Institutional Options
CS 1301 Intro to Computing 3

Core C - Humanities
Any HUM (p. 93) 3
Any LMC HUM 3

Core D - Science, Math, & Technology
Lab Science 8
MATH 1551 Differential Calculus 2
MATH 1554 Linear Algebra 4
or MATH 1561AlgL w Abstract Vec Sp

Core E - Social Sciences
Select one of the following: 3
HIST 2111 United States to 1877
HIST 2112 United States since 1877
INTA 1200 American Government
POL 1101 Government of the U.S.
PUBP 3000 US Constitutional Issues
PSYC 1101 General Psychology 3
Any SS (p. 97) 6

Core F - Courses Related to Major
CS 1331 Intro-Object Orient Prog 3
CS 1332 Data Struct & Algorithms 3
CS 2050 Intro Discrete Math CS 3
CS 2340 Objects and Design 3
LMC 2700 Intr-Computational Media 3
MATH 2550 Intro Multivariable Calc 4

Major Requirement
CS 2261 Media Device Architectur 4
CS 4001 Computing & Society 3
or CS 4726 Privacy Tech Policy Law
or SLS 3111kTech and Sustain Community

Junior Design Option (Capstone)
Junior Design Option 6

People Requirements
PSYC 2015 Research Methods 4
Select one of the following: 3
PSYC 2210 Social Psychology
PSYC 2760 Human Language Process
PSYC 3040 Sensation & Perception
Select two of the following: 6
CS 3750 User Interface Design
CS 3790 Intro-Cognitive Science
CS 4660 Educational Technology
CS 4745 Info&Com Tech&Global Dev
Select one of the following: 3
CS 4460 Intro Info Visualization
CS 4470 User Interface Software
CS 4605 Mobile&Ubiquitous Comp

Interaction Design & Experimental Media Requirements
LMC 2720 Prin of Visual Design 3
LMC 3710 Prin Interaction Design 3
or LMC 4733Experimental Digital Art
Select three of the following: 9
LMC 2730 Construct-Moving Image
LMC 3206 Communication & Culture
LMC 3406 Video Production
LMC 3705 Prin Information Design
LMC 3710 Prin Interaction Design
LMC 4730 Experimental Digital Art
CM or Media Courses 12 12

Free Electives
Free Electives 2
Total Credit Hours 122

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Bachelor of Science in Computational Media - People - Narrative Studies

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- Culturally informed program design: As programming work is increasingly outsourced to nations offering lower labor costs, programming that adds value through a sophisticated response to the needs of specific corporate and group cultures will offer job security to American programmers.

Depending on their coursework within the BS program, students will also be qualified to enter graduate studies in computer science, digital arts, digital media studies, and human-computer interface.
Lab Science 8
MATH 1551 Differential Calculus 2
MATH 1554 Linear Algebra 4

or MATH 1561 Alg w Abstract Vec Sp

**Free Electives**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>MATH 2550</td>
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<tr>
<td>PSYC 3040</td>
<td>Sensation &amp; Perception</td>
<td></td>
</tr>
<tr>
<td>PSYC 2210</td>
<td>Social Psychology</td>
<td></td>
</tr>
<tr>
<td>PSYC 2760</td>
<td>Human Language Process</td>
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</tr>
<tr>
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<td>Sensation &amp; Perception</td>
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</tr>
<tr>
<td>CS 3311</td>
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<td>Data Struct &amp; Algorithms 1</td>
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</tr>
<tr>
<td>CS 2340</td>
<td>Objects and Design</td>
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<tr>
<td>LMC 2700</td>
<td>Intr-Computational Media 1</td>
<td></td>
</tr>
<tr>
<td>MATH 2550</td>
<td>Intro Multivariable Calc 4</td>
<td></td>
</tr>
<tr>
<td>Any SS (p. 97)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Core E - Social Sciences**

Select one of the following:
- HIST 2111 United States to 1877
- HIST 2112 United States since 1877
- INTA 1200 American Government
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**People Requirements**

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<td>PSYC 2015</td>
<td>Research Methods</td>
</tr>
<tr>
<td>PSYC 2210</td>
<td>Social Psychology</td>
</tr>
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</table>

Select two of the following:
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- CS 3790 Intro-Cognitive Science
- CS 4660 Educational Technology
- CS 4745 Info&Com Tech&Global Dev

Select one of the following:
- CS 4470 User Interface Software
- CS 4605 Mobile&Ubiquitous Comp
- CS 4625 Intel & Interactive Sys

**Narrative Studies Requirements**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>LMC 3202</td>
<td>Studies in Fiction</td>
</tr>
<tr>
<td>LMC 4720</td>
<td>Interactive Narrative</td>
</tr>
</tbody>
</table>

Select two of the following:
- LMC 2730 Construct-Moving Image
- LMC 3206 Communication & Culture
- LMC 3710 Print Interaction Design

**CM or Literary Courses**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 1554</td>
<td>Linear Algebra</td>
</tr>
</tbody>
</table>

**Total Credit Hours** 122

Pass Fail is allowed for courses in core areas C, D, E and Free.

1. Minimum grade of C required.
2. CM or Literary courses include 2700-, 3700-, and 4700-level courses, as well as 3200- and 3500-level courses and LMC 2823, LMC 3823, and LMC 3853.
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<td></td>
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<tr>
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<td>1</td>
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**Bachelor of Science in Computer Engineering**

The School of Electrical and Computer Engineering offers two undergraduate degree programs: electrical engineering (EE) and computer engineering (CmpE). Both programs include elective hours, enabling students to individually tailor their programs to provide emphasis in a particular specialization or exposure to a broad range of subjects. Engineering analysis and design concepts are integrated throughout both programs, culminating in a common major design experience involving a broad range of issues including economic and societal considerations.

The field of computer engineering is centered in digital design, computer architecture, computer networks and internetworking, and computer applications. The BS CmpE program offers elective courses in a wide variety of specializations, including computer architecture; embedded systems and software; design tools, test, and verification; computer networks and internetworking; distributed systems and software; and VLSI design. Additionally, students may elect to take advanced courses in other EE specializations, computer science, or programs, such as mathematics, physics, or management. As an alternative to the BS CmpE degree, students may choose a computer engineering specialization within the BS EE degree program.

**Program Objectives**

The School of Electrical and Computer Engineering has established the following student educational objectives for its undergraduate programs:

A. Graduates will be successful in the professional practice of engineering or other related fields. They will obtain employment appropriate to their background, interests, and education and will advance in their career field.

B. Graduates will engage in life-long learning; e.g., advanced education/degrees, professional development activities, and/or other career-appropriate options.

C. Graduates who are employed within engineering fields will demonstrate technical competence, such as identifying, formulating, analyzing, and creating engineering solutions using appropriate current engineering techniques, skills, and tools.

D. As appropriate to their professional or educational positions, graduates will
   i. effectively communicate technical information in multiple formats,
   ii. function effectively on teams, and
   iii. develop and apply electrical/computer engineering solutions within global, societal, and environmental contexts.

Additional information about program assessment (http://www.ece.gatech.edu/academics/accreditation.html) for all of the School’s programs is available on the ECE website.

<table>
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<tr>
<td>or APPH 10 Sci of Phys Act &amp; Health</td>
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<td>ENGL 1101 English Composition I</td>
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<tr>
<td>ENGL 1102 English Composition II</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>MATH 1552 Integral Calculus</td>
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<td></td>
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<tr>
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<td>3</td>
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</tr>
<tr>
<td>Any HUM (p. 93)</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>PHYS 2211 Intro Physics I</td>
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<td>HIST 2111 United States to 1877</td>
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<td>POL 1101 Government of the U.S.</td>
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<tr>
<td>PUBP 3000 US Constitutional Issues</td>
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Choose one of the following:  
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<td>ECON 2100</td>
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<td>ECON 2101</td>
<td>The Global Economy</td>
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</tr>
<tr>
<td>ECON 2105</td>
<td>Prin of Macroeconomics</td>
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<td>ECON 2106</td>
<td>Prin of Microeconomics</td>
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Any SS (p. 97) 6

Core F - Courses Related to Major

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<td>MATH 2552</td>
<td>Differential Equations</td>
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Science Elective 4

Ethics Requirement (p. 100) 5

Probability/Statistics 9

Professional Communications 10

Major Requirements

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<td>ECE 2031</td>
<td>Digital Design Lab</td>
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<td>ECE 2035</td>
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<td>Circuit Analysis</td>
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<td>ECE 3020</td>
<td>Math Foundations of CmpE</td>
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<td>ECE 3030</td>
<td>Physical Foundations CmpE</td>
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<td>ECE 3056</td>
<td>Comp Arch, Concurr, Energy</td>
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<td>ECE 4011</td>
<td>ECE Culuminating Design 1</td>
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<td>ECE 4012</td>
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Non-ECE Engineering Electives

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<td>CMPE Upper Level Electives</td>
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Approved Electives

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<tr>
<td>Total Credit Hours</td>
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Pass-fail only allowed for Humanities Electives, Social Sciences Electives, Science Electives, and Free Elective courses.

Courses that are cross-listed with ECE must be taken under the ECE number.

1. Students must complete an Ethics requirement. See below for allowable Ethics courses.
2. If PHYS 2231 is taken, extra hour goes to Free Electives.
3. Minimum grade of C required.
4. Science Elective must be chosen from the following list: APPH 3751, BIOL 1510, BIOL 1520, BIOL 3571, CHEM 1212K, CHEM 1315, EAS 1600, EAS 1601, EAS 2600, PHYS 2021, PHYS 2022, or PHYS 2213.
5. Students must complete one Ethics course during their program. For a complete list of Ethics courses, please see: http://www.catalog.gatech.edu/students/ugrad/core/ethics.php
6. ECE 3005, ECE 3710, ECE 3741, ECE 4699, CS 4699, ECE 3900-level, CS 3900-level, ECE 4900-level, CS 4900-level, ECE 3800-level, and CS 4800-level not allowed.

Cooperative Plan

The Georgia Tech Undergraduate Cooperative Education Program allows students to combine classroom study with paid practical work experience directly related to the academic major. Co-ops alternate semesters of on-campus study with semesters of full-time employment, normally beginning the program as freshmen or sophomores. Over 30 percent of ECE undergraduates participate in the co-op program.

The degree requirements for students in the co-op program are the same as those for other students in the major. The Cooperative Plan designation may be pursued separately or in combination with the International Plan and/or the Research Option.

Begun in 1912, Georgia Tech's program is currently the largest optional co-op program in the United States and has perennially been listed in U.S. News & World Report as one of the top ten co-op programs in America. As an integral part of the overall education experience, the co-op program allows students to take on increasing levels of responsibility and to use their job knowledge and classroom learning to make meaningful contributions to the organizations in which they work. Many co-op graduates are hired by their co-op employer, and more than 700 companies or government organizations throughout the United States and abroad currently employ Georgia Tech Undergrad Co-op Program students.

Because the School of ECE in Atlanta offers a wide range of electives and almost all required courses every term, including summer, co-op students have substantial flexibility in completing their degree requirements. Many students continue their co-op work assignments through the senior year. Additionally, co-op students working in the Atlanta area may be able to take certain ECE courses, particularly laboratories offered in the evening, during the work term.

In addition to the co-op program, the Center for Career Discovery and Development also offers the Undergraduate Professional Internship and Work Abroad programs. These programs also provide opportunities for students to gain practical work experience, without the long-term commitment of the co-op program.

Center for Career Discovery and Development (http://www.careerdiscovery.gatech.edu)

International Plan

The International Plan is intended for students who seek an intensive international experience integrated into their undergraduate studies.
in computer engineering. The International Plan develops global competence through a combination of coursework, language study, and residential overseas experience. Students who complete this option receive a designation on their transcript and diploma.

The computer engineering aspects of the BS CmpE - International Plan degree requirements are identical to those for the regular BS CmpE. Please refer to the BS CmpE catalog description for general information about the degree program. Students may be able to satisfy the additional requirements imposed for the International Plan designation through appropriate choices of electives without additional credit hours to complete the degree. The International Plan designation may be pursued separately, or in combination with the Cooperative Plan and/or the Research Option.

The School of Electrical and Computer Engineering offers a junior-year program at the Georgia Tech-Lorraine campus in Metz, France, that is designed to facilitate participation in the International Plan. However, computer engineering majors are not restricted to this option and may complete any allowable courses, languages, and overseas experiences that satisfy the International Plan requirements.

Research Option
The Research Option is intended for students who seek a concentrated research experience, culminating in an undergraduate thesis, integrated into their undergraduate studies in computer engineering. This option includes three or four semesters of structured research and provides an open evaluation of a student’s research capabilities, viewable by the public via a required Web-based research portfolio. Students who complete this option receive a designation on their transcript.

The computer engineering aspects of the BS CmpE-Research Option degree requirements are identical to those for the regular BS CmpE. Please refer to the BS CmpE catalog description for general information about the degree program. Students may be able to satisfy the additional requirements imposed for the Research Option designation through appropriate choices of electives without additional credit hours to complete the degree. The Research Option designation may be pursued separately, or in combination with the Cooperative Plan and/or the International Plan.

The School of Electrical and Computer Engineering (ECE) offers a two-semester Undergraduate Research Opportunity Program (UROP), which may be completed to provide a less-intensive research experience or as the initial phase of the Research Option. Contact the ECE Academic Office for additional information about the Research Option, including specific Institute and ECE requirements, and assistance in planning your schedule to allow participation in this program.

BS/MS Electrical and Computer Engineering
This program allows highly qualified students to receive the Bachelor of Science in either Electrical Engineering or Computer Engineering and a master’s degree in Electrical and Computer Engineering. The joint BS/MS degree program affords undergraduate electrical or computer engineering majors the opportunity to broaden their studies and improve their career prospects.

Eligible Georgia Tech undergraduates normally apply for this program during their junior year. Contact the Electrical and Computer Engineering Graduate Affairs Office for program information, eligibility requirements, and applications.

BS/MS Information (5 Year) (http://www.ece.gatech.edu/internal/students/bsms_prog)

Dual BS in Computer Engineering
Georgia Tech & Korea Advanced Institute of Science & Tech

Students may pursue the BSEE degree from the Korea Advanced Institute of Science and Technology (KAIST) as they earn the BSEE or BSCmpE from Georgia Tech. KAIST offers one of the top engineering programs in Korea and the Far East. All lectures at KAIST are given in English to better serve a growing number of students from overseas. While earning their dual degrees, students spend two years each at both Georgia Tech and KAIST.

Bachelor of Science in Computer Science
Bachelor of Science in Computer Science with Threads
Focus: building on a base of fundamentals in programming and computational theory to provide a solid foundation of knowledge and skills for applying digital processes effectively to issues of broad interest in a global society.

The undergraduate degree in computer science (CS) offered by the College of Computing provides a solid foundation of knowledge and skills for applying digital processes effectively to issues of broad interest in a global society. Our program is based on a unique concept, Threads™, a significant College of Computing innovation in undergraduate CS education. The curriculum builds on a base of fundamentals in programming and computational theory to allow each student the opportunity to explore a variety of computing paths in depth. There are eight Threads, each providing a focused journey through a broad spectrum of course offerings at Georgia Tech in preparation for a distinctive future in a changing and interconnected world. Each student selects two Threads to fulfill the requirements for an accredited Bachelor of Science degree in computer science. It is at the intersection of the two paths that the unique synergistic value of this educational experience is realized. Graduates will leave the College of Computing fully aware of the limitless potential of their dynamic discipline and be able to adapt and continuously add value to society throughout their careers.

The Threads™ represent partial paths through the curriculum. Thus, a student weaves a degree from these Threads. Students are not forced to make Thread decisions very early in their academic careers; however, they may if they want. We define the Threads so they are flexible enough to allow for a variety of technical and creative experiences. Threads are coherent enough that students develop computing skills even if their focus shifts as they go along.

The CS curriculum also offers opportunities in undergraduate research and international study. In addition to the standard four-year plan, a five-year cooperative plan is offered for students who wish to combine their academic education with industry experience.

The undergraduate program requires:

- a total of 124 credit hours for graduation, plus
• a two-hour Wellness course.
• With the exception of free electives, all Bachelor of Science degree coursework must be taken on a letter-grade basis.
• Up to six hours of free electives may be taken on a pass/fail basis.
• No 1000- or 2000-level HPS hours or precalculus hours (currently MATH 1113) may be used as free electives.
• No course that covers the same material as other courses in a student’s plan of study can be used as a free elective.
• All required CS courses, whether Thread or non-Thread, must be completed with a C or better to be counted toward degree requirements.
• All courses listed as required for a Thread, whether CS or non-CS, must be completed with a C or better to be counted toward degree requirements.

The College of Computing Defines Eight Threads

A Thread provides an intuitive, flexible, and mutually strengthening set of courses that allows a student to craft a distinctive future in an area that is certain to have societal value in the emerging world. A Thread provides a skill and credential basis that allows graduates to create value in ways beyond what would be possible with only a narrowly focused tool set.

Choose any two threads to create your own path and special variation on an area of study.

1. Computing and Devices: creating devices embedded in physical objects that interact in the physical world
2. Computing and Information Internetworks: representing, transforming, transmitting, and presenting information
3. Computing and Intelligence: building top-to-bottom models of human-level intelligence
4. Computing and Media: building systems in order to exploit computing’s abilities to provide creative outlets
5. Computing and Modeling - Simulation: representing natural and physical processes
6. Computing and People: designing, building, and evaluating systems that treat the human as a central component
7. Computing and Systems and Architecture: creating computer architectures, systems, and languages
8. Computing and Theory: theoretical foundations underlying a wide range of computing disciplines

Threads" are defined as partial paths through the course offerings of the Institute. Students construct their own personalized computer science degree by weaving through two Threads". Each Thread" is about 2/3 of a degree, but with Thread" arithmetic, since there’s so much overlap, 2/3 + 2/3 = 1. Each pair of Threads" fulfills the requirements for an accredited Bachelor of Science degree in computer science.

The Power of One Thread

Are you a computationalist who is interested in the expressive arts (telling stories, making games, creating emotional experiences)? Join the Computing and Media Thread. Here you’ll see courses on topics ranging from computational graphics to Hamlet, from human perception to interactive fiction engines.

Are you a computationalist who is interested in placing intelligence in physical objects like robots, airplanes, or cell phones? Join the Computing and Devices Thread. Here you’ll see courses on everything from computational sensors to dealing with noisy data, from real-time operating systems to mobile power issues and computational autonomy.

Weaving Two Threads Together - A Leap

Are you interested in computer security? Then perhaps choose Computing and Information to learn how data is stored, retrieved, encoded, transmitted, etc. And perhaps also choose Computing and People to learn how people use technology, how to run experiments with human subjects, etc. The kind of person who will become is the kind of person who will be able to invent and build secure systems that are usable by people.

For more information about the BS CS undergraduate program or the College of Computing, visit The College of Computing website (http://www.cc.gatech.edu).

Bachelor of Science in Computer Science

Threads

Devices

The Devices thread is concerned with embedded computational artifacts that interact with people or the physical world. In this thread, one learns how to create and evaluate devices that operate under physical constraints such as size, power, and bandwidth. Examples include PDAs, cell phones, robots, jet engines, and intelligent appliances.

• Modeling and Simulation & Devices (p. 304)
• Theory & Devices (p. 285)
• Information Internetworks & Devices (p. 274)
• Intelligence & Devices (p. 277)
• Media & Devices (p. 279)
• People & Devices (p. 281)
• Systems and Architecture & Devices (p. 283)

Information Internetworks

The Information Internetworks thread is where computing meets the data enterprise and all that this implies. The thread prepares students for all levels of information management by helping them to capture, represent, organize, transform, communicate, and present data so that it becomes information.

• Modeling and Simulation & Information Internetworks (p. 316)
• Devices & Information Internetworks (p. 274)
• Theory & Information Internetworks (p. 321)
• Intelligence & Information Internetworks (p. 287)
• Media & Information Internetworks (p. 289)
• People & Information Internetworks (p. 291)
• Systems and Architecture & Information Internetworks (p. 293)

Intelligence

The Intelligence thread is where computing models intelligence. This thread is concerned with computational models of intelligence from top to bottom. To this end, we emphasize designing and implementing artifacts that exhibit various levels of intelligence as well as understanding and modeling natural cognitive agents such as humans, ants, or bees. Students acquire the technical knowledge and skills necessary for expressing, specifying, understanding, creating, and exploiting computational models that represent cognitive processes. It prepares students for fields as diverse as artificial intelligence, machine
learning, perception, and cognitive science, as well as for fields that benefit from applications of techniques from those fields.

- Modeling and Simulation & Intelligence (p. 306)
- Devices & Intelligence (p. 277)
- Theory & Intelligence (p. 323)
- Information Internetworks & Intelligence (p. 287)
- Media & Intelligence (p. 183)
- People & Intelligence (p. 295)
- Systems and Architecture & Intelligence (p. 298)

**Media**
The Media thread is where computing meets design. This thread prepares students by helping them to understand the technical and computational capabilities of systems in order to exploit their abilities to provide creative outlets.

- Modeling and Simulation & Media (p. 314)
- Devices & Media (p. 279)
- Theory & Media (p. 325)
- Information Internetworks & Media (p. 289)
- Intelligence & Media (p. 183)
- People & Media (p. 300)
- Systems and Architecture & Media (p. 302)

**Modeling and Simulation**
The Modeling · Simulation thread is intended for students interested in developing a deep understanding and appreciation of how natural and human-generated systems such as weather, biological processes, supply chains, or computers can be represented by mathematical models and computer software. Such models are widely used today to better understand and predict the behavior of such systems. Because these models are often described and represented by mathematical expressions, and the models themselves often deal with physical phenomena, a background in mathematics and the sciences is required. Combining this background with a deep knowledge in computer science will yield the basic tools necessary to transform abstract conceptual models to computer programs that execute efficiently on digital machines. The required coursework in this thread includes topics in continuous and discrete mathematics, the sciences, and computing. Elective courses enable students to further develop and apply their knowledge and skills to a specific discipline where Modeling · Simulation plays an important role.

- Devices & Modeling and Simulation (p. 304)
- Theory & Modeling and Simulation (p. 312)
- Information Internetworks & Modeling and Simulation (p. 316)
- Intelligence & Modeling and Simulation (p. 306)
- Media & Modeling and Simulation (p. 314)
- People & Modeling and Simulation (p. 308)
- Systems and Architecture & Modeling and Simulation (p. 310)

**People**
The People thread is where computing meets users. This thread prepares students by helping them to understand the theoretical and computational foundations for designing, building, and evaluating systems that treat the human as a central component.

- Modeling and Simulation & People (p. 308)

- Devices & People (p. 281)
- Theory & People (p. 327)
- Information Internetworks & People (p. 291)
- Intelligence & People (p. 295)
- Media & People (p. 300)
- Systems and Architecture & People (p. 319)

**Systems and Architecture**
The Systems and Architecture thread is where many of the practical skills of computing are learned. Like Theory, Systems and Architecture lies at the center of computing. It prepares students to create and evaluate computer architectures, systems, and languages across a variety of paradigms and approaches.

- Modeling and Simulation & Systems and Architecture (p. 310)
- Devices & Systems and Architecture (p. 283)
- Theory & Systems and Architecture (p. 329)
- Information Internetworks & Systems and Architecture (p. 293)
- Intelligence & Systems and Architecture (p. 298)
- Media & Systems and Architecture (p. 302)
- People & Systems and Architecture (p. 319)

**Theory**
The Theory thread is where computing meets itself. Theory teaches students the theoretical and mathematical foundations underlying a wide range of computational disciplines. Early preparation includes discrete mathematics, algorithms, and complexity. Knowledge goals are for students to mature in development and analysis of abstract models for applications ranging from theoretical computer science to computational physics, biology, mathematics, economics, and optimization.

- Modeling and Simulation & Theory (p. 312)
- Devices & Theory (p. 285)
- Information Internetworks & Theory (p. 321)
- Intelligence & Theory (p. 323)
- Media & Theory (p. 325)
- People & Theory (p. 327)
- Systems and Architecture & Theory (p. 329)

**Bachelor of Science in Computer Science - Thread: Devices & Information Internetworks**
The Threads™ represent partial paths through the curriculum. Thus, a student weaves a degree from these Threads. Students are not forced to make Thread decisions very early in their academic careers; however, they may if they want. We define the Threads so they are flexible enough to allow for a variety of technical and creative experiences. Threads are coherent enough that students develop computing skills even if their focus shifts as they go along.

The Devices thread is concerned with embedded computational artifacts that interact with people or the physical world. In this thread, one learns how to create and evaluate devices that operate under physical constraints such as size, power, and bandwidth. Examples include PDAs, cell phones, robots, jet engines, and intelligent appliances.
The Information Internetworks thread is where computing meets the data enterprise and all that this implies. The thread prepares students for all levels of information management by helping them to capture, represent, organize, transform, communicate, and present data so that it becomes information.

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<tr>
<td>Core F - Courses Related to Major</td>
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<td>CS 3251</td>
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Select one for Building Devices: 4

Select one for Devices in the Real World: 3

Select one for Introduction to Information Management: 3

Select one of the following for Advanced Information Management: 3

Select one of the following for Thread elective: 3
Cooperative Programs

The College of Computing participates in the undergraduate and graduate Cooperative Programs. See links below for further information:

- Undergraduate Cooperative Plan (http://catalog.gatech.edu/academics/special-academic-programs/experiential-education/center-career-discovery-development

International Plan

The College of Computing (http://www.cc.gatech.edu) has an approved BS CS International Plan that accommodates the unique requirements of this option discussed in the International Plan section of the catalog (p. 86).

However, due to the flexible nature of the Threads curriculum, the International Plan designation may not be available with all of the Thread combinations. Efforts will be made to work with interested students to accommodate their individual circumstances with regard to the International Plan designator for the Bachelor of Science in Computer Science.

Research Option

To complete the Research Option in the College of Computing, students must:

1. Complete at least nine units of undergraduate research
   a. Over at least two, preferably three terms
   b. Research may be for either pay or credit;

2. Write an undergraduate thesis/report of research on their findings;

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   a. LMC 4701: Undergraduate Research Proposal Writing (taken during the first or second semester of research)
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Research Classes

The following classes count toward fulfillment of the Research Option:

Research for Credit

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 2699</td>
<td>Undergraduate Research (Freshman and Sophomore)</td>
<td>1-12</td>
</tr>
<tr>
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<td>Undergraduate Research (Junior and Senior)</td>
<td>1-12</td>
</tr>
<tr>
<td>CS 4980</td>
<td>Research Capstone Proj</td>
<td>1-21</td>
</tr>
</tbody>
</table>

Research for Pay (Audit only)

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 2698</td>
<td>Research Assistantship (Freshman and Sophomore)</td>
<td>1-12</td>
</tr>
<tr>
<td>CS 4698</td>
<td>Research Assistantship (Junior and Senior)</td>
<td>1-12</td>
</tr>
</tbody>
</table>

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Completion of the Research Option is noted on the student’s transcript. For more information, see www.urop.gatech.edu (http://www.urop.gatech.edu).

General Research Option Information (p. 90)

**BS/MS in Computer Science**

Students who want to pursue

the BS/MS option must apply to the MSCS program after completing at least 60 hours of work towards the BSCS degree. Applicants should have a cumulative GPA of at least 3.4. This GPA must be maintained for the student to take graduate level courses.

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**Bachelor of Science in Computer Science - Thread: Devices & Intelligence**

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<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Core D - Science, Math, &amp; Technology</th>
</tr>
</thead>
</table>
|          |                                                     | PHYS 2211   Intro Physics I          | 4
|          |                                                     | Lab Science  | 4
|          |                                                     | MATH 1551   Differential Calculus    | 2
|          |                                                     | MATH 1554   Linear Algebra           | 4
|          |                                                     | or MATH 1555 Linear Algebra w Abstract Vec Sp |

### Core E - Social Sciences

Select one of the following:

- HIST 2111 United States to 1877
- HIST 2112 United States since 1877
- INTA 1200 American Government
- POL 1101 Government of the U.S.
- PUBP 3000 US Constitutional Issues
- PSYC 1101 General Psychology
- Any SS (p. 97)

### Core F - Courses Related to Major

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<th>Code</th>
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<th>Credit Hours</th>
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</thead>
</table>
|          |                                                     | Lab Science  | 4
| CS 1100  | Freshman Leap Seminar                               | 1
| CS 1331  | Intro-Object Orient Prog                             | 3
| CS 1332  | Data Struct & Algorithms                             | 3
| CS 2050  | Intro Discrete Math CS                               | 3
| or CS 2051 | Honors Discrete Math CS                           | 3
| MATH 2550 | Intro Multivariable Calc                             | 2

### Major Requirements

<table>
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<tr>
<th>Code</th>
<th>Title</th>
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</tr>
</thead>
</table>
| CS 2340  | Objects and Design                                  | 3
| CS 4001  | Computing & Society                                 | 3
| or CS 4002 | Robots and Society                             | 3
| or CS 4726 | Privacy Tech Policy Law                           | 3
| or SLS 311CTech & Sustain Community             | 3

### Junior Design Options (Capstone)

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
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</tr>
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</table>
|          |                                                     | Junior Design Option | 6

### Concentration

<table>
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<tr>
<th>Code</th>
<th>Title</th>
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</table>
| CS 2110  | Computer Organiz&Program                             | 4
| CS 2200  | Systems and Networks                                 | 4
| CS 3251  | Computer Networking I                                | 3
| CS 3510  | Dsgn&Analysis-Algorithms                            | 3
| or CS 3511 | Algorithms Honors                                   | 3
| CS 3600  | Intro-Artificial Intell                              | 3
| ECE 2031 | Digital Design Lab                                  | 2
| Select one of the following for Building Devices: | 4
| CS 3651  | Prototyping Intell Appl                             | 4
| ECE 4180 | Embedded Systems Design                             | 4
| Select one of the following for Devices in the Real World: | 3
| CS 3630  | Intro-Perception&Robotic                            | 3
| CS 4261  | Mobile Apps & Svcs                                  | 3
| CS 4605  | Mobile&Ubiquitous Comp                               | 3
| CS 4476  | Intro to Computer Vision                             | 3
| Select one of the following for Computational Complexity: | 3
| CS 3240  | Languages and Computation                            | 3
| CS 4510  | Automata and Complexity                              | 3
| Select one of the following for Embodied Intelligence: | 3
| CS 3630  | Intro-Perception&Robotic                            | 3

### Code

**Wellness**

- APPH 1040 Sci Foundation of Health
  - or APPH 10 Sci of Phys Act & Health

**Core A - Essential Skills**

- ENGL 1101 English Composition I
- ENGL 1102 English Composition II
- MATH 1552 Integral Calculus

**Core B - Institutional Options**

- CS 1301 Intro to Computing

**Core C - Humanities**

- Any HUM (p. 93)
Bachelor of Science in Computer Science - Thread: Devices & Intelligence

Cooperative Programs

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**Core B - Institutional Options**

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<thead>
<tr>
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<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 1301</td>
<td>Intro to Computing</td>
<td>3</td>
</tr>
</tbody>
</table>

**Core C - Humanities**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any HUM (p. 93)</td>
<td></td>
<td>6</td>
</tr>
</tbody>
</table>

**Core D - Science, Math, & Technology**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS 2211</td>
<td>Intro Physics I</td>
<td>4</td>
</tr>
<tr>
<td>Lab Science 2</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>MATH 1551</td>
<td>Differential Calculus</td>
<td>2</td>
</tr>
<tr>
<td>MATH 1554</td>
<td>Linear Algebra</td>
<td>4</td>
</tr>
<tr>
<td>or MATH 154</td>
<td>Linear Alg w Abstract Vec Sp</td>
<td></td>
</tr>
</tbody>
</table>

**Core E - Social Sciences**

Select one of the following:

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<thead>
<tr>
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<th>Title</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
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<td>United States to 1877</td>
<td>3</td>
</tr>
<tr>
<td>HIST 2112</td>
<td>United States since 1877</td>
<td>3</td>
</tr>
<tr>
<td>INTA 1200</td>
<td>American Government</td>
<td>3</td>
</tr>
<tr>
<td>POL 1101</td>
<td>Government of the U.S.</td>
<td>3</td>
</tr>
<tr>
<td>PUBP 3000</td>
<td>US Constitutional Issues</td>
<td>9</td>
</tr>
<tr>
<td>Any SS (p. 97)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Core F - Courses Related to Major**

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<tr>
<th>Code</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Lab Science 2</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>CS 1100</td>
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<td>1</td>
</tr>
<tr>
<td>CS 1331</td>
<td>Intro-Object Orient Prog</td>
<td>1</td>
</tr>
<tr>
<td>CS 1332</td>
<td>Data Struct &amp; Algorithms</td>
<td>3</td>
</tr>
<tr>
<td>CS 2050</td>
<td>Intro Discrete Math</td>
<td>3</td>
</tr>
<tr>
<td>or CS 2051</td>
<td>Honors Discrete Math</td>
<td></td>
</tr>
<tr>
<td>MATH 2550</td>
<td>Intro Multivariable Calc</td>
<td>2</td>
</tr>
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</table>

**Major Requirements**

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<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>CS 2340</td>
<td>Objects and Design</td>
<td>3</td>
</tr>
<tr>
<td>CS 4001</td>
<td>Computing &amp; Society</td>
<td>3</td>
</tr>
<tr>
<td>or CS 4002</td>
<td>Robots and Society</td>
<td></td>
</tr>
<tr>
<td>or CS 4726</td>
<td>Privacy Tech Policy Law</td>
<td></td>
</tr>
<tr>
<td>or SLS 3110</td>
<td>Tech and Sustain Community</td>
<td></td>
</tr>
</tbody>
</table>

**Junior Design Options (Capstone)**

Junior Design Option

**Concentration**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 2110</td>
<td>Computer Organiz&amp;Program</td>
<td>4</td>
</tr>
<tr>
<td>CS 2200</td>
<td>Systems and Networks</td>
<td>4</td>
</tr>
<tr>
<td>CS 3251</td>
<td>Computer Networking</td>
<td>3</td>
</tr>
<tr>
<td>CS 3451</td>
<td>Computer Graphics</td>
<td>3</td>
</tr>
<tr>
<td>ECE 2031</td>
<td>Digital Design Lab</td>
<td>2</td>
</tr>
</tbody>
</table>

Select one of the following for Building Devices:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 3651</td>
<td>Prototyping Intell Appl</td>
<td>4</td>
</tr>
<tr>
<td>ECE 4180</td>
<td>Embedded Systems Design</td>
<td></td>
</tr>
<tr>
<td>Select one of the following for Devices in the Real World:</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>CS 3630</td>
<td>Intro-Perception&amp;Robotic</td>
<td></td>
</tr>
<tr>
<td>CS 4261</td>
<td>Mobile Apps &amp; Svcs</td>
<td></td>
</tr>
<tr>
<td>CS 4605</td>
<td>Mobile&amp;Ubiquitous Comp</td>
<td></td>
</tr>
<tr>
<td>CS 4476</td>
<td>Intro to Computer Vision</td>
<td></td>
</tr>
<tr>
<td>Select one of the following for Algorithm Fundamentals:</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>CS 3240</td>
<td>Languages and Computation</td>
<td></td>
</tr>
<tr>
<td>CS 3510</td>
<td>Dsgn&amp;Analysis-Algorithms</td>
<td></td>
</tr>
<tr>
<td>CS 3511</td>
<td>Algorithms Honors</td>
<td></td>
</tr>
</tbody>
</table>
Select two of the following for Media Technologies: 1 6

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 4455</td>
<td>Video Game Design</td>
</tr>
<tr>
<td>CS 4460</td>
<td>Intro Info Visualization</td>
</tr>
<tr>
<td>CS 4464</td>
<td>Computational Journalism</td>
</tr>
<tr>
<td>CS 4475</td>
<td>Comp Photography</td>
</tr>
<tr>
<td>CS 4480</td>
<td>Digital Video Special FX</td>
</tr>
<tr>
<td>CS 4496</td>
<td>Computer Animation</td>
</tr>
<tr>
<td>CS 4590</td>
<td>Computer Audio</td>
</tr>
</tbody>
</table>

Other Required Courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 3012</td>
<td>Applied Combinatorics</td>
</tr>
</tbody>
</table>

Free Electives

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 3215</td>
<td>Probability &amp; Statistics</td>
</tr>
<tr>
<td>MATH 3670</td>
<td>Statistics and Applns</td>
</tr>
<tr>
<td>CEE 3770</td>
<td>Statistics &amp; Applications</td>
</tr>
<tr>
<td>ISYE 3770</td>
<td>Statistics &amp; Applications</td>
</tr>
<tr>
<td></td>
<td>or ISYE 2 Probability With Apps</td>
</tr>
<tr>
<td></td>
<td>&amp; ISYE 2 Basic Statistical Meth</td>
</tr>
</tbody>
</table>

Total Credit Hours 126

1. Minimum grade of C required.
2. Two of three labs MUST be a sequence.
3. Junior Design Options are as follows (students must pick one option and may not change):
   - Option 1 - LMC 3432, LMC 3431, CS 3311, CS 3312.
   - Option 2 - ECE VIP courses and LMC 3403.
   - Option 3 - Satisfy Georgia Tech Research Option
   - Option 4 - CS 2701 (3 hours), CS 4699-12P (3 hours), LMC 3403 (3 hours) = 9 hours OR CS 4699-12P (6 hours), LMC 3403 (3 hours) = 9 hours

Six credits of the Junior Design option are used as Major Requirements and the overage credits of research/VIP (5 credit hours/2 credit hours) may be used as free electives. Students completing VIP for their junior design requirement will be required to complete at least three semesters of VIP. (VIP 1 + VIP 2 + VIP 3) (for a total of 5 credit hours) + LMC 3403 = 8 hours of VIP credit. Students using CREATE-X for junior design take at least 6 hours of CREATE-X Start-up Lab and Idea 2 Prototype (I2P) and 3 of the 6 hours must be I2P. Students take these 6 hours with LMC 3403 (3 hours) for a total of 9 hours. Extra three hours for CREATE-X option can be used in free electives.

4. Two credit hours of MATH 1554 may count along with MATH 2550 to give Area F 18 credit hours.

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<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
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<tbody>
<tr>
<td>Core A - Essential Skills</td>
<td></td>
<td></td>
</tr>
<tr>
<td>APPH 1040</td>
<td>Sci Foundation of Health</td>
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<td>Integral Calculus</td>
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<td>Core B - Institutional Options</td>
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<td>Intro to Computing</td>
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<td>Any HUM</td>
<td>(p. 93)</td>
<td>6</td>
</tr>
<tr>
<td>Core D - Science, Math, &amp; Technology</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PHYS 2211</td>
<td>Intro Physics I</td>
<td>4</td>
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</table>

or MATH 1555 Alg w Abstract Vec Sp

Core E - Social Sciences

Select one of the following: 3

<table>
<thead>
<tr>
<th>Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>HIST 2111 United States to 1877</td>
<td>3</td>
</tr>
<tr>
<td>HIST 2112 United States since 1877</td>
<td>3</td>
</tr>
<tr>
<td>INTA 1200 American Government</td>
<td>3</td>
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<td>3</td>
</tr>
<tr>
<td>PUBP 3000 US Constitutional Issues</td>
<td>3</td>
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<tr>
<td>PSYC 1101 General Psychology</td>
<td>3</td>
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<tr>
<td>Any SS (p. 97)</td>
<td>6</td>
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</table>

Core F - Courses Related to Major

Lab Science 2

<table>
<thead>
<tr>
<th>Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>CS 1100 Freshman Leap Seminar</td>
<td>1</td>
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<tr>
<td>CS 1331 Intro-Object Orient Prog 1</td>
<td>3</td>
</tr>
<tr>
<td>CS 1332 Data Struct &amp; Algorithms 1</td>
<td>3</td>
</tr>
<tr>
<td>CS 2050 Intro Discrete Math CS 1</td>
<td>3</td>
</tr>
<tr>
<td>or CS 2051 Honors Discrete Math CS</td>
<td>3</td>
</tr>
<tr>
<td>MATH 2550 Intro Multivariable Calc 5</td>
<td>2</td>
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Major Requirements

Junior Design Options (Capstone)

Junior Design Option 1,4

Concentration

<table>
<thead>
<tr>
<th>Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>CS 2110 Computer Organiz&amp;Program 1</td>
<td>4</td>
</tr>
<tr>
<td>CS 2200 Systems and Networks</td>
<td>4</td>
</tr>
<tr>
<td>CS 3251 Computer Networking 1</td>
<td>3</td>
</tr>
<tr>
<td>ECE 2031 Digital Design Lab 1</td>
<td>2</td>
</tr>
<tr>
<td>PSYC 2015 Research Methods 1</td>
<td>4</td>
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<tbody>
<tr>
<td>CS 3651 Prototyping Intell Appl</td>
<td>4</td>
</tr>
<tr>
<td>ECE 4180 Embedded Systems Design</td>
<td>4</td>
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</table>

Select one of the following for Devices in the Real World: 1,3

<table>
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<tr>
<th>Title</th>
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<tbody>
<tr>
<td>CS 2630 Intro-Perc&amp;Robotic</td>
<td>3</td>
</tr>
<tr>
<td>CS 4261 Mobile Apps &amp; Svcs</td>
<td>4</td>
</tr>
<tr>
<td>CS 4605 Mobile&amp;Ubiquitous Comp</td>
<td>3</td>
</tr>
<tr>
<td>CS 4476 Intro to Computer Vision</td>
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</tbody>
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Select one of the following for Algorithm Fundamentals: 1

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>CS 3240 Languages and Computation</td>
<td>3</td>
</tr>
<tr>
<td>CS 3510 DsgnAnalysis-Algorithms</td>
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</tr>
<tr>
<td>CS 3511 Algorithms Honors</td>
<td>3</td>
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</tbody>
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Select one of the following for Social/Behavioral Science for Computing: 1

<table>
<thead>
<tr>
<th>Title</th>
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</thead>
<tbody>
<tr>
<td>PSYC 2210 Social Psychology</td>
<td>3</td>
</tr>
<tr>
<td>PSYC 2760 Human Language Process</td>
<td>3</td>
</tr>
<tr>
<td>PSYC 3040 Sensation &amp; Perception</td>
<td>3</td>
</tr>
<tr>
<td>CS 3750 User Interface Design 1</td>
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Select two of the following for Human-Centered Technology: 1,3

<table>
<thead>
<tr>
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<th>Credit Hours</th>
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<tr>
<td>TECH 2150 Design of Healthy and Safe Systems</td>
<td>3</td>
</tr>
<tr>
<td>CS 3630 Intro-Perc&amp;Robotic</td>
<td>3</td>
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<tr>
<td>CS 4261 Mobile Apps &amp; Svcs</td>
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- Graduate Cooperative Plan (http://catalog.gatech.edu/academics/special-academic-programs/experiential-education/graduate-cooperative-plan)

International Plan
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However, due to the flexible nature of the Threads curriculum, the International Plan designation may not be available with all of the Thread combinations. Efforts will be made to work with interested students to accommodate their individual circumstances with regard to the International Plan designator for the Bachelor of Science in Computer Science.

### Research Option
To complete the Research Option in the College of Computing, students must:

1. Complete at least nine units of undergraduate research
   a. Over at least two, preferably three terms
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### Research Classes
The following classes count toward fulfillment of the Research Option:

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<tr>
<td>CS 4980</td>
<td>Research Capstone Proj</td>
<td>1-21</td>
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<td>CS 2698</td>
<td>Research Assistantship (Freshman and Sophomore)</td>
<td>1-12</td>
</tr>
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<td>Research Assistantship (Junior and Senior)</td>
<td>1-12</td>
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General Research Option Information (p. 90)

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**Core A - Essential Skills**
APPH 1040 | Sci Foundation of Health | 2
or APPH 10 | Sci of Phys Act & Health | 4
ENGL 1101 | English Composition I | 3
ENGL 1102 | English Composition II | 3
MATH 1552 | Integral Calculus | 4
**Core B - Institutional Options**
CS 1301 | Intro to Computing | 3
**Core C - Humanities**
Any HUM (p. 93) | | 6

### Core D - Science, Math, & Technology

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<th>Title</th>
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<tr>
<td>PHYS 2211</td>
<td>Intro Physics I</td>
<td>4</td>
</tr>
<tr>
<td>Lab Science</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>MATH 1551</td>
<td>Differential Calculus</td>
<td>2</td>
</tr>
<tr>
<td>MATH 1554</td>
<td>Linear Algebra</td>
<td>4</td>
</tr>
<tr>
<td>or MATH 155</td>
<td>Linear Alg w Abstract Vec Sp</td>
<td>4</td>
</tr>
</tbody>
</table>

### Core E - Social Sciences

Select one of the following:

- HIST 2111 | United States to 1877 | 3 |
- HIST 2112 | United States since 1877 | 3 |
- INTA 1200 | American Government | 3 |
- POL 1101 | Government of the U.S. | 3 |
- PUBP 3000 | US Constitutional Issues | 3 |

- Any SS (p. 97) | 9 |

### Core F - Courses Related to Major

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<tr>
<th>Code</th>
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<td>CS 1100</td>
<td>Freshman Leap Seminar</td>
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<td>Intro-Object Orient Prog</td>
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<td>CS 1332</td>
<td>Data Struct &amp; Algorithms</td>
<td>3</td>
</tr>
<tr>
<td>CS 2050</td>
<td>Intro Discrete Math</td>
<td>3</td>
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<tr>
<td>or CS 2051</td>
<td>Honors Discrete Math CS</td>
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<tr>
<td>MATH 2550</td>
<td>Intro Multivariable Calc</td>
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</table>

### Major Requirements

Select one of the following:

- CS 2340 | Objects and Design | 1 |
- CS 4001 | Computing & Society | 1 |
- or CE 4002 | Robots and Society | 3 |
- or CE 4726 | Privacy Tech Policy Law | 3 |
- or SLS 3110 | Tech and Sustain Community | 3 |

### Junior Design Options (Capstone)

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<tbody>
<tr>
<td>CS 2110</td>
<td>Computer Organiz&amp;Program</td>
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<tr>
<td>CS 2200</td>
<td>Systems and Networks</td>
<td>4</td>
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<tr>
<td>CS 3210</td>
<td>Design-Operating Systems</td>
<td>3</td>
</tr>
<tr>
<td>CS 3220</td>
<td>Processor Design</td>
<td>3</td>
</tr>
<tr>
<td>CS 3251</td>
<td>Computer Networking</td>
<td>3</td>
</tr>
<tr>
<td>CS 3510</td>
<td>Dsgn&amp;Analysis-Algorithms</td>
<td>3</td>
</tr>
<tr>
<td>or CS 3511</td>
<td>Algorithms Honors</td>
<td>3</td>
</tr>
<tr>
<td>ECE 2031</td>
<td>Digital Design Lab</td>
<td>2</td>
</tr>
</tbody>
</table>

Select one of the following for Building Devices:

- CS 3651 | Prototyping Intell Appl | 4 |
- ECE 4180 | Embedded Systems Design | 4 |
Select one of the following for Devices in the Real World:

- CS 3630 | Intro-Perception&Robotic | 3 |
- CS 4261 | Mobile Apps & Svcs | 3 |
- CS 4605 | Mobile&Ubiquitous Comp | 3 |
- CS 4476 | Intro to Computer Vision | 3 |

Select one of the following for Systems Software Tools:

- CS 3300 | Intro to Software Engr | 3 |
- CS 4240 | Compilers & Interpreters | 3 |

Select one of the following for Advanced Systems Architectures:

- CS 4260 | Systems Architectures | 4 |

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The Theory thread is where computing meets itself. Theory teaches students the theoretical and mathematical foundations underlying a wide range of computational disciplines. Early preparation includes discrete mathematics, algorithms, and complexity. Knowledge goals are for students to mature in development and analysis of abstract models for applications ranging from theoretical computer science to computational physics, biology, mathematics, economics, and optimization.

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<tr>
<td>PHYS 2211</td>
<td>Intro Physics I</td>
<td>2</td>
</tr>
</tbody>
</table>

Lab Science

| MATH 1551  | Differential Calculus                      | 2            |
| MATH 1554  | Linear Algebra                             | 4            |
| or MATH 1564 | w Abstract Vec Sp                      |              |

Core E - Social Sciences

Select one of the following:

| HIST 2111 | United States to 1877                     | 3            |
| HIST 2112 | United States since 1877                  |              |
| INTA 1200 | American Government                       |              |
| POL 1101  | Government of the U.S.                     |              |
| PUBP 3000 | US Constitutional Issues                  |              |

Any SS (p. 97)

Core F - Courses Related to Major

Lab Science

| CS 1100  | Freshman Leap Seminar                      | 4            |
| CS 1331  | Intro-Object Orient Prog                    | 3            |
| CS 1332  | Data Struct & Algorithms                   | 3            |
| CS 2050  | Intro Discrete Math CS                     | 3            |
| or CS 2051| Honors Discrete Math CS                    |              |
| MATH 2550| Intro Multivariable Calc                    | 2            |

Major Requirements

| CS 2340  | Objects and Design                         | 3            |
| CS 4001  | Computing & Society                        | 3            |
| or CS 4002| Robots and Society                         |              |
| or CS 4726| Privacy Tech Policy Law                    |              |
| or SLS 3110| Tech and Sustain Community                |              |

Junior Design Options (Capstone)

Junior Design Option

| Concentration|                                   |              |
| CS 2110 | Computer Organiz&Program               | 4            |
| CS 2200 | Systems and Networks                   | 4            |
| CS 3251 | Computer Networking                    | 3            |
| CS 3510 | Dsgn&Analysis-Algorithms               | 3            |
| or CS 3511| Algorithms Honors                      |              |
| CS 4510 | Automata and Complexity                 | 3            |
| CS 4540 | Advanced Algs                          | 3            |
| ECE 2031| Digital Design Lab                     | 2            |

Select one of the following for Building Devices:

| CS 3651 | Prototyping Intell Appl                | 4            |
| ECE 4180| Embedded Systems Design                |              |
| MATH 3406| Second Course Linear Alg               | 3            |

Select one of the following for Devices in the Real World:

| CS 3630 | Intro-Perception&Robotic               | 3            |
| CS 4261 | Mobile Apps & Svcs                      |              |
| CS 4605 | Mobile&Ubiquitous Comp                  |              |
| CS 4476 | Intro to Computer Vision                |              |

Select one of the following for Advanced Mathematics:

| MATH 4022Into to Graph Theory | 3 |
| MATH 4150Intro To Number Theory |   |
| MATH 4032Combinatorial Analysis |    |

Other Required Courses

| MATH 3012 | Applied Combinatorics                   | 3            |
Select one of the following:  

- MATH 3215 Probability & Statistics
- MATH 3670 Statistics and Applns
- CEE 3770 Statistics & Applications
- ISYE 3770 Statistics & Applications or ISYE 3770 Probability With Apps
- ISYE 2020 Basic Statistical Meth

### Free Electives

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Free Electives</td>
<td>10</td>
</tr>
</tbody>
</table>

**Total Credit Hours:** 126

Pass-fail only allowed for Free Electives (max 6 credit hours), CS 1100, and CS 1171 (if required)

1. Minimum grade of C required.
2. Two of three labs MUST be a sequence.
3. Junior Design Options are as follows (students must pick one option and may not change):
   - Option 1 - LMC 3432, LMC 3431, CS 3311, CS 3312.
   - Option 2 - ECE VIP courses and LMC 3403.
   - Option 3 - Satisfy Georgia Tech Research Option.
   - Option 4 - CS 2701 (3 hours), CS 4699-I2P (3 hours), LMC 3403 (3 hours) = 9 hours OR CS 4699-I2P (6 hours), LMC 3403 (3 hours) = 9 hours

Six credits of the Junior Design option are used as Major Requirements and the average credits of research/VIP (5 credit hours/2 credit hours) may be used as free electives. Students completing VIP for their junior design requirement will be required to complete at least three semesters of VIP. (VIP 1 + VIP 2 + VIP 3) for a total of 5 credit hours

Students using CREATE-X for junior design take at least 6 hours of CREATE-X Start-ip Lab and Idea 2 Prototype (I2P) and 3 of the 6 hours must be I2P. Students take these 6 hours with LMC 3403 (3 hours) for a total of 9 hours. Extra three hours for CREATE-X option can be used in free electives.

4. Two credit hours of MATH 1554 may count along with MATH 2550 to give Area F 18 credit hours.

### Cooperative Programs

The College of Computing participates in the undergraduate and graduate Cooperative Programs. See links below for further information:

- Undergraduate Cooperative Program (http://catalog.gatech.edu/academics/special-academic-programs/experiential-education/center-career-discovery-development)
- Graduate Cooperative Program (http://catalog.gatech.edu/academics/special-academic-programs/experiential-education/graduate-cooperative-plan)

### International Plan

The College of Computing (http://www.cc.gatech.edu) has an approved BS CS International Plan that accommodates the unique requirements of this option discussed in the International Plan section of the catalog (p. 86).

However, due to the flexible nature of the Threads curriculum, the International Plan designation may not be available with all of the Thread combinations. Efforts will be made to work with interested students to accommodate their individual circumstances with regard to the International Plan designator for the Bachelor of Science in Computer Science.

### Research Option

To complete the Research Option in the College of Computing, students must:

1. **Complete at least nine units of undergraduate research**
   a. Over at least two, preferably three terms
   b. Research may be for either pay or credit;
2. **Write an undergraduate thesis/report of research on their findings**;
3. **Take**
   a. LMC 4701: Undergraduate Research Proposal Writing (taken during the first or second semester of research)
   b. LMC 4702: Undergraduate Research Thesis Writing (taken during the thesis writing semester).

### Research Classes

The following classes count toward fulfillment of the Research Option:

#### Research for Credit

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 2699</td>
<td>Undergraduate Research (Freshman and Sophomore)</td>
<td>1-12</td>
</tr>
<tr>
<td>CS 4699</td>
<td>Undergraduate Research (Junior and Senior)</td>
<td>1-12</td>
</tr>
<tr>
<td>CS 4980</td>
<td>Research Capstone Proj</td>
<td>1-21</td>
</tr>
</tbody>
</table>

#### Research for Pay (Audit only)

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 2698</td>
<td>Research Assistantship (Freshman and Sophomore)</td>
<td>1-12</td>
</tr>
<tr>
<td>CS 4698</td>
<td>Research Assistantship (Junior and Senior)</td>
<td>1-12</td>
</tr>
</tbody>
</table>

To get credit toward completion of the Research Option for research for pay, students must be registered for the appropriate audit-only research for pay class (CS 2698 or 4698). If work on research for pay begins after the close of registration and the student has not signed up for the appropriate class, unfortunately it is not possible to get credit toward the Research Option for work that term.

A research project will also fulfill the capstone design requirement if the student registers for CS 4980 for one of the research terms. This is typically done the last semester of research, while taking LMC 4702.

Completion of the Research Option is noted on the student’s transcript. For more information, see www.urop.gatech.edu (http://www.urop.gatech.edu).

General Research Option Information (p. 90)

### BS/MS in Computer Science

Students who want to pursue

the BS/MS option must apply to the MSCS program after completing at least 60 hours of work towards the BSCS degree. Applicants should have
a cumulative GPA of at least 3.4. This GPA must be maintained for the student to take graduate level courses.

Students admitted to the program will take 6 hours during their final undergraduate year to double count in both their BSCS and MSCS degrees; they should choose 3 hours of MS Core or Elective hours their fall semester and 3 hours of MS Core or Elective hours their spring semester that can count toward their thread hours and CS Specialization hours.

Visit College of Computing (https://www.cc.gatech.edu) for more information.

**Bachelor of Science in Computer Science - Thread: Information Internetworks & Intelligence**

The Threads™ represent partial paths through the curriculum. Thus, a student weaves a degree from these Threads. Students are not forced to make Thread decisions very early in their academic careers; however, they may if they want. We define the Threads so they are flexible enough to allow for a variety of technical and creative experiences. Threads are coherent enough that students develop computing skills even if their focus shifts as they go along.

The Intelligence thread is where computing models intelligence. This thread is concerned with computational models of intelligence from top to bottom. To this end, we emphasize designing and implementing artifacts that exhibit various levels of intelligence as well as understanding and modeling natural cognitive agents such as humans, ants, or bees. Students acquire the technical knowledge and skills necessary for expressing, specifying, understanding, creating, and exploiting computational models that represent cognitive processes. It prepares students for fields as diverse as artificial intelligence, machine learning, perception, and cognitive science, as well as for fields that benefit from applications of techniques from those fields.

The Information Internetworks thread is where computing meets the data enterprise and all that this implies. The thread prepares students for all levels of information management by helping them to capture, represent, organize, transform, communicate, and present data so that it becomes information.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>MATH 1551</td>
<td>Differential Calculus</td>
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</tr>
<tr>
<td>MATH 1554</td>
<td>Linear Algebra 4</td>
<td>4</td>
</tr>
<tr>
<td>or MATH 1554w Abstract Vec Sp</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Core E - Social Sciences</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Select one of the following:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HIST 2111</td>
<td>United States to 1877</td>
<td>3</td>
</tr>
<tr>
<td>HIST 2112</td>
<td>United States since 1877</td>
<td></td>
</tr>
<tr>
<td>INTA 1200</td>
<td>American Government</td>
<td></td>
</tr>
<tr>
<td>POL 1101</td>
<td>Government of the U.S.</td>
<td></td>
</tr>
<tr>
<td>PUBP 3000</td>
<td>US Constitutional Issues</td>
<td></td>
</tr>
<tr>
<td>PSYC 1101</td>
<td>General Psychology</td>
<td>3</td>
</tr>
<tr>
<td>Any SS (p. 97)</td>
<td>6</td>
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</tr>
<tr>
<td><strong>Core F - Courses Related to Major</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lab Science 2</td>
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<tr>
<td>CS 1100</td>
<td>Freshman Leap Seminar</td>
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</tr>
<tr>
<td>CS 1331</td>
<td>Intro-Object Orient Prog 1</td>
<td>3</td>
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<tr>
<td>CS 1332</td>
<td>Data Struct &amp; Algorithms 1</td>
<td>3</td>
</tr>
<tr>
<td>CS 2050</td>
<td>Intro Discrete Math CS 1</td>
<td>3</td>
</tr>
<tr>
<td>or CS 2051</td>
<td>Honors Discrete Math CS</td>
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</tr>
<tr>
<td>MATH 2550</td>
<td>Intro Multivariable Calc 4</td>
<td>2</td>
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<tr>
<td><strong>Major Requirements</strong></td>
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<tr>
<td>CS 2340</td>
<td>Objects and Design 1</td>
<td>3</td>
</tr>
<tr>
<td>CS 4001</td>
<td>Computing &amp; Society 1</td>
<td>3</td>
</tr>
<tr>
<td>or CS 4002</td>
<td>Robots and Society</td>
<td></td>
</tr>
<tr>
<td>or CS 4726</td>
<td>Privacy Tech Policy Law</td>
<td></td>
</tr>
<tr>
<td>or SLS 311</td>
<td>Tech and Sustain Community</td>
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<tr>
<td><strong>Junior Design Options (Capstone)</strong></td>
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<td>Junior Design Option 1,3</td>
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<td></td>
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<tr>
<td><strong>Concentration</strong></td>
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<td></td>
</tr>
<tr>
<td>CS 2110</td>
<td>Computer Organiz&amp;Program 1</td>
<td>4</td>
</tr>
<tr>
<td>CS 2200</td>
<td>Systems and Networks 1</td>
<td>4</td>
</tr>
<tr>
<td>CS 3510</td>
<td>Dsgn&amp;Analysis-Algorithms 1</td>
<td>3</td>
</tr>
<tr>
<td>or CS 3511</td>
<td>Algorithms Honors</td>
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</tr>
<tr>
<td>CS 3600</td>
<td>Intro-Artificial Intell 1</td>
<td>3</td>
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<tr>
<td>Select six credit hours of the following for Introduction to Information Management: 1</td>
<td>6</td>
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<tr>
<td>CS 3251</td>
<td>Computer Networking I</td>
<td></td>
</tr>
<tr>
<td>CS 4235</td>
<td>Intro to Info Security</td>
<td></td>
</tr>
<tr>
<td>CS 4400</td>
<td>Instr to Database Systems</td>
<td></td>
</tr>
<tr>
<td><strong>Select one of the following for Advanced Information Management: 1</strong></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>CS 3251</td>
<td>Computer Networking I (if not taken for Introduction to Information Management)</td>
<td></td>
</tr>
<tr>
<td>CS 4235</td>
<td>Intro to Info Security (if not taken for Introduction to Information Management)</td>
<td></td>
</tr>
<tr>
<td>CS 4237</td>
<td>Comp &amp; Network Security</td>
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</tr>
<tr>
<td>CS 4251</td>
<td>Computer Networking II</td>
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<tr>
<td>CS 4255</td>
<td>Intro-Network Management</td>
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<tr>
<td>CS 4261</td>
<td>Mobile Apps &amp; Svcs</td>
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<tr>
<td>CS 4270</td>
<td>Data Communications Lab</td>
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<tr>
<td>CS 4365</td>
<td>Intro Enterprise Comp</td>
<td></td>
</tr>
<tr>
<td>CS 4400</td>
<td>Instr to Database Systems (if not taken for Introduction to Information Management)</td>
<td></td>
</tr>
</tbody>
</table>

**Wellness**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>APPH 1040</td>
<td>Sci Foundation of Health</td>
<td>2</td>
</tr>
<tr>
<td>or APPH 10</td>
<td>Sci of Phys Act &amp; Health</td>
<td></td>
</tr>
</tbody>
</table>

**Core A - Essential Skills**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>ENGL 1101</td>
<td>English Composition I</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 1102</td>
<td>English Composition II</td>
<td>3</td>
</tr>
<tr>
<td>MATH 1552</td>
<td>Integral Calculus</td>
<td>4</td>
</tr>
</tbody>
</table>

**Core B - Institutional Options**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 1301</td>
<td>Intro to Computing 1</td>
<td>3</td>
</tr>
</tbody>
</table>

**Core C - Humanities**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any HUM (p. 93)</td>
<td></td>
<td>6</td>
</tr>
</tbody>
</table>

**Core D - Science, Math, & Technology**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>PHYS 2211</td>
<td>Intro Physics I 2</td>
<td>4</td>
</tr>
<tr>
<td>Lab Science 2</td>
<td></td>
<td>4</td>
</tr>
</tbody>
</table>

**Georgia Institute of Technology - DRAFT COPY**
Bachelor of Science in Computer Science - Thread: Information Internetworks & Intelligence

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 4420</td>
<td>Database Sys Implement</td>
<td></td>
</tr>
<tr>
<td>CS 4440</td>
<td>Database Technologies</td>
<td></td>
</tr>
<tr>
<td>CS 4675</td>
<td>Internet Sys &amp; Services</td>
<td></td>
</tr>
<tr>
<td>CS 3240</td>
<td>Languages and Computation</td>
<td></td>
</tr>
<tr>
<td>CS 4510</td>
<td>Automata and Complexity</td>
<td></td>
</tr>
<tr>
<td>CS 4731</td>
<td>Game AI</td>
<td></td>
</tr>
</tbody>
</table>

Select one of the following for Computational Complexity:  
- CS 4476 Intro to Computer Vision
- CS 4635 Knowledge-Based AI
- CS 4641 Machine Learning
- CS 4646 Mach Learn for Trading
- CS 4649 Robot Intelli Planning
- CS 4650 Natural Language
- CS 4731 Game AI

Select six credit hours of the following for Approaches to Intelligence:  
- CS 4476 Intro to Computer Vision
- CS 4635 Knowledge-Based AI
- CS 4641 Machine Learning
- CS 4646 Mach Learn for Trading
- CS 4649 Robot Intelli Planning
- CS 4650 Natural Language
- CS 4731 Game AI

Select one of the following for Embodied Intelligence:  
- CS 3630 Intro-Perception&Robotic
- CS 3790 Intro-Cognitive Science
- PSYC 3040 Sensation & Perception

Other Required Courses

- MATH 3012 Applied Combinatorics
- MATH 3215 Probability & Statistics
- MATH 3670 Statistics and Applications
- CS 2701
- ISYE 3770 Statistics & Applications
- ISYE 3770 Statistics & Applications
- ISYE 2 Probability With Apps or ISYE 2 Probability
- Other Required Courses

Free Electives

- Free Electives 10
- Total Credit Hours 126

Pass-fail only allowed for Free Electives (max six credit hours), CS 1100, and CS 1171 (if required).

1. Minimum grade of C required.
2. Two of three labs MUST be a sequence.
3. Junior Design Options are as follows (students must pick one option and may not change):
   - Option 1 - LMC 3432, LMC 3431, CS 3311, CS 3312.
   - Option 2 - ECE VIP courses and LMC 3403.
   - Option 3 - Satisfy Georgia Tech Research Option.
   - Option 4 - CS 2701 (3 hours), CS 4699-12P (3 hours), LMC 3403 (3 hours) = 9 hours OR CS 4699-12P (6 hours), LMC 3403 (3 hours) = 9 hours

Six credits of the Junior Design option are used as Major Requirements and the overage credits of research/VIP (5 credit hours/2 credit hours) may be used as free electives. Students completing VIP for their junior design requirement will be required to complete at least three semesters of VIP. (VIP 1 + VIP 2 + VIP 3) (for a total of 5 credit hours) + LMC 3403 = 8 hours of VIP credit. Students using CREATE-X for junior design take at least 6 hours of CREATE-X Start-Up Lab and Idea 2 Prototype (I2P) and 3 of the 6 hours must be I2P. Students take these 6 hours with LMC 3403 (3 hours) for a total of 9 hours. Extra three hours for CREATE-X option can be used in free electives.

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International Plan

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Research Option

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1. Complete at least nine units of undergraduate research
   a. Over at least two, preferably three terms
   b. Research may be for either pay or credit;
2. Write an undergraduate thesis/report of research on their findings;
3. Take
   a. LMC 4701: Undergraduate Research Proposal Writing (taken during the first or second semester of research)
   b. LMC 4702: Undergraduate Research Thesis Writing (taken during the thesis writing semester)

Research Classes

The following classes count toward fulfillment of the Research Option:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 2699</td>
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<td>Undergraduate Research (Junior and Senior)</td>
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</tr>
<tr>
<td>CS 4980</td>
<td>Research Capstone Proj</td>
<td>1-21</td>
</tr>
</tbody>
</table>

Research for Pay (Audit only)

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 2698</td>
<td>Research Assistantship (Freshman and Sophomore)</td>
<td>1-12</td>
</tr>
</tbody>
</table>
To get credit toward completion of the Research Option for research for pay, students must be registered for the appropriate audit-only, research for pay class (CS 2698 or 4698). If work on research for pay begins after the close of registration and the student has not signed up for the appropriate class, unfortunately it is not possible to get credit toward the Research Option for work that term.

A research project will also fulfill the capstone design requirement if the student registers for CS 4980 for one of the research terms. This is typically done the last semester of research, while taking LMC 4702.

Completion of the Research Option is noted on the student’s transcript. For more information, see www.urop.gatech.edu (http://www.urop.gatech.edu).

General Research Option Information (p. 90)

BS/MS in Computer Science

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Bachelor of Science in Computer Science - Thread: Information Internetworks & Media

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The Media thread is where computing meets design. This thread prepares students by helping them to understand the technical and computational capabilities of systems in order to exploit their abilities to provide creative outlets.

The Information Internetworks thread is where computing meets the data enterprise and all that this implies. The thread prepares students for all levels of information management by helping them to capture, represent, organize, transform, communicate, and present data so that it becomes information.
Bachelor of Science in Computer Science - Thread: Information Internetworks & Media

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 4235</td>
<td>Intro to Info Security</td>
</tr>
<tr>
<td>CS 4400</td>
<td>Intro to Database Systems</td>
</tr>
</tbody>
</table>

Select one of the following for Advanced Information Management:  

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 3251</td>
<td>Computer Networking I (if not taken for Introduction to Information Management)</td>
</tr>
<tr>
<td>CS 4235</td>
<td>Intro to Info Security (if not taken for Introduction to Information Management)</td>
</tr>
<tr>
<td>CS 4237</td>
<td>Comp &amp; Network Security</td>
</tr>
<tr>
<td>CS 4251</td>
<td>Computer Networking II</td>
</tr>
<tr>
<td>CS 4255</td>
<td>Intro-Network Management</td>
</tr>
<tr>
<td>CS 4261</td>
<td>Mobile Apps &amp; Svcs</td>
</tr>
<tr>
<td>CS 4270</td>
<td>Data Communications Lab</td>
</tr>
<tr>
<td>CS 4365</td>
<td>Intro Enterprise Comp</td>
</tr>
<tr>
<td>CS 4400</td>
<td>Intr to Database Systems (if not taken for Introduction to Information Management)</td>
</tr>
<tr>
<td>CS 4420</td>
<td>Database Sys Implement</td>
</tr>
<tr>
<td>CS 4440</td>
<td>Database Technologies</td>
</tr>
<tr>
<td>CS 4675</td>
<td>Internet Sys &amp; Services</td>
</tr>
</tbody>
</table>

Select six credit hours of the following for Media Technologies:  

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 4455</td>
<td>Video Game Design</td>
</tr>
<tr>
<td>CS 4460</td>
<td>Intro Info Visualization</td>
</tr>
<tr>
<td>CS 4464</td>
<td>Computational Journalism</td>
</tr>
<tr>
<td>CS 4475</td>
<td>Comp Photography</td>
</tr>
<tr>
<td>CS 4480</td>
<td>Digital Video Special FX</td>
</tr>
<tr>
<td>CS 4496</td>
<td>Computer Animation</td>
</tr>
<tr>
<td>CS 4590</td>
<td>Computer Audio</td>
</tr>
</tbody>
</table>

Other Required Courses  

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 3012</td>
<td>Applied Combinatorics</td>
</tr>
</tbody>
</table>

Select one of the following:  

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 3215</td>
<td>Probability &amp; Statistics</td>
</tr>
<tr>
<td>MATH 3670</td>
<td>Statistics and Applns</td>
</tr>
<tr>
<td>CEE 3770</td>
<td>Statistics &amp; Applications</td>
</tr>
<tr>
<td>ISYE 3770</td>
<td>Statistics &amp; Applications</td>
</tr>
<tr>
<td>or ISYE 2</td>
<td>Probability With Apps</td>
</tr>
<tr>
<td>&amp; ISYE 2</td>
<td>and Basic Statistical Meth</td>
</tr>
</tbody>
</table>

Free Electives  

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Free Electives</td>
<td></td>
</tr>
</tbody>
</table>

Total Credit Hours 126

Pass-fail only allowed for Free Electives (max six credit hours), CS 1100, and CS 1171 (if required).

1 Minimum grade of C required.
2 Two of three labs MUST be a sequence.

Junior Design Options are as follows (students must pick one option and may not change):

- Option 1 - LMC 3432, LMC 3431, CS 3311, CS 3312.
- Option 2 - ECE VIP courses and LMC 3403.
- Option 3 - Satisfy Georgia Tech Research Option.
- Option 4 - CS 2701 (3 hours), CS 4699-I2P (3 hours), LMC 3403 (3 hours) = 9 hours OR CS 4699-I2P (6 hours), LMC 3403 (3 hours) = 9 hours

Six credits of the Junior Design option are used as Major Requirements and the overage credits of research VIP (5 credit hours/2 credit hours) may be used as free electives. Students completing VIP for their junior design requirement will be required to complete at least three semesters of VIP. (VIP 1 + VIP 2 + VIP 3) (for a total of 5 credit hours) + LMC 3403 = 8 hours of VIP credit. Students using CREATE-X for junior design take at least 6 hours of CREATE-X Start-ip Lab and Idea 2 Prototype (I2P) and 3 of the 6 hours must be I2P. Students take these 6 hours with LMC 3403 (3 hours) for a total of 9 hours. Extra three hours for CREATE-X option can be used in free electives.

Two credit hours of MATH 1554 may count along with MATH 2550 to give Area F 18 credit hours.

Cooperative Programs

The College of Computing participates in the undergraduate and graduate Cooperative Programs. See links below for further information:

- Undergraduate Cooperative Plan (http://catalog.gatech.edu/academics/special-academic-programs/experiential-education/center-career-discovery-development)
- Graduate Cooperative Plan (http://catalog.gatech.edu/academics/special-academic-programs/experiential-education/graduate-cooperative-plan)

International Plan

The College of Computing (http://www.cc.gatech.edu) has an approved BS CS International Plan that accommodates the unique requirements of this option discussed in the International Plan section of the catalog (p. 86). However, due to the flexible nature of the Threads curriculum, the International Plan designation may not be available with all of the Thread combinations. Efforts will be made to work with interested students to accommodate their individual circumstances with regard to the International Plan designator for the Bachelor of Science in Computer Science.

Research Option

To complete the Research Option in the College of Computing, students must:

1. Complete at least nine units of undergraduate research
   a. Over at least two, preferably three terms
   b. Research may be for either pay or credit;

2. Write an undergraduate thesis/report of research on their findings;
3. Take
   a. LMC 4701: Undergraduate Research Proposal Writing (taken during the first or second semester of research)
b. LMC 4702: Undergraduate Research Thesis Writing (taken during the thesis writing semester).

Research Classes

The following classes count toward fulfillment of the Research Option:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 2699</td>
<td>Undergraduate Research (Freshman and Sophomore)</td>
<td>1-12</td>
</tr>
<tr>
<td>CS 4699</td>
<td>Undergraduate Research (Junior and Senior)</td>
<td>1-12</td>
</tr>
<tr>
<td>CS 4980</td>
<td>Research Capstone Proj</td>
<td>1-21</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 2698</td>
<td>Research Assistantship (Freshman and Sophomore)</td>
<td>1-12</td>
</tr>
<tr>
<td>CS 4698</td>
<td>Research Assistantship (Junior and Senior)</td>
<td>1-12</td>
</tr>
</tbody>
</table>

To get credit toward completion of the Research Option for research for pay, students must be registered for the appropriate audit-only, research for pay class (CS 2698 or 4698). If work on research for pay begins after the close of registration and the student has not signed up for the appropriate class, unfortunately it is not possible to get credit toward the Research Option for work that term.

A research project will also fulfill the capstone design requirement if the student registers for CS 4980 for one of the research terms. This is typically done the last semester of research, while taking LMC 4702.

Completion of the Research Option is noted on the student’s transcript. For more information, see www.urop.gatech.edu (http://www.urop.gatech.edu).

General Research Option Information (p. 90)

**Bachelor of Science in Computer Science - Thread: Information Internetworks & People**

The Threads™ represent partial paths through the curriculum. Thus, a student weaves a degree from these Threads. Students are not forced to make Thread decisions very early in their academic careers; however, they may if they want. We define the Threads so they are flexible enough to allow for a variety of technical and creative experiences. Threads are coherent enough that students develop computing skills even if their focus shifts as they go along.

The People thread is where computing meets users. This thread prepares students by helping them to understand the theoretical and computational foundations for designing, building, and evaluating systems that treat the human as a central component.

The Information Internetworks thread is where computing meets the data enterprise and all that this implies. The thread prepares students for all levels of information management by helping them to capture, represent, organize, transform, communicate, and present data so that it becomes information.

**Wellness**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>APPH 1040</td>
<td>Sci Foundation of Health</td>
<td>2</td>
</tr>
<tr>
<td>or APPH 10</td>
<td>Sci of Phys Act &amp; Health</td>
<td></td>
</tr>
</tbody>
</table>

**Core A - Essential Skills**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGL 1101</td>
<td>English Composition I</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 1102</td>
<td>English Composition II</td>
<td>3</td>
</tr>
<tr>
<td>MATH 1552</td>
<td>Integral Calculus</td>
<td>4</td>
</tr>
</tbody>
</table>

**Core B - Institutional Options**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 1301</td>
<td>Intro to Computing</td>
<td>1</td>
</tr>
</tbody>
</table>

**Core C - Humanities**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any HUM (p. 93)</td>
<td></td>
<td>6</td>
</tr>
</tbody>
</table>

**Core D - Science, Math, & Technology**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS 2211</td>
<td>Intro Physics I</td>
<td>2</td>
</tr>
<tr>
<td>Lab Science</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>MATH 1551</td>
<td>Differential Calculus</td>
<td>2</td>
</tr>
<tr>
<td>MATH 1554</td>
<td>Linear Algebra</td>
<td>4</td>
</tr>
<tr>
<td>or MATH 1564</td>
<td>LinAlg w Abstract Vec Sp</td>
<td></td>
</tr>
</tbody>
</table>

**Core E - Social Sciences**

Select one of the following:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIST 2111</td>
<td>United States to 1877</td>
<td>3</td>
</tr>
<tr>
<td>HIST 2112</td>
<td>United States since 1877</td>
<td></td>
</tr>
<tr>
<td>INTA 1200</td>
<td>American Government</td>
<td></td>
</tr>
<tr>
<td>POL 1101</td>
<td>Government of the U.S.</td>
<td></td>
</tr>
<tr>
<td>PUBP 3000</td>
<td>US Constitutional Issues</td>
<td></td>
</tr>
<tr>
<td>PSYC 1101</td>
<td>General Psychology</td>
<td>3</td>
</tr>
<tr>
<td>Any SS (p. 97)</td>
<td></td>
<td>6</td>
</tr>
</tbody>
</table>

**Core F - Courses Related to Major**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lab Science</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>CS 1100</td>
<td>Freshman Leap Seminar</td>
<td>1</td>
</tr>
<tr>
<td>CS 1331</td>
<td>Intro-Object Orient Proj</td>
<td>3</td>
</tr>
</tbody>
</table>
### Major Requirements

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 1332</td>
<td>Data Struct &amp; Algorithms</td>
<td>3</td>
</tr>
<tr>
<td>CS 2050</td>
<td>Intro Discrete Math</td>
<td>3</td>
</tr>
<tr>
<td>or CS 2051</td>
<td>Honors Discrete Math</td>
<td>3</td>
</tr>
<tr>
<td>MATH 2550</td>
<td>Intro Multivariable Calc</td>
<td>2</td>
</tr>
</tbody>
</table>

### Concentration

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 2110</td>
<td>Computer Organiz&amp;Program</td>
<td>4</td>
</tr>
<tr>
<td>CS 2200</td>
<td>Systems and Networks</td>
<td>4</td>
</tr>
<tr>
<td>CS 3510</td>
<td>Dsgn&amp;Analysis-Algorithms</td>
<td>3</td>
</tr>
<tr>
<td>or CS 3511</td>
<td>Algorithms Honors</td>
<td></td>
</tr>
<tr>
<td>PSYC 2015</td>
<td>Research Methods</td>
<td>4</td>
</tr>
</tbody>
</table>

Select six credit hours of the following for Introduction to Information Management:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 3251</td>
<td>Computer Networking I</td>
<td></td>
</tr>
<tr>
<td>CS 4235</td>
<td>Intro to Info Security</td>
<td></td>
</tr>
<tr>
<td>CS 4400</td>
<td>Intr to Database Systems</td>
<td></td>
</tr>
</tbody>
</table>

Select one of the following for Advanced Information Management:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 4237</td>
<td>Comp &amp; Network Security</td>
<td></td>
</tr>
<tr>
<td>CS 3251</td>
<td>Computer Networking I (if not taken for Intro to Information Management)</td>
<td></td>
</tr>
<tr>
<td>CS 4235</td>
<td>Intro to Info Security (if not taken for Intro to Information Management)</td>
<td></td>
</tr>
<tr>
<td>CS 4251</td>
<td>Computer Networking II</td>
<td></td>
</tr>
<tr>
<td>CS 4255</td>
<td>Intro-Network Management</td>
<td></td>
</tr>
<tr>
<td>CS 4261</td>
<td>Mobile Apps &amp; Svscs</td>
<td></td>
</tr>
<tr>
<td>CS 4270</td>
<td>Data Communications Lab</td>
<td></td>
</tr>
<tr>
<td>CS 4365</td>
<td>Intro Enterprise Comp</td>
<td></td>
</tr>
<tr>
<td>CS 4400</td>
<td>Intr to Database Systems (if not taken for Intro to Information Management)</td>
<td></td>
</tr>
<tr>
<td>CS 4420</td>
<td>Database Sys Implement</td>
<td></td>
</tr>
<tr>
<td>CS 4440</td>
<td>Database Technologies</td>
<td></td>
</tr>
<tr>
<td>CS 4675</td>
<td>Internet Sys &amp; Services</td>
<td></td>
</tr>
<tr>
<td>CS 3750</td>
<td>User Interface Design</td>
<td>3</td>
</tr>
</tbody>
</table>

Select six credit hours of the following for Human-Centered Technology:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 3790</td>
<td>Intro-Cognitive Science</td>
<td></td>
</tr>
<tr>
<td>CS 4460</td>
<td>Intro Info Visualization</td>
<td></td>
</tr>
<tr>
<td>CS 4660</td>
<td>Educational Technology</td>
<td></td>
</tr>
<tr>
<td>CS 4470</td>
<td>User Interface Software</td>
<td></td>
</tr>
<tr>
<td>CS 4605</td>
<td>Mobile&amp;Ubiquitous Comp</td>
<td></td>
</tr>
<tr>
<td>CS 4472</td>
<td>Design of Online Comm</td>
<td></td>
</tr>
<tr>
<td>CS 4745</td>
<td>Info&amp;Com Tech&amp;Global Dev</td>
<td></td>
</tr>
</tbody>
</table>

Select one of the following for Social/Behavioral Science for Computing:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSYC 2210</td>
<td>Social Psychology</td>
<td></td>
</tr>
</tbody>
</table>

### Other Required Courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSYC 2760</td>
<td>Human Language Process</td>
<td></td>
</tr>
<tr>
<td>PSYC 3040</td>
<td>Sensation &amp; Perception</td>
<td></td>
</tr>
</tbody>
</table>

### Free Electives

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Free Electives</td>
<td>9</td>
</tr>
</tbody>
</table>

Total Credit Hours: 126

Pass-fail only allowed for Free Electives (max six credit hours), CS 1100, and CS 1171 (if required).

1. Minimum grade of C required.
2. Two of three labs MUST be a sequence.
3. Junior Design Options are as follows (students must pick one option and may not change):
   - Option 1 - LMC 3432, LMC 3431, CS 3311, CS 3312.
   - Option 2 - ECE VIP courses and LMC 3403.
   - Option 3 - Satisfy Georgia Tech Research Option.
   - Option 4 - CS 2701 (3 hours), CS 4699-IP (3 hours), LMC 3403 (3 hours) + 9 hours OR CS 4699-IP (6 hours), LMC 3403 (3 hours) = 9 hours.

Six credits of the Junior Design option are used as Major Requirements and the average credits of research/VIP (5 credit hours/2 credit hours) may be used as free electives. Students completing VIP for their junior design requirement will be required to complete at least three semesters of VIP. (VIP 1 + VIP 2 + VIP 3) (for a total of 5 credit hours) + LMC 3403 = 8 hours of VIP credit.

Students using CREATE-X for junior design take at least 6 hours of CREATE-X Start-ip Lab and Idea 2 Prototype (I2P) and 3 of the 6 hours must be I2P. Students take these 6 hours with LMC 3403 (3 hours) for a total of 9 hours. Extra three hours for CREATE-X option can be used in free electives.

4. Two credit hours of MATH 1554 may count along with MATH 2550 to give Area F 18 credit hours.

### Cooperative Programs

The College of Computing participates in the undergraduate and graduate Cooperative Programs. See links below for further information:

- Undergraduate Cooperative Plan (http://catalog.gatech.edu/academics/special-academic-programs/experiential-education/center-career-discovery-development)
- Graduate Cooperative Plan (http://catalog.gatech.edu/academics/special-academic-programs/experiential-education/graduate-cooperative-plan)

### International Plan

The College of Computing (http://www.cc.gatech.edu) has an approved BS CS International Plan that accommodates the unique requirements of this option discussed in the International Plan section of the catalog (p. 86).
However, due to the flexible nature of the Threads curriculum, the International Plan designation may not be available with all of the Thread combinations. Efforts will be made to work with interested students to accommodate their individual circumstances with regard to the International Plan designator for the Bachelor of Science in Computer Science.

Research Option

To complete the Research Option in the College of Computing, students must:

1. Complete at least nine units of undergraduate research
   a. Over at least two, preferably three terms
   b. Research may be for either pay or credit;
2. Write an undergraduate thesis/report of research on their findings;
3. Take
   a. LMC 4701: Undergraduate Research Proposal Writing (taken during the first or second semester of research)
   b. LMC 4702: Undergraduate Research Thesis Writing (taken during the thesis writing semester).

Research Classes

The following classes count toward fulfillment of the Research Option:

<table>
<thead>
<tr>
<th>Research for Credit</th>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CS 2699</td>
<td>Undergraduate Research (Freshman and Sophomore)</td>
<td>1-12</td>
</tr>
<tr>
<td></td>
<td>CS 4699</td>
<td>Undergraduate Research (Junior and Senior)</td>
<td>1-12</td>
</tr>
<tr>
<td></td>
<td>CS 4980</td>
<td>Research Capstone Proj</td>
<td>1-21</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Research for Pay (Audit only)</th>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CS 2698</td>
<td>Research Assistantship (Freshman and Sophomore)</td>
<td>1-12</td>
</tr>
<tr>
<td></td>
<td>CS 4698</td>
<td>Research Assistantship (Junior and Senior)</td>
<td>1-12</td>
</tr>
</tbody>
</table>

To get credit toward completion of the Research Option for research for pay, students must be registered for the appropriate audit-only, research for pay class (CS 2698 or 4698). If work on research for pay begins after the close of registration and the student has not signed up for the appropriate class, unfortunately it is not possible to get credit toward the Research Option for work that term.

A research project will also fulfill the capstone design requirement if the student registers for CS 4980 for one of the research terms. This is typically done the last semester of research, while taking LMC 4702.

Completion of the Research Option is noted on the student's transcript. For more information, see www.urop.gatech.edu (http://www.urop.gatech.edu).

General Research Option Information (p. 90)

BS/MS in Computer Science

Students who want to pursue

the BS/MS option must apply to the MSCS program after completing at least 60 hours of work towards the BSCS degree. Applicants should have a cumulative GPA of at least 3.4. This GPA must be maintained for the student to take graduate level courses.

Students admitted to the program will take 6 hours during their final undergraduate year to double count in both their BSCS and MSCS degrees; they should choose 3 hours of MS Core or Elective hours their fall semester and 3 hours of MS Core or Elective hours their spring semester that can count toward their thread hours and CS Specialization hours.

Visit College of Computing (https://www.cc.gatech.edu) for more information.

Bachelor of Science in Computer Science - Thread: Information Internetworks & Systems and Architecture

The Threads™ represent partial paths through the curriculum. Thus, a student weaves a degree from these Threads. Students are not forced to make Thread decisions very early in their academic careers; however, they may if they want. We define the Threads so they are flexible enough to allow for a variety of technical and creative experiences. Threads are coherent enough that students develop computing skills even if their focus shifts as they go along.

The Systems and Architecture thread is where many of the practical skills of computing are learned. Like Theory, Systems and Architecture lies at the center of computing. It prepares students to create and evaluate computer architectures, systems, and languages across a variety of paradigms and approaches.

The Information Internetworks thread is where computing meets the data enterprise and all that this implies. The thread prepares students for all levels of information management by helping them to capture, represent, organize, transform, communicate, and present data so that it becomes information.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
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</tr>
</thead>
<tbody>
<tr>
<td>APPH 1040</td>
<td>Sci Foundation of Health</td>
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<td>MATH 1552</td>
<td>Integral Calculus</td>
<td>4</td>
</tr>
<tr>
<td>CS 1301</td>
<td>Intro to Computing</td>
<td>1</td>
</tr>
<tr>
<td>Core C - Humanities</td>
<td>Any HUM (p. 93)</td>
<td>6</td>
</tr>
<tr>
<td>PHYS 2211</td>
<td>Intro Physics I</td>
<td>4</td>
</tr>
</tbody>
</table>
Bachelor of Science in Computer Science - Thread: Information Internetworks & Systems and Architecture

Management:

Select one of the following for Advanced Information

Select six credit hours of the following for Introduction to ECE
CS 3510
CS 3220
CS 2200
CS 2110

Concentration

Junior Design Option

Core E - Social Sciences

Select one of the following:

HIST 2111 United States to 1877
HIST 2112 United States since 1877
INTA 1200 American Government
POL 1101 Government of the U.S.
PUBP 3000 US Constitutional Issues

Any SS (p. 97)

Core F - Courses Related to Major

Lab Science

CS 1100 Freshman Leap Seminar
CS 1331 Intro-Object Orient Prog
CS 1332 Data Struct & Algorithms
CS 2050 Intro Discrete Math CS
or CS 2051 Honors Discrete Math CS

MATH 2550 Intro Multivariable Calc

Major Requirements

CS 2340 Objects and Design
CS 4001 Computing & Society
or CS 4002 Robots and Society
or CS 4726 Privacy Tech Policy Law
or SLS 3110 Tech and Sustain Community

Junior Design Options (Capstone)

Junior Design Option

Concentration

CS 2110 Computer Organiz&Program
CS 2200 Systems and Networks
CS 3210 Design-Operating Systems
CS 3220 Processor Design
CS 3510 Design&Analysis-Algorithms
or CS 3511 Algorithms Honors

ECE 2031 Digital Design Lab

Select six credit hours of the following for Introduction to Information Management:

CS 3251 Computer Networking I
CS 4235 Intro to Info Security
CS 4400 Intr to Database Systems

Select one of the following for Advanced Information Management:

CS 3251 Computer Networking I (if not takeng for Introduction to Information Management)
CS 4235 Intro to Info Security (if not taken for Introduction to Information Management)

CS 4237 Comp & Network Security
CS 4251 Computer Networking II
CS 4255 Intro-Network Management
CS 4261 Mobile Apps & Svcs
CS 4270 Data Communications Lab
CS 4365 Intro Enterprise Comp

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Any SS (p. 97)

Other Required Courses

MATH 3012 Applied Combinatorics

Select one of the following:

MATH 3215 Probability & Statistics
MATH 3670 Statistics and Applns
CEE 3770 Statistics & Applications
ISYE 3770 Statistics & Applications

Lab Science

CS 1100 Freshman Leap Seminar
CS 1331 Intro-Object Orient Prog
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Junior Design Option

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Cooperative Programs

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International Plan
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Research Option
To complete the Research Option in the College of Computing, students must:

1. Complete at least nine units of undergraduate research
   a. Over at least two, preferably three terms
   b. Research may be for either pay or credit;
2. Write an undergraduate thesis/report of research on their findings;
3. Take
   a. LMC 4701: Undergraduate Research Proposal Writing (taken during the first or second semester of research)
   b. LMC 4702: Undergraduate Research Thesis Writing (taken during the thesis writing semester).

Research Classes
The following classes count toward fulfillment of the Research Option:

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<tr>
<td>CS 4980</td>
<td>Research Capstone Proj</td>
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To get credit toward completion of the Research Option for research for pay, students must be registered for the appropriate audit-only, research for pay class (CS 2698 or 4698). If work on research for pay begins after the close of registration and the student has not signed up for the appropriate class, unfortunately it is not possible to get credit toward the Research Option for work that term.

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General Research Option Information (p. 90)

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Students admitted to the program will take 6 hours during their final undergraduate year to double count in both their BSCS and MSCS degrees; they should choose 3 hours of MS Core or Elective hours their fall semester and 3 hours of MS Core or Elective hours their spring semester that can count toward their thread hours and CS Specialization hours.

Visit College of Computing (https://www.cc.gatech.edu) for more information.

Bachelor of Science in Computer Science - Thread: Intelligence & People

The Threads™ represent partial paths through the curriculum. Thus, a student weaves a degree from these Threads. Students are not forced to make Thread decisions very early in their academic careers; however, they may if they want. We define the Threads so they are flexible enough to allow for a variety of technical and creative experiences. Threads are coherent enough that students develop computing skills even if their focus shifts as they go along.

The People thread is where computing meets users. This thread prepares students by helping them to understand the theoretical and computational foundations for designing, building, and evaluating systems that treat the human as a central component.

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### Core A - Essential Skills

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### Core B - Institutional Options

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### Core C - Humanities

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### Core D - Science, Math, & Technology

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<tr>
<td>Lab Science</td>
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<tr>
<td>MATH 1551</td>
<td>Differential Calculus</td>
<td>2</td>
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<tr>
<td>MATH 1554</td>
<td>Linear Algebra w Abstract Vec Sp</td>
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### Core E - Social Sciences

Select one of the following:

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<td>United States since 1877</td>
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<tr>
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<td>American Government</td>
<td></td>
</tr>
<tr>
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<td>Government of the U.S.</td>
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<td>PUBP 3000</td>
<td>US Constitutional Issues</td>
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<td>PSYC 1101</td>
<td>General Psychology</td>
<td>3</td>
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<td>Any SS</td>
<td>(p. 97)</td>
<td>6</td>
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### Core F - Courses Related to Major

<table>
<thead>
<tr>
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<td>CS 1100</td>
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<td>1</td>
</tr>
<tr>
<td>CS 1331</td>
<td>Intro-Object Orient Prog</td>
<td>3</td>
</tr>
<tr>
<td>CS 1332</td>
<td>Data Struct &amp; Algorithms</td>
<td>3</td>
</tr>
<tr>
<td>CS 2050</td>
<td>Intro Discrete Math CS</td>
<td>3</td>
</tr>
<tr>
<td>or CS 2051</td>
<td>Honors Discrete Math CS</td>
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<tr>
<td>MATH 2550</td>
<td>Intro Multivariable Calc</td>
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### Major Requirements

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<tr>
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<tbody>
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<td>Objects and Design</td>
<td>3</td>
</tr>
<tr>
<td>CS 4001</td>
<td>Computing &amp; Society</td>
<td>3</td>
</tr>
<tr>
<td>or CS 4002</td>
<td>Robots and Society</td>
<td></td>
</tr>
<tr>
<td>or CS 4726</td>
<td>Privacy Tech Policy Law</td>
<td></td>
</tr>
<tr>
<td>or SLS 3111</td>
<td>Tech and Sustain Community</td>
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### Junior Design Options (Capstone)

<table>
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<tr>
<th>Code</th>
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### Concentration

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<tr>
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</tr>
<tr>
<td>CS 3510</td>
<td>Dsgn&amp;Analysis-Algorithms</td>
<td>3</td>
</tr>
<tr>
<td>or CS 3511</td>
<td>Algorithms Honors</td>
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<tr>
<td>CS 3600</td>
<td>Intro-Artificial Intell</td>
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<tr>
<td>PSYC 2015</td>
<td>Research Methods</td>
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Select one of the following for Computational Complexity:

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<tbody>
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<td>CS 3240</td>
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### Other Required Courses

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<tr>
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<tbody>
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<td>MATH 3012</td>
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<td>3</td>
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<tr>
<td>Select one of the following:</td>
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</tr>
<tr>
<td>MATH 3215</td>
<td>Probability &amp; Statistics</td>
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<td>MATH 3670</td>
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<td>Statistics &amp; Applications</td>
<td></td>
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<td>ISYE 3770</td>
<td>Statistics &amp; Applications</td>
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<tr>
<td>or ISYE 3770</td>
<td>Probability With Apps</td>
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<tr>
<td>&amp; ISYE 270</td>
<td>Basic Statistical Meth</td>
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### Free Electives

<table>
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<tr>
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</thead>
<tbody>
<tr>
<td>Free Electives</td>
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<td>7</td>
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</table>

Total Credit Hours 126

Pass-fail only allowed for Free Electives (max 6 credit hours), CS 1100, and CS 1171 if required.

1. Minimum grade of C required.
2. Two of three lab sciences MUST be a sequence.
3. If CS 3790 is successfully completed, Embodied Intelligence is considered fulfilled, and three credit hours are added to Free Electives.
4. If PSYC 3040 is successfully completed, both requirements are fulfilled, and three credit hours are added to Free Electives.
Junior Design Options are as follows (students must pick one option and may not change):

- Option 1 - LMC 3432, LMC 3431, CS 3311, CS 3312.
- Option 2 - ECE VIP courses and LMC 3403.
- Option 3 - Satisfy Georgia Tech Research Option.
- Option 4 - CS 2701 (3 hours), CS 4699-I2P (3 hours), LMC 3403 (3 hours) = 9 hours OR CS 4699-I2P (6 hours), LMC 3403 (3 hours) = 9 hours

Six credits of the Junior Design option are used as Major Requirements and the overage credits of research/VIP (5 credit hours/2 credit hours) may be used as free electives. Students completing VIP for their junior design requirement will be required to complete at least three semesters of VIP. (VIP 1 + VIP 2 + VIP 3) (for a total of 5 credit hours) + LMC 3403 = 8 hours of VIP credit. Students using CREATE-X for junior design take at least 6 hours of CREATE-X Start-ip Lab and Idea 2 Prototype (I2P) and 3 of the 6 hours must be I2P. Students take these 6 hours with LMC 3403 (3 hours) for a total of 9 hours. Extra three hours for CREATE-X option can be used in free electives.

Two credit hours of MATH 1554 may count along with MATH 2550 to give Area F 18 credit hours.

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The College of Computing participates in the undergraduate and graduate Cooperative Programs. See links below for further Information:

- Undergraduate Cooperative Plan (http://catalog.gatech.edu/academics/special-academic-programs/experiential-education/center-career-discovery-development)
- Graduate Cooperative Plan (http://catalog.gatech.edu/academics/special-academic-programs/experiential-education/graduate-cooperative-plan)

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   a. LMC 4701: Undergraduate Research Proposal Writing (taken during the first or second semester of research)

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Research Classes

The following classes count toward fulfillment of the Research Option:

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</tr>
<tr>
<td>CS 4980</td>
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<td>1-21</td>
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Research for Pay (Audit only)

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General Research Option Information (p. 90)

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The Systems and Architecture thread is where many of the practical skills of computing are learned. Like Theory, Systems and Architecture lies at the center of computing. It prepares students to create and evaluate computer architectures, systems, and languages across a variety of paradigms and approaches.

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### Core C - Humanities

Any HUM (p. 93) 6

### Core D - Science, Math, & Technology

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<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS 2211</td>
<td>Intro Physics I</td>
<td>4</td>
</tr>
<tr>
<td>or MATH 1551</td>
<td>Differential Calculus</td>
<td>2</td>
</tr>
<tr>
<td>or MATH 1554</td>
<td>Linear Algebra</td>
<td>4</td>
</tr>
<tr>
<td>or MATH 156 &amp; Alg w Abstract Vec Sp</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

### Core E - Social Sciences

Select one of the following: 3

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIST 2111</td>
<td>United States to 1877</td>
<td></td>
</tr>
<tr>
<td>HIST 2112</td>
<td>United States since 1877</td>
<td></td>
</tr>
<tr>
<td>INTA 1200</td>
<td>American Government</td>
<td></td>
</tr>
<tr>
<td>POL 1101</td>
<td>Government of the U.S.</td>
<td></td>
</tr>
<tr>
<td>PUBP 3000</td>
<td>US Constitutional Issues</td>
<td></td>
</tr>
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</table>

### Major Requirements

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 2340</td>
<td>Objects and Design</td>
<td>3</td>
</tr>
<tr>
<td>or CS 4001</td>
<td>Computing &amp; Society</td>
<td>3</td>
</tr>
<tr>
<td>or CS 4002</td>
<td>Robots and Society</td>
<td></td>
</tr>
<tr>
<td>or CS 4726</td>
<td>Privacy Tech Policy Law</td>
<td></td>
</tr>
<tr>
<td>or SLS 311</td>
<td>Tech and Sustain Community</td>
<td></td>
</tr>
</tbody>
</table>

### Junior Design Options (Capstone)

Junior Design Option 1 3

### Concentration

Select one of the following for Embodied Intelligence: 1

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 3630</td>
<td>Intro-Perception &amp; Robotic</td>
<td></td>
</tr>
<tr>
<td>CS 3790</td>
<td>Intro-Cognitive Science</td>
<td></td>
</tr>
<tr>
<td>PSYC 3040</td>
<td>Sensation &amp; Perception</td>
<td></td>
</tr>
</tbody>
</table>

Select six credit hours of the following for Approaches to Intelligence: 6

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 4635</td>
<td>Knowledge-Based AI</td>
<td></td>
</tr>
<tr>
<td>CS 4476</td>
<td>Intro to Computer Vision</td>
<td></td>
</tr>
<tr>
<td>CS 4641</td>
<td>Machine Learning</td>
<td></td>
</tr>
<tr>
<td>CS 4646</td>
<td>Mach Learn for Trading</td>
<td></td>
</tr>
<tr>
<td>CS 4649</td>
<td>Robot Intellli Planning</td>
<td></td>
</tr>
<tr>
<td>CS 4650</td>
<td>Natural Language</td>
<td></td>
</tr>
<tr>
<td>CS 4731</td>
<td>Game AI</td>
<td></td>
</tr>
</tbody>
</table>

Select one of the following for Computational Complexity: 1

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 3240</td>
<td>Languages and Computation</td>
<td></td>
</tr>
<tr>
<td>CS 4510</td>
<td>Automata and Complexity</td>
<td></td>
</tr>
</tbody>
</table>

Select one of the following for Advanced System Architectures: 1

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 3300</td>
<td>Intro to Software Engr</td>
<td></td>
</tr>
<tr>
<td>CS 4240</td>
<td>Compilers &amp; Interpreters</td>
<td></td>
</tr>
</tbody>
</table>

Select one of the following for Systems Software Tools: 1

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 4210</td>
<td>Adv Operating Systems</td>
<td></td>
</tr>
<tr>
<td>CS 4220</td>
<td>Embedded Systems</td>
<td></td>
</tr>
<tr>
<td>CS 4290</td>
<td>Advanced Computer Org</td>
<td></td>
</tr>
</tbody>
</table>
MATH 3012  Applied Combinatorics  3
Select one of the following:  3
  MATH 3215 Probability & Statistics
  MATH 3670 Statistics and Applns
CEE 3770  Statistics & Applications
ISYE 3770  Statistics & Applications
  or ISYE 2027 Probability With Apps
  & ISYE 2028 Basic Statistical Meth
Free Electives
Free Electives  5
Total Credit Hours  126

Pass-fail only allowed for Free Electives (max 6 credit hours), CS 1100, and CS 1171 (if required).

1 Minimum grade of C required.
2 Two of three lab sciences MUST be a sequence.
3 Junior Design Options are as follows (students must pick one option and may not change):
   • Option 1 - LMC 3432, LMC 3431, CS 3311, CS 3312.
   • Option 2 - ECE VIP courses and LMC 3403.
   • Option 3 - Satisfy Georgia Tech Research Option.
   • Option 4 - CS 2701 (3 hours), CS 4699-I2P (3 hours), LMC 3403 (3 hours) = 9 hours
     OR CS 4699-I2P (6 hours), LMC 3403 (3 hours) = 9 hours

Six credits of the Junior Design option are used as Major Requirements and the overage credits of research/VIP (5 credit hours/2 credit hours) may be used as free electives. Students completing VIP for their junior design requirement will be required to complete at least three semesters of VIP. (VIP 1 + VIP 2 + VIP 3) (for a total of 5 credit hours) + LMC 3403 × 8 = 24 hours of VIP credit.

Students using CREATE-X for junior design take at least 6 hours of CREATE-X Start-ip Lab and Idea 2 Prototype (I2P) and 3 of the 6 hours must be I2P. Students take these 6 hours with LMC 3403 (3 hours) for a total of 9 hours. Extra three hours for CREATE-X option can be used in free electives.

4 Two credit hours of MATH 1554 may count along with MATH 2550 to give Area F 18 credit hours.

Cooperative Programs
The College of Computing participates in the undergraduate and graduate Cooperative Programs. See links below for further Information:
   • Undergraduate Cooperative Plan (http://catalog.gatech.edu/academics/special-academic-programs/experiential-education-center-career-discovery-development)
   • Graduate Cooperative Plan (http://catalog.gatech.edu/academics/special-academic-programs/experiential-education/graduate-cooperative-plan)

International Plan
The College of Computing (http://www.cc.gatech.edu) has an approved BS CS International Plan that accommodates the unique requirements of this option discussed in the International Plan section of the catalog (p. 86).

However, due to the flexible nature of the Threads curriculum, the International Plan designation may not be available with all of the Thread combinations. Efforts will be made to work with interested students to accommodate their individual circumstances with regard to the International Plan designator for the Bachelor of Science in Computer Science.

Research Option
To complete the Research Option in the College of Computing, students must:
1. Complete at least nine units of undergraduate research
   a. Over at least two, preferably three terms
   b. Research may be for either pay or credit;
2. Write an undergraduate thesis/report of research on their findings;
3. Take
   a. LMC 4701: Undergraduate Research Proposal Writing (taken during the first or second semester of research)
   b. LMC 4702: Undergraduate Research Thesis Writing (taken during the thesis writing semester).

Research Classes
The following classes count toward fulfillment of the Research Option:

Research for Credit

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 2699</td>
<td>Undergraduate Research (Freshman and Sophomore)</td>
<td>1-12</td>
</tr>
<tr>
<td>CS 4699</td>
<td>Undergraduate Research (Junior and Senior)</td>
<td>1-12</td>
</tr>
<tr>
<td>CS 4980</td>
<td>Research Capstone Proj</td>
<td>1-21</td>
</tr>
</tbody>
</table>

Research for Pay (Audit only)

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 2698</td>
<td>Research Assistantship (Freshman and Sophomore)</td>
<td>1-12</td>
</tr>
<tr>
<td>CS 4698</td>
<td>Research Assistantship (Junior and Senior)</td>
<td>1-12</td>
</tr>
</tbody>
</table>

To get credit toward completion of the Research Option for research for pay, students must be registered for the appropriate audit-only, research for pay class (CS 2698 or 4698). If work on research for pay begins after the close of registration and the student has not signed up for the appropriate class, unfortunately it is not possible to get credit toward the Research Option for work that term.

A research project will also fulfill the capstone design requirement if the student registers for CS 4980 for one of the research terms. This is typically done the last semester of research, while taking LMC 4702.

Completion of the Research Option is noted on the student’s transcript. For more information, see www.urop.gatech.edu (http://www.urop.gatech.edu).

General Research Option Information (p. 90)

BS/MS in Computer Science
Students who want to pursue

the BS/MS option must apply to the MSCS program after completing at least 60 hours of work towards the BSCS degree. Applicants should have
a cumulative GPA of at least 3.4. This GPA must be maintained for the student to take graduate level courses.

Students admitted to the program will take 6 hours during their final undergraduate year to double count in both their BSCS and MSCS degrees; they should choose 3 hours of MS Core or Elective hours their fall semester and 3 hours of MS Core or Elective hours their spring semester that can count toward their thread hours and CS Specialization hours.

Visit College of Computing (https://www.cc.gatech.edu) for more information.

**Bachelor of Science in Computer Science - Thread: Media & People**

The Threads™ represent partial paths through the curriculum. Thus, a student weaves a degree from these Threads. Students are not forced to make Thread decisions very early in their academic careers; however, they may if they want. We define the Threads so they are flexible enough to allow for a variety of technical and creative experiences. Threads are coherent enough that students develop computing skills even if their focus shifts as they go along.

The Media thread is where computing meets design. This thread prepares students by helping them to understand the technical and computational capabilities of systems in order to exploit their abilities to provide creative outlets.

The People thread is where computing meets users. This thread prepares students by helping them to understand the theoretical and computational foundations for designing, building, and evaluating systems that treat the human as a central component.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>APPH 1040</td>
<td>Sci Foundation of Health</td>
<td>2</td>
</tr>
<tr>
<td>ENGL 1101</td>
<td>English Composition I</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 1102</td>
<td>English Composition II</td>
<td>3</td>
</tr>
<tr>
<td>MATH 1552</td>
<td>Integral Calculus</td>
<td>4</td>
</tr>
<tr>
<td>CS 1301</td>
<td>Intro to Computing ¹</td>
<td>3</td>
</tr>
<tr>
<td>HIST 2111</td>
<td>United States to 1877</td>
<td>3</td>
</tr>
<tr>
<td>HIST 2112</td>
<td>United States since 1877</td>
<td>3</td>
</tr>
<tr>
<td>INTA 1200</td>
<td>American Government</td>
<td>3</td>
</tr>
<tr>
<td>POL 1101</td>
<td>Government of the U.S.</td>
<td>3</td>
</tr>
<tr>
<td>PSUBP 3000</td>
<td>US Constitutional Issues</td>
<td>3</td>
</tr>
<tr>
<td>PSYC 1101</td>
<td>General Psychology</td>
<td>3</td>
</tr>
<tr>
<td>Any SS (p. 97)</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>CS 1100</td>
<td>Freshman Leap Seminar</td>
<td>1</td>
</tr>
<tr>
<td>CS 1331</td>
<td>Intro-Object Orient Prog ¹</td>
<td>3</td>
</tr>
<tr>
<td>CS 1332</td>
<td>Data Struct &amp; Algorithms ¹</td>
<td>3</td>
</tr>
<tr>
<td>CS 2050</td>
<td>Intro Discrete Math CS ¹</td>
<td>3</td>
</tr>
<tr>
<td>or CS 2051</td>
<td>Honors Discrete Math CS</td>
<td>3</td>
</tr>
<tr>
<td>MATH 2550</td>
<td>Intro Multivariable Calc ⁵</td>
<td>2</td>
</tr>
<tr>
<td>Lab Science ²</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>CS 2340</td>
<td>Objects and Design ¹</td>
<td>3</td>
</tr>
<tr>
<td>CS 4001</td>
<td>Computing &amp; Society ¹</td>
<td>3</td>
</tr>
<tr>
<td>or CS 4002</td>
<td>Robots and Society</td>
<td>3</td>
</tr>
<tr>
<td>or CS 4726</td>
<td>Privacy Tech Policy Law</td>
<td>3</td>
</tr>
<tr>
<td>or SLS 311(Tech &amp; Sustain Community)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Junior Design Options (Capstone)</td>
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<td>6</td>
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<tr>
<td>Junior Design Option ¹, ⁴</td>
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<td></td>
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<tr>
<td>Concentration</td>
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</tr>
<tr>
<td>Select one of the following for Media Architectures: ¹</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>CS 2110</td>
<td>Computer Organiz&amp;Program</td>
<td>4</td>
</tr>
<tr>
<td>CS 2261</td>
<td>Media Device Architect</td>
<td>4</td>
</tr>
<tr>
<td>PSYC 2015</td>
<td>Research Methods ¹</td>
<td>4</td>
</tr>
<tr>
<td>CS 3451</td>
<td>Computer Graphics</td>
<td>3</td>
</tr>
<tr>
<td>Select six credit hours of the following for Media Technologies: ¹, ³</td>
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<td>6</td>
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<tr>
<td>CS 4455</td>
<td>Video Game Design</td>
<td>3</td>
</tr>
<tr>
<td>CS 4460</td>
<td>Intro Info Visualization</td>
<td>3</td>
</tr>
<tr>
<td>CS 4464</td>
<td>Computational Journalism</td>
<td>3</td>
</tr>
<tr>
<td>CS 4475</td>
<td>Comp Photography</td>
<td>3</td>
</tr>
<tr>
<td>CS 4480</td>
<td>Digital Video Special FX</td>
<td>3</td>
</tr>
<tr>
<td>CS 4496</td>
<td>Computer Animation</td>
<td>3</td>
</tr>
<tr>
<td>CS 4590</td>
<td>Computer Audio</td>
<td>3</td>
</tr>
<tr>
<td>CS 3750</td>
<td>User Interface Design ¹</td>
<td>3</td>
</tr>
<tr>
<td>Select six credit hours of the following for Human-Centered Technology: ¹, ³</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>CS 3790</td>
<td>Intro-Cognitive Science</td>
<td>3</td>
</tr>
<tr>
<td>CS 4660</td>
<td>Educational Technology</td>
<td>3</td>
</tr>
<tr>
<td>CS 4460</td>
<td>Intro Info Visualization</td>
<td>3</td>
</tr>
<tr>
<td>CS 4470</td>
<td>User Interface Software</td>
<td>3</td>
</tr>
<tr>
<td>CS 4472</td>
<td>Design of Online Comm</td>
<td>3</td>
</tr>
<tr>
<td>CS 4605</td>
<td>Mobile&amp;Ubiquitous Comp</td>
<td>3</td>
</tr>
<tr>
<td>CS 4745</td>
<td>Info&amp;Com Tech&amp;Global Dev</td>
<td>3</td>
</tr>
<tr>
<td>Select one of the following for Social/Behavioral Science for Computing: ¹</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>PSYC 2210</td>
<td>Social Psychology</td>
<td>3</td>
</tr>
<tr>
<td>PSYC 2760</td>
<td>Human Language Process</td>
<td>3</td>
</tr>
<tr>
<td>PSYC 3040</td>
<td>Sensation &amp; Perception</td>
<td>3</td>
</tr>
<tr>
<td>Other Required Courses</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>MATH 3012</td>
<td>Applied Combinatorics</td>
<td>3</td>
</tr>
<tr>
<td>Select one of the following:</td>
<td></td>
<td>3</td>
</tr>
</tbody>
</table>
MATH 3215 Probability & Statistics
MATH 3670 Statistics and Applns
CEE 3770 Statistics & Applications
ISYE 3770 Statistics & Applications
or ISYE 2 Probability With Apps
& ISYE 2 and Basic Statistical Meth

<table>
<thead>
<tr>
<th>Free Electives</th>
<th>Free Electives</th>
<th>Total Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>16</td>
</tr>
<tr>
<td></td>
<td></td>
<td>126</td>
</tr>
</tbody>
</table>

Pass-fail only allowed for Free Electives (max six credit hours), CS 1100, and CS 1171 (if required)

1. Minimum grade of C required.
2. Two of three lab sciences MUST be a sequence.
3. If CS 4460 is successfully completed, one of the Media Technologies is fulfilled, one of the Human-Centered Technology is fulfilled, and an additional 3 credit hour Thread Elective is required. Thread Electives can be chosen from the following courses: CS 2110, CS 2261, CS 3240, CS 3510, CS 3790, CS 4455, CS 4464, CS 4470, CS 4472, CS 4475, CS 4480, CS 4496, CS 4550, CS 4590, CS 4605, CS 4660, CS 4665, CS 4670, CS 4690, CS 4770, CS 4775, CS 4793, PSYC 2020, PSYC 2210, PSYC 2760, PSYC 3012, PSYC 3040, PSYC 4090, PSYC 4250 or CX 4236.
4. Junior Design Options are as follows (students must pick one option and may not change):
   - Option 1 - LMC 3432, LMC 3431, CS 3311, CS 3312.
   - Option 2 - ECE VIP courses and LMC 3403.
   - Option 3 - Satisfy Georgia Tech Research Option.
   - Option 4 - CS 2701 (3 hours), CS 4699-12P (3 hours), LMC 3403 (3 hours) = 9 hours OR CS 4699-12P (6 hours), LMC 3403 (3 hours) = 9 hours

Six credits of the Junior Design option are as follows (students must pick one option and may not change):
- Option 1 - LMC 3432, LMC 3431, CS 3311, CS 3312.
- Option 2 - ECE VIP courses and LMC 3403.
- Option 3 - Satisfy Georgia Tech Research Option.
- Option 4 - CS 2701 (3 hours), CS 4699-12P (3 hours), LMC 3403 (3 hours) = 9 hours OR CS 4699-12P (6 hours), LMC 3403 (3 hours) = 9 hours

5. Two credit hours of MATH 1554 may count along with MATH 2550 to give Area F 18 credit hours.

Cooperative Programs
The College of Computing participates in the undergraduate and graduate Cooperative Programs. See links below for further Information:
- Undergraduate Cooperative Plan (http://catalog.gatech.edu/academics/special-academic-programs/undergraduate-experiential-education/center-career-discovery-development)
- Graduate Cooperative Plan (http://catalog.gatech.edu/academics/special-academic-programs/undergraduate-experiential-education/graduate-cooperative-plan)

International Plan
The College of Computing (http://www.cc.gatech.edu) has an approved BS CS International Plan that accommodates the unique requirements of this option discussed in the International Plan section of the catalog (p. 86).

However, due to the flexible nature of the Threads curriculum, the International Plan designation may not be available with all of the Thread combinations. Efforts will be made to work with interested students to accommodate their individual circumstances with regard to the International Plan designator for the Bachelor of Science in Computer Science.

Research Option
To complete the Research Option in the College of Computing, students must:
1. Complete at least nine units of undergraduate research
   a. Over at least two, preferably three terms
   b. Research may be for either pay or credit;
2. Write an undergraduate thesis/report of research on their findings;
3. Take
   a. LMC 4701: Undergraduate Research Proposal Writing (taken during the first or second semester of research)
   b. LMC 4702: Undergraduate Research Thesis Writing (taken during the thesis writing semester).

Research Classes
The following classes count toward fulfillment of the Research Option:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 2699</td>
<td>Undergraduate Research (Freshman and Sophomore)</td>
<td>1-12</td>
</tr>
<tr>
<td>CS 4699</td>
<td>Undergraduate Research (Junior and Senior)</td>
<td>1-12</td>
</tr>
<tr>
<td>CS 4980</td>
<td>Research Capstone Proj</td>
<td>1-21</td>
</tr>
</tbody>
</table>

Research for Pay (Audit only)

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 2698</td>
<td>Research Assistantship (Freshman and Sophomore)</td>
<td>1-12</td>
</tr>
<tr>
<td>CS 4698</td>
<td>Research Assistantship (Junior and Senior)</td>
<td>1-12</td>
</tr>
</tbody>
</table>

To get credit toward completion of the Research Option for research for pay, students must be registered for the appropriate audit-only, research for pay class (CS 2698 or 4698). If work on research for pay begins after the close of registration and the student has not signed up for the appropriate class, unfortunately it is not possible to get credit toward the Research Option for work that term.

A research project will also fulfill the capstone design requirement if the student registers for CS 4980 for one of the research terms. This is typically done the last semester of research, while taking LMC 4702.
Completion of the Research Option is noted on the student’s transcript. For more information, see www.urop.gatech.edu (http://www.urop.gatech.edu).

General Research Option Information (p. 90)

**BS/MS in Computer Science**

Students who want to pursue

the BS/MS option must apply to the MSCS program after completing at least 60 hours of work towards the BSCS degree. Applicants should have a cumulative GPA of at least 3.4. This GPA must be maintained for the student to take graduate level courses.

Students admitted to the program will take 6 hours during their final undergraduate year to double count in both their BSCS and MSCS degrees; they should choose 3 hours of MS Core or Elective hours their fall semester and 3 hours of MS Core or Elective hours their spring semester that can count toward their thread hours and CS Specialization hours.

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**Bachelor of Science in Computer Science - Thread: Media & Systems and Architecture**

The Threads™ represent partial paths through the curriculum. Thus, a student weaves a degree from these Threads. Students are not forced to make Thread decisions very early in their academic careers; however, they may if they want. We define the Threads so they are flexible enough to allow for a variety of technical and creative experiences. Threads are coherent enough that students develop computing skills even if their focus shifts as they go along.

The Media thread is where computing meets design. This thread prepares students by helping them to understand the technical and computational capabilities of systems in order to exploit their abilities to provide creative outlets.

The Systems and Architecture thread is where many of the practical skills of computing are learned. Like Theory, Systems and Architecture lies at the center of computing. It prepares students to create and evaluate computer architectures, systems, and languages across a variety of paradigms and approaches.

### Code and Title

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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<tr>
<td>or APPH 10</td>
<td>Sci of Phys Act &amp; Health</td>
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<td>Core A - Essential Skills</td>
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<tr>
<td>ENGL 1102</td>
<td>English Composition II</td>
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<td>MATH 1552</td>
<td>Integral Calculus</td>
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<td>Core B - Institutional Options</td>
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### Core D - Science, Math, & Technology

<table>
<thead>
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<tbody>
<tr>
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<td>MATH 1554 Linear Algebra</td>
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<td>or MATH 1556 Alg w Abstract Vec Sp</td>
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### Core E - Social Sciences

Select one of the following:

<table>
<thead>
<tr>
<th>Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>HIST 2111 United States to 1877</td>
<td>3</td>
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<tr>
<td>HIST 2112 United States since 1877</td>
<td></td>
</tr>
<tr>
<td>INTA 1200 American Government</td>
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<td>POL 1101 Government of the U.S.</td>
<td></td>
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<tr>
<td>PUBP 3000 US Constitutional Issues</td>
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<tr>
<td>Any SS (p. 97)</td>
<td>9</td>
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### Core F - Courses Related to Major

<table>
<thead>
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<th>Title</th>
<th>Credit Hours</th>
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</thead>
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<tr>
<td>Lab Science</td>
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<tr>
<td>CS 1100 Freshman Leap Seminar</td>
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</tr>
<tr>
<td>CS 1331 Intro-Object Orient Prog</td>
<td>3</td>
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<td>CS 1332 Data Struct &amp; Algorithms</td>
<td>3</td>
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<tr>
<td>CS 2050 Intro Discrete Math CS</td>
<td>3</td>
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<tr>
<td>or CS 2051 Honors Discrete Math CS</td>
<td></td>
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<tr>
<td>MATH 2550 Intro Multivariable Calc</td>
<td>2</td>
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### Major Requirements

<table>
<thead>
<tr>
<th>Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>CS 2340 Objects and Design</td>
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<tr>
<td>CS 4001 Computing &amp; Society</td>
<td>3</td>
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<td>or CS 4002 Robots and Society</td>
<td></td>
</tr>
<tr>
<td>or CS 4726 Privacy Tech Policy Law</td>
<td></td>
</tr>
<tr>
<td>or SLS 3110Tech and Sustain Community</td>
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</table>

### Junior Design Options (Capston)

<table>
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<th>Title</th>
<th>Credit Hours</th>
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<tr>
<td>Junior Design Option</td>
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</table>

### Concentration

<table>
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<th>Title</th>
<th>Credit Hours</th>
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<tr>
<td>CS 2110 Computer Organiz&amp;Program</td>
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<tr>
<td>CS 2200 Systems and Networks</td>
<td>4</td>
</tr>
<tr>
<td>CS 3210 Design-Operating Systems</td>
<td>3</td>
</tr>
<tr>
<td>CS 3220 Processor Design</td>
<td>3</td>
</tr>
<tr>
<td>ECE 2031 Digital Design Lab</td>
<td>2</td>
</tr>
<tr>
<td>CS 3451 Computer Graphics</td>
<td>3</td>
</tr>
<tr>
<td>CS 3510 Dsgn&amp;Analysis-Algorithms</td>
<td>3</td>
</tr>
<tr>
<td>or CS 3511 Algorithms Honors</td>
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</table>

Select six credit hours of the following for Media Technologies:

<table>
<thead>
<tr>
<th>Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>CS 4455 Video Game Design</td>
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<tr>
<td>CS 4460 Intro Info Visualization</td>
<td></td>
</tr>
<tr>
<td>CS 4464 Computational Journalism</td>
<td></td>
</tr>
<tr>
<td>CS 4475 Comp Photography</td>
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<tr>
<td>CS 4480 Digital Video Special FX</td>
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</tr>
<tr>
<td>CS 4496 Computer Animation</td>
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<tr>
<td>CS 4590 Computer Audio</td>
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</table>

Select one of the following for Advanced Systems Architectures:

<table>
<thead>
<tr>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 4210 Adv Operating Systems</td>
<td>3</td>
</tr>
<tr>
<td>CS 4220 Embedded Systems</td>
<td></td>
</tr>
</tbody>
</table>
CS 4290  Advanced Computer Org
Select one of the following for Systems Software Tools: 1
   CS 3300  Intro to Software Engr
   CS 4240  Compilers & Interpreters
Other Required Courses
MATH 3012  Applied Combinatorics 3
Select one of the following:
   MATH 3215 Probability & Statistics
   MATH 3670 Statistics and Applns
CEE 3770  Statistics & Applications
ISYE 3770  Statistics & Applications
   or ISYE 2670 Probability With Apps
   & ISYE 2671 Basic Statistical Meth
Free Electives
   Free Electives  11
Total Credit Hours  126

Pass-fail only allowed for Free Electives (max six credit hours), CS 1100, and CS 1171 (if required)

1 Minimum grade of C required.
2 Two of three lab sciences MUST be a sequence.
3 Junior Design Options are as follows (students must pick one option and may not change):
   • Option 1 - LMC 3432, LMC 3431, CS 3311, CS 3312.
   • Option 2 - ECE VIP courses and LMC 3403.
   • Option 3 - Satisfy Georgia Tech Research Option.
   • Option 4 - CS 2701 (3 hours), CS 4699-I2P (3 hours), LMC 3403 (3 hours) = 9 hours
          OR CS 4699-I2P (6 hours), LMC 3403 (3 hours) = 9 hours

Six credits of the Junior Design option are used as Major Requirements and the average credits of research/VIP (5 credit
hours/2 credit hours) may be used as free electives. Students
completing VIP for their junior design requirement will be required to
complete at least three semesters of VIP. (VIP 1 + VIP 2 + VIP 3) (for
a total of 5 credit hours) + LMC 3403 = 8 hours of VIP credit.
Students using CREATE-X for junior design take at least 6 hours
of CREATE-X Start-up Lab and Idea 2 Prototype (I2P) and 3 of the 6
hours must be I2P. Students take these 6 hours with LMC 3403 (3
hours) for a total of 9 hours. Extra three hours for CREATE-X option
can be used in free electives.

4 Two credit hours of MATH 1554 may count along with MATH 2550 to
give Area F 18 credit hours.

Cooperative Programs
The College of Computing participates in the undergraduate and graduate
Cooperative Programs. See links below for further Information:
   • Undergraduate Cooperative Plan (http://catalog.gatech.edu/
     academics/special-academic-programs/experiential-education/
     center-career-discovery-development)
   • Graduate Cooperative Plan (http://catalog.gatech.edu/academics/
     special-academic-programs/experiential-education/graduate-
     cooperative-plan)

International Plan
The College of Computing (http://www.cc.gatech.edu) has an approved
BS CS International Plan that accommodates the unique requirements
of this option discussed in the International Plan section of the catalog
(p. 86).

However, due to the flexible nature of the Threads curriculum, the
International Plan designation may not be available with all of the Thread
combinations. Efforts will be made to work with interested students
to accommodate their individual circumstances with regard to the
International Plan designator for the Bachelor of Science in Computer
Science.

Research Option
To complete the Research Option in the College of Computing, students must:

1. Complete at least nine units of undergraduate research
   a. Over at least two, preferably three terms
   b. Research may be for either pay or credit;

2. Write an undergraduate thesis/report of research on their findings;

3. Take
   a. LMC 4701: Undergraduate Research Proposal Writing (taken
during the first or second semester of research)
   b. LMC 4702: Undergraduate Research Thesis Writing (taken during
the thesis writing semester).

Research Classes
The following classes count toward fulfillment of the Research Option:

Research for Credit

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>CS 2699</td>
<td>Undergraduate Research (Freshman and Sophomore)</td>
<td>1-12</td>
</tr>
<tr>
<td>CS 4699</td>
<td>Undergraduate Research (Junior and Senior)</td>
<td>1-12</td>
</tr>
<tr>
<td>CS 4980</td>
<td>Research Capstone Proj</td>
<td>1-21</td>
</tr>
</tbody>
</table>

Research for Pay (Audit only)

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>CS 2698</td>
<td>Research Assistantship (Freshman and Sophomore)</td>
<td>1-12</td>
</tr>
<tr>
<td>CS 4698</td>
<td>Research Assistantship (Junior and Senior)</td>
<td>1-12</td>
</tr>
</tbody>
</table>

To get credit toward completion of the Research Option for research for
pay, students must be registered for the appropriate audit-only, research
for pay class (CS 2698 or 4698). If work on research for pay begins
after the close of registration and the student has not signed up for the
appropriate class, unfortunately it is not possible to get credit toward the
Research Option for work that term.

A research project will also fulfill the capstone design requirement if
the student registers for CS 4980 for one of the research terms. This is
typically done the last semester of research, while taking LMC 4702.

Completion of the Research Option is noted on the student’s
transcript. For more information, see www.urop.gatech.edu (http://
www.urop.gatech.edu).
BS/MS in Computer Science

Students who want to pursue

the BS/MS option must apply to the MSCS program after completing at least 60 hours of work towards the BSCS degree. Applicants should have a cumulative GPA of at least 3.4. This GPA must be maintained for the student to take graduate level courses.

Students admitted to the program will take 6 hours during their final undergraduate year to double count in both their BSCS and MSCS degrees; they should choose 3 hours of MS Core or Elective hours their fall semester and 3 hours of MS Core or Elective hours their spring semester that can count toward their thread hours and CS Specialization hours.

Visit College of Computing (https://www.cc.gatech.edu) for more information.

Bachelor of Science in Computer Science - Thread: Modeling - Simulation & Devices

The Threads™ represent partial paths through the curriculum. Thus, a student weaves a degree from these Threads. Students are not forced to make Thread decisions very early in their academic careers; however, they may if they want. We define the Threads so they are flexible enough that students develop computing skills even if their focus shifts as they go along.

The Devices thread is concerned with embedded computational artifacts that interact with people or the physical world. In this thread, one learns how to create and evaluate devices that operate under physical constraints such as size, power, and bandwidth. Examples include PDAs, cell phones, robots, jet engines, and intelligent appliances.

The Modeling - Simulation thread is intended for students interested in developing a deep understanding and appreciation of how natural and human-generated systems such as weather, biological processes, supply chains, or computers can be represented by mathematical models and computer software. Such models are widely used today to better understand and predict the behavior of such systems. Because these models are often described and represented by mathematical expressions, and the models themselves often deal with physical phenomena, a background in mathematics and the sciences is required. Combining this background with a deep knowledge in computer science will yield the basic tools necessary to transform abstract conceptual models to computer programs that execute efficiently on digital machines. The required coursework in this thread includes topics in continuous and discrete mathematics, the sciences, and computing. Elective courses enable students to further develop and apply their knowledge and skills to a specific discipline where Modeling - Simulation plays an important role.

### Core A - Essential Skills

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>ENGL 1101</td>
<td>English Composition I</td>
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<td>ENGL 1102</td>
<td>English Composition II</td>
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<td>MATH 1552</td>
<td>Integral Calculus</td>
<td>4</td>
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</table>

### Core B - Institutional Options

<table>
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<tr>
<th>Code</th>
<th>Title</th>
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<tr>
<td>CS 1301</td>
<td>Intro to Computing</td>
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### Core C - Humanities

Any HUM (p. 93) 6

### Core D - Science, Math, & Technology

<table>
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<tr>
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<tr>
<td>Lab Science</td>
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<tr>
<td>MATH 1551</td>
<td>Differential Calculus</td>
<td>2</td>
</tr>
<tr>
<td>MATH 1554</td>
<td>Linear Algebra</td>
<td>4</td>
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<tr>
<td>or MATH 1564</td>
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### Core E - Social Sciences

Select one of the following: 3

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<tr>
<td>HIST 2112</td>
<td>United States since 1877</td>
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<td>INTA 1200</td>
<td>American Government</td>
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<td>POL 1101</td>
<td>Government of the U.S.</td>
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<td>PUBP 3000</td>
<td>US Constitutional Issues</td>
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Any SS (p. 97) 9

### Core F - Courses Related to Major

<table>
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<tr>
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<tr>
<td>Lab Science</td>
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<td>CS 1100</td>
<td>Freshman Leap Seminar</td>
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</tr>
<tr>
<td>CS 1331</td>
<td>Intro-Object Orient Prog</td>
<td>3</td>
</tr>
<tr>
<td>CS 1332</td>
<td>Data Struct &amp; Algorithms</td>
<td>3</td>
</tr>
<tr>
<td>CS 2050</td>
<td>Intro Discrete Math CS</td>
<td>3</td>
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<tr>
<td>or CS 2051</td>
<td>Honors Discrete Math CS</td>
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</tr>
<tr>
<td>MATH 2550</td>
<td>Intro Multivariable Calc</td>
<td>2</td>
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### Major Requirements

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>CS 2340</td>
<td>Objects and Design</td>
<td>3</td>
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<tr>
<td>CS 4001</td>
<td>Computing &amp; Society</td>
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<tr>
<td>or CS 4002</td>
<td>Robots and Society</td>
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<tr>
<td>or CS 4726</td>
<td>Privacy Tech Policy Law</td>
<td></td>
</tr>
<tr>
<td>or SLS 3110</td>
<td>Tech and Sustain Community</td>
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### Junior Design Options (Capstone)

Junior Design Option 13

### Concentration

<table>
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<tr>
<th>Code</th>
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<tbody>
<tr>
<td>CS 1171</td>
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</tr>
<tr>
<td>CS 2110</td>
<td>Computer Organiz&amp;Program</td>
<td>4</td>
</tr>
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<td>CS 2200</td>
<td>Systems and Networks</td>
<td>4</td>
</tr>
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<td>CS 3251</td>
<td>Computer Networking</td>
<td>3</td>
</tr>
<tr>
<td>CS 3510</td>
<td>Dsgn&amp;Analysis-Algorithms</td>
<td>3</td>
</tr>
<tr>
<td>or CS 3511</td>
<td>Algorithms Honors</td>
<td></td>
</tr>
<tr>
<td>ECE 2031</td>
<td>Digital Design Lab</td>
<td>2</td>
</tr>
<tr>
<td>MATH 2552</td>
<td>Differential Equations</td>
<td>4</td>
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</table>

Select one of the following for Building Devices: 4

<table>
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<tr>
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<th>Title</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>CS 3651</td>
<td>Prototyping Intell Appl</td>
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</tr>
<tr>
<td>ECE 4180</td>
<td>Embedded Systems Design</td>
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</table>

Select one of the following for Devices in the Real World: 3

<table>
<thead>
<tr>
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<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 3630</td>
<td>Intro-Perception&amp;Robotic</td>
<td></td>
</tr>
</tbody>
</table>
Cooperative Programs

The College of Computing participates in the undergraduate and graduate Cooperative Programs. See links below for further information:

- Undergraduate Cooperative Plan (http://catalog.gatech.edu/academics/special-academic-programs/experiential-education/center-career-discovery-development)
- Graduate Cooperative Plan (http://catalog.gatech.edu/academics/special-academic-programs/experiential-education/graduate-cooperative-plan)

International Plan

The College of Computing (http://www.cc.gatech.edu) has an approved BS CS International Plan that accommodates the unique requirements of this option discussed in the International Plan section of the catalog (p. 86).

However, due to the flexible nature of the Threads curriculum, the International Plan designation may not be available with all of the Thread combinations. Efforts will be made to work with interested students to accommodate their individual circumstances with regard to the International Plan designator for the Bachelor of Science in Computer Science.

Research Option

To complete the Research Option in the College of Computing, students must:

1. Complete at least nine units of undergraduate research
   a. Over at least two, preferably three terms
   b. Research may be for either pay or credit;
2. Write an undergraduate thesis/report of research on their findings;
3. Take
   a. LMC 4701: Undergraduate Research Proposal Writing (taken during the first or second semester of research)
   b. LMC 4702: Undergraduate Research Thesis Writing (taken during the thesis writing semester).

Research Classes

The following classes count toward fulfillment of the Research Option:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 2699</td>
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<td>Undergraduate Research (Junior and Senior)</td>
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</tr>
<tr>
<td>CS 4980</td>
<td>Research Capstone Proj</td>
<td>1-21</td>
</tr>
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</table>

Research for Pay (Audit only)

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 2698</td>
<td>Research Assistantship (Freshman and Sophomore)</td>
<td>1-12</td>
</tr>
<tr>
<td>CS 4698</td>
<td>Research Assistantship (Junior and Senior)</td>
<td>1-12</td>
</tr>
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</table>

To get credit toward completion of the Research Option for research for pay, students must be registered for the appropriate audit-only, research for pay class (CS 2698 or 4698). If work on research for pay begins after the close of registration and the student has not signed up for the
appropriate class, unfortunately it is not possible to get credit toward the Research Option for work that term.

A research project will also fulfill the capstone design requirement if the student registers for CS 4980 for one of the research terms. This is typically done the last semester of research, while taking LMC 4702.

Completion of the Research Option is noted on the student's transcript. For more information, see www.urop.gatech.edu (http://www.urop.gatech.edu).

General Research Option Information (p. 90)

**BS/MS in Computer Science**

Students who want to pursue

the BS/MS option must apply to the MSCS program after completing at least 60 hours of work towards the BSCS degree. Applicants should have a cumulative GPA of at least 3.4. This GPA must be maintained for the student to take graduate level courses.

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Visit College of Computing (https://www.cc.gatech.edu) for more information.

**Bachelor of Science in Computer Science - Thread: Modeling - Simulation & Intelligence**

The Threads represent partial paths through the curriculum. Thus, a student weaves a degree from these Threads. Students are not forced to make Thread decisions very early in their academic careers; however, they may if they want. We define the Threads so they are flexible enough for a variety of technical and creative experiences. Threads are coherent enough that students develop computing skills even if their focus shifts as they go along.

The Modeling - Simulation thread is intended for students interested in developing a deep understanding and appreciation of how natural and human-generated systems such as weather, biological processes, supply chains, or computers can be represented by mathematical models and computer software. Such models are widely used today to better understand and predict the behavior of such systems. Because these models are often described and represented by mathematical expressions, and the models themselves often deal with physical phenomena, a background in mathematics and the sciences is required. Combining this background with a deep knowledge in computer science will yield the basic tools necessary to transform abstract conceptual models to computer programs that execute efficiently on digital machines. The required coursework in this thread includes topics in continuous and discrete mathematics, the sciences, and computing. Elective courses enable students to further develop and apply their knowledge and skills to a specific discipline where Modeling - Simulation plays an important role.

The Intelligence thread is where computing models intelligence. This thread is concerned with computational models of intelligence from top to bottom. To this end, we emphasize designing and implementing artifacts that exhibit various levels of intelligence as well as understanding and modeling natural cognitive agents such as humans, ants, or bees. Students acquire the technical knowledge and skills necessary for expressing, specifying, understanding, creating, and exploiting computational models that represent cognitive processes. It prepares students for fields as diverse as artificial intelligence, machine learning, perception, and cognitive science, as well as for fields that benefit from applications of techniques from those fields.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
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</tr>
</thead>
<tbody>
<tr>
<td>APPH 1040</td>
<td>Sci Foundation of Health</td>
<td>2</td>
</tr>
<tr>
<td>or APPH 10 Sci of Phys Act &amp; Health</td>
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<tr>
<td><strong>Core A - Essential Skills</strong></td>
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<tr>
<td>ENGL 1101</td>
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<td>Integral Calculus</td>
<td>4</td>
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<td><strong>Core B - Institutional Options</strong></td>
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<tr>
<td>CS 1301</td>
<td>Intro to Computing</td>
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<tr>
<td><strong>Core C - Humanities</strong></td>
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<tr>
<td>Any HUM (p. 93)</td>
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<td></td>
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<td><strong>Core D - Science, Math, &amp; Technology</strong></td>
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<td>PHYS 2211</td>
<td>Intro Physics I</td>
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<td>Linear Algebra</td>
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<td>or MATH 1554 LinAlg w Abstract Vec Sp</td>
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<td><strong>Core E - Social Sciences</strong></td>
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<td>United States to 1877</td>
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<td>HIST 2112</td>
<td>United States since 1877</td>
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<td>INTA 1200</td>
<td>American Government</td>
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<td>POL 1101</td>
<td>Government of the U.S.</td>
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<td>PUBP 3000 US Constitutional Issues</td>
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<td>PSYC 1101</td>
<td>General Psychology</td>
<td>3</td>
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<td>Any SS (p. 97)</td>
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<td><strong>Core F - Courses Related to Major</strong></td>
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<tr>
<td>Lab Science</td>
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<tr>
<td>CS 1100</td>
<td>Freshman Leap Seminar</td>
<td>1</td>
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<tr>
<td>CS 1331</td>
<td>Intro-Object Orient Prog</td>
<td>3</td>
</tr>
<tr>
<td>CS 1332</td>
<td>Data Struct &amp; Algorithms</td>
<td>3</td>
</tr>
<tr>
<td>CS 2050</td>
<td>Intro Discrete Math CS</td>
<td>3</td>
</tr>
<tr>
<td>or CS 2051</td>
<td>Honors Discrete Math CS</td>
<td></td>
</tr>
<tr>
<td>MATH 2550</td>
<td>Intro Multivariable Calc</td>
<td>2</td>
</tr>
</tbody>
</table>

**Major Requirements**

| CS 2340 | Objects and Design                           | 3            |
| or CS 4002 | Robots and Society                         |              |
| or CS 4726 | Privacy Tech Policy Law                    |              |
| or SLS 311C (Tech and Sustain Community)     |              |
Junior Design Options (Capstone)

Junior Design Option 1, 3, 4 6

Concentration

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<thead>
<tr>
<th>Course</th>
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<tbody>
<tr>
<td>CS 1171</td>
<td>Computing in MATLAB</td>
<td>1</td>
</tr>
<tr>
<td>CS 2110</td>
<td>Computer Organization and Programming 1</td>
<td>4</td>
</tr>
<tr>
<td>CS 2200</td>
<td>Systems and Networks 1</td>
<td>4</td>
</tr>
<tr>
<td>CS 3510</td>
<td>Design and Analysis Algorithms 1</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>or CS 3511 Algorithms Honors</td>
<td></td>
</tr>
<tr>
<td>CS 3600</td>
<td>Intro-Artificial Intelligence 1</td>
<td>3</td>
</tr>
<tr>
<td>MATH 2552</td>
<td>Differential Equations 1</td>
<td>4</td>
</tr>
</tbody>
</table>

Select one of the following for Computational Complexity: 1, 3

- CS 3240 Languages and Computation
- CS 4610 Automata and Complexity
- CS 4630 Intro-Perception & Robotic
- CS 3790 Intro-Cognitive Science
- PSYC 3040 Sensation & Perception

Select six credit hours of the following for Approaches to Intelligence: 1, 3

- CS 4635 Knowledge-Based AI
- CS 4476 Intro to Computer Vision
- CS 4641 Machine Learning
- CS 4646 Mach Learn for Trading
- CS 4649 Robot Intelii Planning
- CS 4650 Natural Language
- CS 4731 Game AI

Select six credit hours of the following for Computational Science and Engineering: 1, 3

- CS 4641 Machine Learning
- CX 4140 Comp Model Algorithms
- CX 4220 Intro High Perf Comp
- CX 4230 Computer Simulation
- CX 4640 Numerical Analysis I

Other Required Courses

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<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 3012</td>
<td>Applied Combinatorics</td>
<td>3</td>
</tr>
</tbody>
</table>

Select one of the following:

- MATH 3215 Probability & Statistics
- MATH 3670 Statistics and Applications
- CEE 3770 Statistics & Applications
- ISYE 3770 Statistics & Applications
- or ISYE 2601 Probability With Apps
- or ISYE 2601 Basic Statistical Meth

Free Electives

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Free Electives 3</td>
<td>8</td>
</tr>
</tbody>
</table>

Total Credit Hours 126

Pass-fail only allowed for Free Electives (max 6 credit hours), CS 1100, and CS 1171 (if required).

1 Minimum grade of C required.
2 Two of three lab sciences MUST be a sequence.
3 If CS 4641 is successfully completed, it counts toward both requirements, and an addition 3 credit hours Free Elective is required.

Junior Design Options are as follows (students must pick one option and may not change):

- Option 1 - LMC 3432, LMC 3431, CS 3311, CS 3312.
- Option 2 - ECE VIP courses and LMC 3403.
- Option 3 - Satisfy Georgia Tech Research Option.
- Option 4 - CS 2701 (3 hours), CS 4699-I2P (3 hours), LMC 3403 (3 hours) = 9 hours OR CS 4699-I2P (6 hours), LMC 3403 (3 hours) = 9 hours

Six credits of the Junior Design option are used as Major Requirements and the overage credits of research/VIP (5 credit hours/2 credit hours) may be used as free electives. Students completing VIP for their junior design requirement will be required to complete at least three semesters of VIP. (VIP 1 + VIP 2 + VIP 3) (for a total of 5 credit hours) + LMC 3403 = 8 hours of VIP credit. Students using CREATE-X for junior design take at least 6 hours of CREATE-X Start-Ip Lab and Idea 2 Prototype (I2P) and 3 of the 6 hours must be I2P. Students take these 6 hours with LMC 3403 (3 hours) for a total of 9 hours. Extra three hours for CREATE-X option can be used in free electives.

Two credit hours of MATH 1554 may count along with MATH 2550 to give Area F 18 credit hours.

Cooperative Programs

The College of Computing participates in the undergraduate and graduate Cooperative Programs. See links below for further information:

- Undergraduate Cooperative Plan (http://catalog.gatech.edu/academics/special-academic-programs/experiential-education/center-career-discovery-development)
- Graduate Cooperative Plan (http://catalog.gatech.edu/academics/special-academic-programs/experiential-education/graduate-cooperative-plan)

International Plan

The College of Computing (http://www.cc.gatech.edu) has an approved BS CS International Plan that accommodates the unique requirements of this option discussed in the International Plan section of the catalog (p. 86).

However, due to the flexible nature of the Threads curriculum, the International Plan designation may not be available with all of the Thread combinations. Efforts will be made to work with interested students to accommodate their individual circumstances with regard to the International Plan designator for the Bachelor of Science in Computer Science.

Research Option

To complete the Research Option in the College of Computing, students must:

1. Complete at least nine units of undergraduate research
   a. Over at least two, preferably three terms
   b. Research may be for either pay or credit;
2. Write an undergraduate thesis/report of research on their findings;
3. Take
   a. LMC 4701: Undergraduate Research Proposal Writing (taken during the first or second semester of research)
b. LMC 4702: Undergraduate Research Thesis Writing (taken during the thesis writing semester).

Research Classes
The following classes count toward fulfillment of the Research Option:

Research for Credit

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<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 2699</td>
<td>Undergraduate Research (Freshman and Sophomore)</td>
<td>1-12</td>
</tr>
<tr>
<td>CS 4699</td>
<td>Undergraduate Research (Junior and Senior)</td>
<td>1-12</td>
</tr>
<tr>
<td>CS 4980</td>
<td>Research Capstone Proj</td>
<td>1-21</td>
</tr>
</tbody>
</table>

Research for Pay (Audit only)

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>CS 2698</td>
<td>Research Assistantship (Freshman and Sophomore)</td>
<td>1-12</td>
</tr>
<tr>
<td>CS 4698</td>
<td>Research Assistantship (Junior and Senior)</td>
<td>1-12</td>
</tr>
</tbody>
</table>

To get credit toward completion of the Research Option for research for pay, students must be registered for the appropriate audit-only, research for pay class (CS 2698 or 4698). If work on research for pay begins after the close of registration and the student has not signed up for the appropriate class, unfortunately it is not possible to get credit toward the Research Option for work that term.

A research project will also fulfill the capstone design requirement if the student registers for CS 4980 for one of the research terms. This is typically done the last semester of research, while taking LMC 4702.

Completion of the Research Option is noted on the student’s transcript. For more information, see www.urop.gatech.edu (http://www.urop.gatech.edu).

General Research Option Information (p. 90)

BS/MS in Computer Science
Students who want to pursue

the BS/MS option must apply to the MSCS program after completing at least 60 hours of work towards the BSCS degree. Applicants should have a cumulative GPA of at least 3.4. This GPA must be maintained for the student to take graduate level courses.

Students admitted to the program will take 6 hours during their final undergraduate year to double count in both their BSCS and MSCS degrees; they should choose 3 hours of MS Core or Elective hours their fall semester and 3 hours of MS Core or Elective hours their spring semester that can count toward their thread hours and CS Specialization hours.

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Bachelor of Science in Computer Science - Thread: Modeling - Simulation & People

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The People thread is where computing meets users. This thread prepares students by helping them to understand the theoretical and computational foundations for designing, building, and evaluating systems that treat the human as a central component.

<table>
<thead>
<tr>
<th>Code</th>
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<th>Credit Hours</th>
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</thead>
</table>

Wellness

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<th>Credit Hours</th>
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<td>APPH 1040</td>
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<tr>
<td>or APPH 10</td>
<td>Sci of Phys Act &amp; Health</td>
<td>2</td>
</tr>
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</table>

Core A - Essential Skills

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<tr>
<th>Code</th>
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<tbody>
<tr>
<td>ENGL 1101</td>
<td>English Composition I</td>
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</tr>
<tr>
<td>ENGL 1102</td>
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Core B - Institutional Options

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<tr>
<th>Code</th>
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<tbody>
<tr>
<td>MATH 1552</td>
<td>Integral Calculus</td>
<td>4</td>
</tr>
<tr>
<td>CS 1301</td>
<td>Intro to Computing</td>
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</tr>
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</table>

Core C - Humanities

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
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</tr>
</thead>
<tbody>
<tr>
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Core D - Science, Math, & Technology

<table>
<thead>
<tr>
<th>Code</th>
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<th>Credit Hours</th>
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<tbody>
<tr>
<td>PHYS 2211</td>
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<td>Lab Science</td>
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<td>Linear Algebra</td>
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<tr>
<td>or MATH 1556</td>
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Core E - Social Sciences

Choose one of the following:

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<tbody>
<tr>
<td>HIST 2111</td>
<td>United States to 1877</td>
<td>3</td>
</tr>
</tbody>
</table>
Other Required Courses

Computing:
- Select one of the following for Social/Behavioral Science for 3 credits:
  - PSYC 2015
  - PSYC 3040
  - any SS (p. 97)

Core F - Courses Related to Major

Lab Science 
- CS 1100 Freshman Leap Seminar
- CS 1331 Intro-Object Orient Prog
- CS 1332 Data Struct & Algorithms
- CS 2050 Intro Discrete Math
- or CS 2051 Honors Discrete Math
- MATH 2550 Intro Multivariable Calc

Major Requirements

MATH 2550

Junior Design Option (Capstone)

Junior Design Option

Concentration

CS 1171 Computing in MATLAB
- CS 2110 Computer Organiz&Program
- CS 2200 Systems and Networks
- CS 3510 Dsgn&Analysis-Algorithms
- or CS 3511 Algorithms Honors

MATH 2552 Differential Equations
- PSYC 2015 Research Methods
- CS 3750 User Interface Design

Select two of the following for Computational Science and Engineering:
- CS 4611 Machine Learning
- CX 4140 Comp Model Algorithms
- CX 4220 Intro High Perf Comp
- CX 4230 Computer Simulation
- CX 4640 Numerical Analysis I

Select two of the following for Human-Centered Technology:
- CS 3790 Intro-Cognitive Science
- CS 4660 Educational Technology
- CS 4460 Intro Info Visualization
- CS 4470 User Interface Software
- CS 4472 Design of Online Comm
- CS 4605 Mobile&Ubiquitous Comp
- CS 4745 Info&Com Tech&Global Dev

Select one of the following for Social/Behavioral Science for Computing:
- PSYC 2210 Social Psychology
- PSYC 2760 Human Language Process
- PSYC 3040 Sensation & Perception

Other Required Courses

MATH 3012 Applied Combinatorics
- Choose one of the following:
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  - MATH 3670 Statistics and Applns

CEE 3770 Statistics & Applications
- ISYE 3770 Statistics & Applications
- or ISYE 2 Probability With Apps
- or ISYE 21and Basic Statistical Meth

Free Electives

Free Electives

Total Credit Hours

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<td>CS 4980</td>
<td>Research Capstone Proj</td>
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Research for Pay (Audit only)

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Bachelor of Science in Computer Science - Thread: Modeling - Simulation & Systems and Architecture

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The Systems and Architecture thread is where many of the practical skills of computing are learned. Like Theory, Systems and Architecture lies at the center of computing. It prepares students to create and evaluate computer architectures, systems, and languages across a variety of paradigms and approaches.

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<thead>
<tr>
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</tr>
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<tbody>
<tr>
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<td>Integral Calculus</td>
<td>4</td>
</tr>
<tr>
<td>or APPH 10</td>
<td>Sci of Phys Act &amp; Health</td>
<td>2</td>
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</table>

Wellness

APPH 1040 | Sci Foundation of Health       | 2            |

Core A - Essential Skills
### Core B - Institutional Options

<table>
<thead>
<tr>
<th>Course</th>
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<th>Hours</th>
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</thead>
<tbody>
<tr>
<td>CS 1301</td>
<td>Intro to Computing</td>
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### Core C - Humanities

<table>
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<tr>
<th>Course</th>
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<tr>
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### Core D - Science, Math, & Technology

<table>
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<th>Hours</th>
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<tbody>
<tr>
<td>PHYS 2211</td>
<td>Intro Physics I</td>
<td>4</td>
</tr>
<tr>
<td>Lab Science</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>MATH 1551</td>
<td>Differential Calculus</td>
<td>2</td>
</tr>
<tr>
<td>MATH 1554</td>
<td>Linear Algebra</td>
<td>4</td>
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</table>

or MATH 156 Alg w Abstract Vec Sp

### Core E - Social Sciences

<table>
<thead>
<tr>
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</thead>
<tbody>
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<td>HIST 2111</td>
<td>United States to 1877</td>
<td>3</td>
</tr>
<tr>
<td>HIST 2112</td>
<td>United States since 1877</td>
<td>3</td>
</tr>
<tr>
<td>INTA 1200</td>
<td>American Government</td>
<td>3</td>
</tr>
<tr>
<td>POL 1101</td>
<td>Government of the U.S.</td>
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</tr>
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<td>PUBP 3000</td>
<td>US Constitutional Issues</td>
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Any SS (p. 97)

### Core F - Courses Related to Major

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
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<tbody>
<tr>
<td>Lab Science</td>
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<tr>
<td>CS 1100</td>
<td>Freshman Leap Seminar</td>
<td>1</td>
</tr>
<tr>
<td>CS 1331</td>
<td>Intro-Object Orient Prog</td>
<td>3</td>
</tr>
<tr>
<td>CS 1332</td>
<td>Data Struct &amp; Algorithms</td>
<td>3</td>
</tr>
<tr>
<td>CS 2050</td>
<td>Intro Discrete Math CS</td>
<td>3</td>
</tr>
</tbody>
</table>

or CS 2051 | Honors Discrete Math CS | 3 |

MATH 2550 | Intro Multivariable Calc | 2 |

### Major Requirements

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 2340</td>
<td>Objects and Design</td>
<td>3</td>
</tr>
<tr>
<td>CS 4001</td>
<td>Computing &amp; Society</td>
<td>3</td>
</tr>
</tbody>
</table>

or CS 4002 | Robots and Society | 3 |

or CS 4726 | Privacy Tech Policy Law | 3 |

or SLS 3110Tech and Sustain Community

### Junior Design Options (Capstone)

**Junior Design Option**

1. CS 1171 | Computing in MATLAB | 3 |
2. CS 2110 | Computer Organiz&Program | 4 |
3. CS 2200 | Systems and Networks | 4 |
4. CS 3210 | Design-Operating Systems | 3 |
5. CS 3220 | Processor Design | 3 |
6. CS 3510 | Dsgn&Analysis-Algorithms | 3 |

or CS 3511 | Algorithms Honors | 3 |

ECE 2031 | Digital Design Lab | 2 |

MATH 2552 | Differential Equations | 4 |

Select two of the following for Computational Science and Engineering:

1. CS 4641 | Machine Learning | 3 |
2. CX 4140 | Comp Model Algorithms | 3 |
3. CX 4220 | Intro High Perf Comp | 3 |
4. CX 4230 | Computer Simulation | 3 |
5. CX 4640 | Numerical Analysis | 3 |

Select one of the following for Software Systems Tools:

1. CS 3300 | Intro to Software Engr | 3 |
2. CS 4240 | Compilers & Interpreters | 3 |

Select one of the following for Advanced Systems Architectures:

1. CS 4110 | Adv Operating Systems | 3 |
2. CS 4220 | Embedded Systems | 3 |
3. CS 4290 | Advanced Computer Org | 3 |

### Other Required Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
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</thead>
<tbody>
<tr>
<td>MATH 3012</td>
<td>Applied Combinatorics</td>
<td>3</td>
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</tbody>
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### Free Electives

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
</table>

Free Electives | | 9 |

Total Credit Hours | 126 |

Pass-fail only allowed for Free Electives (max 6 credit hours), CS 1100, and CS 1171 (if required)

1. Minimum grade of C required.
2. Two of three lab sciences MUST be a sequence.
3. Junior Design Options are as follows (students must pick one option and may not change):
   - Option 1 - LMC 3432, LMC 3431, CS 3311, CS 3312.
   - Option 2 - ECE VIP courses and LMC 3403.
   - Option 3 - Satisfy Georgia Tech Research Option.
   - Option 4 - CS 2701 (3 hours), CS 4699-I2P (3 hours), LMC 3403 (3 hours) = 9 hours OR CS 4699-I2P (6 hours), LMC 3403 (3 hours) = 9 hours

Six credits of the Junior Design option are used as Major Requirements and the overage credits of research/VIP (5 credit hours/2 credit hours) may be used as free electives. Students completing VIP for their junior design requirement will be required to complete at least three semesters of VIP. (VIP 1 + VIP 2 + VIP 3) (for a total of 5 credit hours) + LMC 3403 + 8 hours of VIP credit.

Students using CREATE-X for junior design take at least 6 hours of CREATE-X Start-ip Lab and Idea 2 Prototype (I2P) and 3 of the 6 hours must be I2P. Students take these 6 hours with LMC 3403 (3 hours) for a total of 9 hours. Extra three hours for CREATE-X option can be used in free electives.

4. Two credit hours of MATH 1554 may count along with MATH 2550 to give Area F 18 credit hours.

### Cooperative Programs

The College of Computing participates in the undergraduate and graduate Cooperative Programs. See links below for further information:

- Undergraduate Cooperative Plan (http://catalog.gatech.edu/academics/special-academic-programs/experiential-education/center-career-discovery-development)
- Graduate Cooperative Plan (http://catalog.gatech.edu/academics/special-academic-programs/experiential-education/graduate-cooperative-plan)
International Plan
The College of Computing (http://www.cc.gatech.edu) has an approved BS CS International Plan that accommodates the unique requirements of this option discussed in the International Plan section of the catalog (p. 86).

However, due to the flexible nature of the Threads curriculum, the International Plan designation may not be available with all of the Thread combinations. Efforts will be made to work with interested students to accommodate their individual circumstances with regard to the International Plan designator for the Bachelor of Science in Computer Science.

Research Option
To complete the Research Option in the College of Computing, students must:

1. Complete at least nine units of undergraduate research
   a. Over at least two, preferably three terms
   b. Research may be for either pay or credit;
2. Write an undergraduate thesis/report of research on their findings;
3. Take
   a. LMC 4701: Undergraduate Research Proposal Writing (taken during the first or second semester of research)
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Research Classes
The following classes count toward fulfillment of the Research Option:

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<td>Undergraduate Research (Junior and Senior)</td>
<td>1-12</td>
</tr>
<tr>
<td>CS 4980</td>
<td>Research Capstone Proj</td>
<td>1-21</td>
</tr>
</tbody>
</table>

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<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 2698</td>
<td>Research Assistantship (Freshman and Sophomore)</td>
<td>1-12</td>
</tr>
<tr>
<td>CS 4698</td>
<td>Research Assistantship (Junior and Senior)</td>
<td>1-12</td>
</tr>
</tbody>
</table>

To get credit toward completion of the Research Option for research for pay, students must be registered for the appropriate audit-only, research for pay class (CS 2698 or 4698). If work on research for pay begins after the close of registration and the student has not signed up for the appropriate class, unfortunately it is not possible to get credit toward the Research Option for work that term.

A research project will also fulfill the capstone design requirement if the student registers for CS 4980 for one of the research terms. This is typically done the last semester of research, while taking LMC 4702.

Completion of the Research Option is noted on the student’s transcript. For more information, see www.urop.gatech.edu (http://www.urop.gatech.edu).

General Research Option Information (p. 90)

BS/MS in Computer Science
Students who want to pursue
the BS/MS option must apply to the MSCS program after completing at least 60 hours of work towards the BSCS degree. Applicants should have a cumulative GPA of at least 3.4. This GPA must be maintained for the student to take graduate level courses.

Students admitted to the program will take 6 hours during their final undergraduate year to double count in both their BSCS and MSCS degrees; they should choose 3 hours of MS Core and Elective hours their fall semester and 3 hours of MS Core and Elective hours their spring semester that can count toward their thread hours and CS Specialization hours.

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Bachelor of Science in Computer Science - Thread: Modeling - Simulation & Theory

The Threads™ represent partial paths through the curriculum. Thus, a student weaves a degree from these Threads. Students are not forced to make Thread decisions very early in their academic careers; however, they may if they want. We define the Threads so they are flexible enough to allow for a variety of technical and creative experiences. Threads are coherent enough that students develop computing skills even if their focus shifts as they go along.

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The Theory thread is where computing meets itself. Theory teaches students the theoretical and mathematical foundations underlying a wide range of computational disciplines. Early preparation includes discrete mathematics, algorithms, and complexity. Knowledge goals are for students to mature in development and analysis of abstract models for applications ranging from theoretical computer science to computational physics, biology, mathematics, economics, and optimization.
### Concentration

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>CS 1117</td>
<td>Computing in MATLAB</td>
<td>1</td>
</tr>
<tr>
<td>CS 2110</td>
<td>Computer Organization &amp; Program</td>
<td>4</td>
</tr>
<tr>
<td>CS 2200</td>
<td>Systems and Networks</td>
<td>4</td>
</tr>
<tr>
<td>CS 3510</td>
<td>Design &amp; Analysis - Algorithms</td>
<td>3</td>
</tr>
<tr>
<td>or CS 3511</td>
<td>Algorithms Honors</td>
<td></td>
</tr>
<tr>
<td>CS 4510</td>
<td>Automata and Complexity</td>
<td>3</td>
</tr>
<tr>
<td>CS 4540</td>
<td>Advanced Algorithms</td>
<td>3</td>
</tr>
<tr>
<td>MATH 2552</td>
<td>Differential Equations</td>
<td>4</td>
</tr>
<tr>
<td>MATH 3406</td>
<td>Second Course Linear Alg</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Select two of the following for Computational Science and Engineering:</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>MATH 4641</td>
<td>Machine Learning</td>
</tr>
<tr>
<td></td>
<td>CS 4140</td>
<td>Comp Model Algorithms</td>
</tr>
<tr>
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<td>CS 4220</td>
<td>Intro High Perf Comp</td>
</tr>
<tr>
<td></td>
<td>CS 4230</td>
<td>Computer Simulation</td>
</tr>
<tr>
<td></td>
<td>CS 4640</td>
<td>Numerical Analysis I</td>
</tr>
<tr>
<td></td>
<td>Select one of the following for Advanced Mathematics:</td>
<td>3</td>
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<tr>
<td></td>
<td>MATH 4022 Intro to Graph Theory</td>
<td></td>
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<tr>
<td></td>
<td>MATH 4032 Combinatorial Analysis</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MATH 4150 Intro To Number Theory</td>
<td></td>
</tr>
</tbody>
</table>

### Other Required Courses

- MATH 3012 | Applied Combinatorics                     | 3            
- Select one of the following:  
  - MATH 3215 Probability & Statistics  
  - MATH 3670 Statistics and Applications  
  - CEE 3770 Statistics & Applications  
  - ISYE 3770 Statistics & Applications  
  - or ISYE 2 Probability With Apps  
  - & ISYE 2 & Basic Statistical Meth

### Free Electives

- Free Electives                          11
- Total Credit Hours                       126

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**Research for Credit**

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**Research for Pay (Audit only)**

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The Media thread is where computing meets design. This thread prepares students by helping them to understand the technical and computational capabilities of systems in order to exploit their abilities to provide creative outlets.

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<td><strong>Wellness</strong></td>
<td></td>
</tr>
<tr>
<td>APPH 1040</td>
<td>Sci Foundation of Health</td>
<td>2</td>
</tr>
<tr>
<td>or APPH 10</td>
<td>Sci of Phys Act &amp; Health</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Core A - Essential Skills</strong></td>
<td></td>
</tr>
<tr>
<td>ENGL 1101</td>
<td>English Composition I</td>
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<tr>
<td>MATH 1552</td>
<td>Integral Calculus</td>
<td>4</td>
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<tr>
<td></td>
<td><strong>Core B - Institutional Options</strong></td>
<td></td>
</tr>
<tr>
<td>CS 1301</td>
<td>Intro to Computing</td>
<td>3</td>
</tr>
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<td></td>
<td><strong>Core C - Humanities</strong></td>
<td></td>
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<td>Any HUM (p. 93)</td>
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<td></td>
<td><strong>Core D - Science, Math, &amp; Technology</strong></td>
<td></td>
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<tr>
<td>PHYS 2211</td>
<td>Intro Physics I</td>
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<td>Differential Calculus</td>
<td>2</td>
</tr>
<tr>
<td>MATH 1554</td>
<td>Linear Algebra</td>
<td>4</td>
</tr>
<tr>
<td>or MATH 156b</td>
<td>Alg w Abstract Vec Sp</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Core E - Social Sciences</strong></td>
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<tr>
<td>Select one of the following:</td>
<td></td>
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<tr>
<td>HIST 2111</td>
<td>United States to 1877</td>
<td>3</td>
</tr>
<tr>
<td>HIST 2112</td>
<td>United States since 1877</td>
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<tr>
<td>INTA 1200</td>
<td>American Government</td>
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<td>POL 1101</td>
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<td><strong>Core F - Courses Related to Major</strong></td>
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<td>Lab Science</td>
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<td>CS 1100</td>
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<td>CS 1331</td>
<td>Intro-Object Orient Prog</td>
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<td>CS 1332</td>
<td>Data Struct &amp; Algorithms</td>
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<td>CS 2050</td>
<td>Intro Discrete Math CS</td>
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<td>or CS 2051</td>
<td>Honors Discrete Math CS</td>
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<td>MATH 2550</td>
<td>Intro Multivariable Calc</td>
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<td>CS 2340</td>
<td>Objects and Design</td>
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<td>CS 4001</td>
<td>Computing &amp; Society</td>
<td>3</td>
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<tr>
<td>or CS 4002</td>
<td>Robots and Society</td>
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<tr>
<td>or CS 4726</td>
<td>Privacy Tech Policy Law</td>
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<tr>
<td>or SLS 3110</td>
<td>Tech and Sustain Community</td>
<td></td>
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<td></td>
<td><strong>Junior Design Options (Capstone)</strong></td>
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<td>Junior Design Option</td>
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<td><strong>Concentration</strong></td>
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<tr>
<td>CS 1171</td>
<td>Computing in MATLAB</td>
<td>1</td>
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<tr>
<td>CS 2110</td>
<td>Computer Organize&amp;Program</td>
<td>4</td>
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<tr>
<td>CS 2200</td>
<td>Systems and Networks</td>
<td>4</td>
</tr>
<tr>
<td>CS 3451</td>
<td>Computer Graphics</td>
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<tr>
<td>CS 3510</td>
<td>Dsgn&amp;Analysis-Algorithms</td>
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<tr>
<td>CS 3511</td>
<td>Algorithms Honors</td>
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<td>MATH 2552</td>
<td>Differential Equations</td>
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<td>Select six credit hours of the following for Media Technologies:</td>
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<tr>
<td>CS 4455</td>
<td>Video Game Design</td>
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<td>CS 4460</td>
<td>Intro Info Visualization</td>
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<tr>
<td>CS 4464</td>
<td>Computational Journalism</td>
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<tr>
<td>CS 4475</td>
<td>Comp Photography</td>
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<tr>
<td>CS 4480</td>
<td>Digital Video Special FX</td>
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<tr>
<td>CS 4496</td>
<td>Computer Animation</td>
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<tr>
<td>CS 4590</td>
<td>Computer Audio</td>
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<tr>
<td>Select six credit hours of the following for Computational Science and Engineering:</td>
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</tr>
<tr>
<td>CS 4641</td>
<td>Machine Learning</td>
<td></td>
</tr>
<tr>
<td>CX 4140</td>
<td>Comp Model Algorithms</td>
<td></td>
</tr>
<tr>
<td>CX 4220</td>
<td>Intro High Perf Comp</td>
<td></td>
</tr>
<tr>
<td>CX 4230</td>
<td>Computer Simulation</td>
<td></td>
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<tr>
<td>CX 4640</td>
<td>Numerical Analysis I</td>
<td></td>
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<tr>
<td></td>
<td><strong>Other Required Courses</strong></td>
<td></td>
</tr>
<tr>
<td>MATH 3012</td>
<td>Applied Combinatorics</td>
<td>3</td>
</tr>
<tr>
<td>Select one of the following:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MATH 3215</td>
<td>Probability &amp; Statistics</td>
<td></td>
</tr>
<tr>
<td>MATH 3670</td>
<td>Statistics and Applns</td>
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<td>CEE 3770</td>
<td>Statistics &amp; Applications</td>
<td></td>
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<tr>
<td>ISYE 3770</td>
<td>Statistics &amp; Applications</td>
<td></td>
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<tr>
<td>or ISYE 2000</td>
<td>Probability With Apps</td>
<td></td>
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<tr>
<td>&amp; ISYE 2000</td>
<td>Basic Statistical Meth</td>
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<td></td>
<td><strong>Free Electives</strong></td>
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<td>Free Electives</td>
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<td>Total Credit Hours</td>
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<td>126</td>
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</table>

Pass-Fail only allowed for Free Electives (max six credit hours), CS 1100, and CS 1171 (if required).

---

1 Minimum grade of C required.
2 Two of three lab sciences MUST be a sequence.
3 Junior Design Options are as follows (students must pick one option and may not change):
   - Option 1 - LMC 3432, LMC 3431, CS 3311, CS 3312.
   - Option 2 - ECE VIP courses and LMC 3403.
   - Option 3 - Satisfy Georgia Tech Research Option.
   - Option 4 - CS 2701 (3 hours), CS 4699-2IP (3 hours), LMC 3403 (3 hours) = 9 hours
   OR CS 4699-6IP (6 hours), LMC 3403 (3 hours) = 9 hours

Six credits of the Junior Design option are used as Major Requirements and the overage credits of research/VIP (5 credit hours/2 credit hours) may be used as free electives. Students completing VIP for their junior design requirement will be required to complete at least three semesters of VIP. (VIP 1 + VIP 2 + VIP 3) (for a total of 5 credit hours) + LMC 3403 = 8 hours of VIP credit.

Students using CREATE-X for junior design take at least 6 hours of CREATE-X Start-up Lab and Idea 2 Prototype (I2P) and 3 of the 6 hours must be I2P. Students take these 6 hours with LMC 3403 (3 hours) for a total of 9 hours. Extra three hours for CREATE-X option can be used in free electives.
Two credit hours of MATH 1554 may count along with MATH 2550 to give Area F 18 credit hours.

Cooperative Programs
The College of Computing participates in the undergraduate and graduate Cooperative Programs. See links below for further information:

- Undergraduate Cooperative Plan (http://catalog.gatech.edu/academics/special-academic-programs/experiential-education/center-career-discovery-development)
- Graduate Cooperative Plan (http://catalog.gatech.edu/academics/special-academic-programs/experiential-education/graduate-cooperative-plan)

International Plan
The College of Computing (http://www.cc.gatech.edu) has an approved BS CS International Plan that accommodates the unique requirements of this option discussed in the International Plan section of the catalog (p. 86).

However, due to the flexible nature of the Threads curriculum, the International Plan designation may not be available with all of the Thread combinations. Efforts will be made to work with interested students to accommodate their individual circumstances with regard to the International Plan designator for the Bachelor of Science in Computer Science.

Research Option
To complete the Research Option in the College of Computing, students must:

1. Complete at least nine units of undergraduate research
   a. Over at least two, preferably three terms
   b. Research may be for either pay or credit;
2. Write an undergraduate thesis/report of research on their findings;
3. Take
   a. LMC 4701: Undergraduate Research Proposal Writing (taken during the first or second semester of research)
   b. LMC 4702: Undergraduate Research Thesis Writing (taken during the thesis writing semester).

Research Classes
The following classes count toward fulfillment of the Research Option:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 2699</td>
<td>Undergraduate Research (Freshman and Sophomore)</td>
<td>1-12</td>
</tr>
<tr>
<td>CS 4699</td>
<td>Undergraduate Research (Junior and Senior)</td>
<td>1-12</td>
</tr>
<tr>
<td>CS 4980</td>
<td>Research Capstone Proj</td>
<td>1-21</td>
</tr>
</tbody>
</table>

Research for Pay (Audit only)

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 2698</td>
<td>Research Assistantship (Freshman and Sophomore)</td>
<td>1-12</td>
</tr>
</tbody>
</table>

To get credit toward completion of the Research Option for research for pay, students must be registered for the appropriate audit-only, research for pay class (CS 2698 or 4698). If work on research for pay begins after the close of registration and the student has not signed up for the appropriate class, unfortunately it is not possible to get credit toward the Research Option for work that term.

A research project will also fulfill the capstone design requirement if the student registers for CS 4980 for one of the research terms. This is typically done the last semester of research, while taking LMC 4702.

Completion of the Research Option is noted on the student’s transcript. For more information, see www.urop.gatech.edu (http://www.urop.gatech.edu).

General Research Option Information (p. 90)

BS/MS in Computer Science
Students who want to pursue

the BS/MS option must apply to the MSCS program after completing at least 60 hours of work towards the BSCS degree. Applicants should have a cumulative GPA of at least 3.4. This GPA must be maintained for the student to take graduate level courses.

Students admitted to the program will take 6 hours during their final undergraduate year to double count in both their BSCS and MSCS degrees; they should choose 3 hours of MS Core or Elective hours their fall semester and 3 hours of MS Core or Elective hours their spring semester that can count toward their thread hours and CS Specialization hours.

Visit College of Computing (https://www.cc.gatech.edu) for more information.

Bachelor of Science in Computer Science - Thread: Modeling-Simulation & Information Internetworks

The Threads™ represent partial paths through the curriculum. Thus, a student weaves a degree from these Threads. Students are not forced to make Thread decisions very early in their academic careers; however, they may if they want. We define the Threads so they are flexible enough to allow for a variety of technical and creative experiences. Threads are coherent enough that students develop computing skills even if their focus shifts as they go along.

The Modeling - Simulation thread is intended for students interested in developing a deep understanding and appreciation of how natural and human-generated systems such as weather, biological processes, supply chains, or computers can be represented by mathematical models and computer software. Such models are widely used today to better understand and predict the behavior of such systems. Because these models are often described and represented by mathematical expressions, and the models themselves often deal with physical phenomena, a background in mathematics and the sciences is required. Combining this background with a deep knowledge in computer science
will yield the basic tools necessary to transform abstract conceptual models to computer programs that execute efficiently on digital machines. The required coursework in this thread includes topics in continuous and discrete mathematics, the sciences, and computing. Elective courses enable students to further develop and apply their knowledge and skills to a specific discipline where Modeling - Simulation plays an important role.

The Information Internetworks thread is where computing meets the data enterprise and all that this implies. The thread prepares students for all levels of information management by helping them to capture, represent, organize, transform, communicate, and present data so that it becomes information.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
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<td>Sci Foundation of Health</td>
<td>2</td>
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<tr>
<td>or APPH 10 Sci of Phys Act &amp; Health</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ENGL 1101</td>
<td>English Composition I</td>
<td>3</td>
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<tr>
<td>ENGL 1102</td>
<td>English Composition II</td>
<td>3</td>
</tr>
<tr>
<td>MATH 1552</td>
<td>Integral Calculus</td>
<td>4</td>
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<tr>
<td>CS 1301</td>
<td>Intro to Computing</td>
<td>3</td>
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<tr>
<td>Any HUM (p. 93)</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>PHYS 2211</td>
<td>Intro Physics I</td>
<td>4</td>
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<tr>
<td>Lab Science (p. 93)</td>
<td>4</td>
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<tr>
<td>MATH 1551</td>
<td>Differential Calculus</td>
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<tr>
<td>MATH 1554</td>
<td>Linear Algebra</td>
<td>4</td>
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<tr>
<td>or MATH 1568Alg w Abstract Vec Sp</td>
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<tr>
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<td>United States to 1877</td>
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<td>HIST 2112</td>
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<tr>
<td>PUBP 3000</td>
<td>US Constitutional Issues</td>
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<td>Any SS (p. 97)</td>
<td>9</td>
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<tr>
<td>CS 1100</td>
<td>Freshman Leap Seminar</td>
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<td>Intro-Object Orient Prog</td>
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<td>CS 1332</td>
<td>Data Struct &amp; Algorithms</td>
<td>3</td>
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<tr>
<td>CS 2050</td>
<td>Intro Discrete Math CS</td>
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<td>or CS 2051 Honors Discrete Math CS</td>
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<td>Intro Multivariable Calculus</td>
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<td>CS 2340</td>
<td>Objects and Design</td>
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<td>CS 4001</td>
<td>Computing &amp; Society</td>
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<td>or CS 4022 Robots and Society</td>
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<td>or CS 4726 Privacy Tech Policy Law</td>
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<td>or SLS 3110Tech and Sustain Community</td>
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<td>MATH 3012</td>
<td>Applied Combinatorics</td>
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<td>MATH 3215</td>
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<td>CEE 3770</td>
<td>Statistics &amp; Applications</td>
<td></td>
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<td>ISYE 3770</td>
<td>Statistics &amp; Applications</td>
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<tr>
<td>or ISYE 2805 Probability with Apps</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&amp; ISYE 2806 Basic Statistical Meth</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CS 4641</td>
<td>Machine Learning</td>
<td></td>
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<tr>
<td>CX 4140</td>
<td>Comp Model Algorithms</td>
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<td>CX 4220</td>
<td>Intro High Perf Comp</td>
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<td>CX 4230</td>
<td>Computer Simulation</td>
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<td>CX 4640</td>
<td>Numerical Analysis I</td>
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<td>MATH 3012</td>
<td>Applied Combinatorics</td>
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<td>Select one of the following:</td>
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<td>MATH 3215</td>
<td>Probability &amp; Statistics</td>
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<td>MATH 3670</td>
<td>Statistics and Applns</td>
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<td>ISYE 3770</td>
<td>Statistics &amp; Applications</td>
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<tr>
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<td></td>
<td></td>
</tr>
<tr>
<td>&amp; ISYE 2806 Basic Statistical Meth</td>
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<td></td>
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</tbody>
</table>

Pass-fail only allowed for Free Electives (max six credit hours) and CS 1171 (if required).
Minimum grade of C required.
Two of three labs MUST be a sequence.
Junior Design Options are as follows (students must pick one option and may not change):
- Option 1 - LMC 3432, LMC 3431, CS 3311, CS 3312.
- Option 2 - ECE VIP courses and LMC 3403.
- Option 3 - Satisfy Georgia Tech Research Option.
- Option 4 - CS 2701 (3 hours), CS 4699-I2P (3 hours), LMC 3403 (3 hours) + 9 hours OR CS 4699-I2P (6 hours), LMC 3403 (3 hours) x 9 hours

Six credits of the Junior Design option are used as Major Requirements and the overage credits of research/VIP (5 credit hours/2 credit hours) may be used as free electives. Students completing VIP for their junior design requirement will be required to complete at least three semesters of VIP. (VIP 1 + VIP 2 + VIP 3) (for a total of 5 credit hours) + LMC 3403 = 8 hours of VIP credit.

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- Graduate Cooperative Plan (http://catalog.gatech.edu/academics/special-academic-programs/experiential-education/graduate-cooperative-plan)

International Plan
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Research Option
To complete the Research Option in the College of Computing, students must:
1. Complete at least nine units of undergraduate research
   a. Over at least two, preferably three terms
   b. Research may be for either pay or credit;
2. Write an undergraduate thesis/report of research on their findings;
3. Take
   a. LMC 4701: Undergraduate Research Proposal Writing (taken during the first or second semester of research)
   b. LMC 4702: Undergraduate Research Thesis Writing (taken during the thesis writing semester).

Research Classes
The following classes count toward fulfillment of the Research Option:

Research for Credit

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>CS 2699</td>
<td>Undergraduate Research (Freshman and Sophomore)</td>
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<td>CS 4699</td>
<td>Undergraduate Research (Junior and Senior)</td>
<td>1-12</td>
</tr>
<tr>
<td>CS 4980</td>
<td>Research Capstone Proj</td>
<td>1-21</td>
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</table>

Research for Pay (Audit only)

<table>
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<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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</thead>
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<tr>
<td>CS 2698</td>
<td>Research Assistantship (Freshman and Sophomore)</td>
<td>1-12</td>
</tr>
<tr>
<td>CS 4698</td>
<td>Research Assistantship (Junior and Senior)</td>
<td>1-12</td>
</tr>
</tbody>
</table>

To get credit toward completion of the Research Option for research for pay, students must be registered for the appropriate audit-only, research for pay class (CS 2698 or 4698). If work on research for pay begins after the close of registration and the student has not signed up for the appropriate class, unfortunately it is not possible to get credit toward the Research Option for work that term.

A research project will also fulfill the capstone design requirement if the student registers for CS 4980 for one of the research terms. This is typically done the last semester of research, while taking LMC 4702.

Completion of the Research Option is noted on the student's transcript. For more information, see www.urop.gatech.edu (http://www.urop.gatech.edu).

General Research Option Information (p. 90)

BS/MS in Computer Science
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Students admitted to the program will take 6 hours during their final undergraduate year to double count in both their BSCS and MSCS degrees; they should choose 3 hours of MS Core or Elective hours their fall semester and 3 hours of MS Core or Elective hours their spring semester that can count toward their thread hours and CS Specialization hours.

Visit College of Computing (https://www.cc.gatech.edu) for more information.
## Bachelor of Science in Computer Science - Thread: People & Systems and Architecture

The Threads™ represent partial paths through the curriculum. Thus, a student weaves a degree from these Threads. Students are not forced to make Thread decisions very early in their academic careers; however, they may if they want. We define the Threads so they are flexible enough to allow for a variety of technical and creative experiences. Threads are coherent enough that students develop computing skills even if their focus shifts as they go along.

The Systems and Architecture thread is where many of the practical skills of computing are learned. Like Theory, Systems and Architecture lies at the center of computing. It prepares students to create and evaluate computer architectures, systems, and languages across a variety of paradigms and approaches.

The People thread is where computing meets users. This thread prepares students by helping them to understand the theoretical and computational foundations for designing, building, and evaluating systems that treat the human as a central component.

<table>
<thead>
<tr>
<th>Code</th>
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<td>or APPH 1050</td>
<td>Sci of Phys Act &amp; Health</td>
<td></td>
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<td>ENGL 1101</td>
<td>English Composition I</td>
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<td>ENGL 1102</td>
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<td>MATH 1552</td>
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<td>CS 1301</td>
<td>Intro to Computing</td>
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<tr>
<td>PHYS 2211</td>
<td>Intro Physics I</td>
<td>2</td>
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<tr>
<td>Lab Science</td>
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<td>MATH 1551</td>
<td>Differential Calculus</td>
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<td>MATH 1554</td>
<td>Linear Algebra</td>
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<td>or MATH 156 in Alg w Abstract Vec Sp</td>
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<td>3</td>
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<td>Government of the U.S.</td>
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<td>US Constitutional Issues</td>
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<tr>
<td>CS 1100</td>
<td>Freshman Leap Seminar</td>
<td>1</td>
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<tr>
<td>CS 1331</td>
<td>Intro-Object Orient Prog</td>
<td>3</td>
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### Core A - Essential Skills

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<thead>
<tr>
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<th>Credit Hours</th>
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<tbody>
<tr>
<td>CS 1332 Data Struct &amp; Algorithms</td>
<td>3</td>
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<tr>
<td>CS 2050 Intro Discrete Math CS</td>
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<tr>
<td>or CS 2051 Honors Discrete Math CS</td>
<td></td>
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<tr>
<td>MATH 2550 Intro Multivariable Calc</td>
<td>2</td>
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### Major Requirements

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<tr>
<td>CS 2340 Objects and Design</td>
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<tr>
<td>CS 4001 Computing &amp; Society</td>
<td>3</td>
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<tr>
<td>or CS 4002 Robots and Society</td>
<td></td>
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<tr>
<td>or CS 4726 Privacy Tech Policy Law</td>
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<tr>
<td>or SLS 311 Tech and Sustain Community</td>
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### Junior Design Options (Capstone)

**Junior Design Option** | 6

### Concentration

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<tr>
<td>CS 2110 Computer Organiz&amp;Program</td>
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<tr>
<td>CS 2200 Systems and Networks</td>
<td>4</td>
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<tr>
<td>CS 3210 Design-Operating Systems</td>
<td>3</td>
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<td>CS 3220 Processor Design</td>
<td>3</td>
</tr>
<tr>
<td>CS 3510 Dsgn&amp;Analysis-Algorithms</td>
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<td>or CS 3511 Algorithms Honors</td>
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<tr>
<td>ECE 2031 Digital Design Lab</td>
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<td>PSYC 2015 Research Methods</td>
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<td>CS 3750 User Interface Design</td>
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Select two of the following for Human-Centered Technology: | 6

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<thead>
<tr>
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<tbody>
<tr>
<td>CS 3790 Intro-Cognitive Science</td>
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<tr>
<td>CS 4660 Educational Technology</td>
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<tr>
<td>CS 4460 Intro Info Visualization</td>
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<tr>
<td>CS 4470 User Interface Software</td>
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<tr>
<td>CS 4605 Mobile&amp;Ubiquitous Comp</td>
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<tr>
<td>CS 4472 Design of Online Comm</td>
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<tr>
<td>CS 4745 Info&amp;Com Tech&amp;Global Dev</td>
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Select one of the following for Social/Behavioral Science for Computing: | 3

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>PSYC 2210 Social Psychology</td>
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<tr>
<td>PSYC 2760 Human Language Process</td>
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<td>PSYC 3040 Sensation &amp; Perception</td>
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Select one of the following for Systems Software Tools: | 3

<table>
<thead>
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<tbody>
<tr>
<td>CS 3300 Intro to Software Engr</td>
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<td>CS 4240 Compilers &amp; Interpreters</td>
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Select one of the following for Advanced Systems Architectures: | 3

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<thead>
<tr>
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<th>Credit Hours</th>
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<tbody>
<tr>
<td>CS 4210 Adv Operating Systems</td>
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<tr>
<td>CS 4220 Embedded Systems</td>
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<tr>
<td>CS 4290 Advanced Computer Org</td>
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</table>

### Other Required Courses

<table>
<thead>
<tr>
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<tr>
<td>MATH 3012 Applied Combinatorics</td>
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Select one of the following: | 3

<table>
<thead>
<tr>
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<th>Credit Hours</th>
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<tbody>
<tr>
<td>MATH 3215 Probability &amp; Statistics</td>
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<tr>
<td>MATH 3670 Statistics and Applns</td>
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</tr>
<tr>
<td>CEE 3770 Statistics &amp; Applications</td>
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<tr>
<td>ISYE 3770 Statistics &amp; Applications</td>
<td></td>
</tr>
<tr>
<td>or ISYE 2620bability With Apps</td>
<td></td>
</tr>
<tr>
<td>&amp; ISYE 2620 Basic Statistical Meth</td>
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</table>

### Free Electives

<table>
<thead>
<tr>
<th>Title</th>
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*Georgia Institute of Technology - DRAFT COPY*
To complete the Research Option in the College of Computing, students must:

1. Complete at least nine units of undergraduate research
   a. Over at least two, preferably three terms

2. Write an undergraduate thesis/report of research on their findings;

3. Take
   a. LMC 4701: Undergraduate Research Proposal Writing (taken during the first or second semester of research)
   b. LMC 4702: Undergraduate Research Thesis Writing (taken during the thesis writing semester).

**Research Classes**

The following classes count toward fulfillment of the Research Option:

**Research for Credit**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 2699</td>
<td>Undergraduate Research (Freshman and Sophomore)</td>
<td>1-12</td>
</tr>
<tr>
<td>CS 4699</td>
<td>Undergraduate Research (Junior and Senior)</td>
<td>1-12</td>
</tr>
<tr>
<td>CS 4980</td>
<td>Research Capstone Proj</td>
<td>1-21</td>
</tr>
</tbody>
</table>

**Research for Pay (Audit only)**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>CS 2698</td>
<td>Research Assistantship (Freshman and Sophomore)</td>
<td>1-12</td>
</tr>
<tr>
<td>CS 4698</td>
<td>Research Assistantship (Junior and Senior)</td>
<td>1-12</td>
</tr>
</tbody>
</table>

To get credit toward completion of the Research Option for research for pay, students must be registered for the appropriate audit-only research for pay class (CS 2698 or 4698). If work on research for pay begins after the close of registration and the student has not signed up for the appropriate class, unfortunately it is not possible to get credit toward the Research Option for work that term.

A research project will also fulfill the capstone design requirement if the student registers for CS 4980 for one of the research terms. This is typically done the last semester of research, while taking LMC 4702.

Completion of the Research Option is noted on the student’s transcript. For more information, see www.urop.gatech.edu (http://www.urop.gatech.edu).

**General Research Option Information**

**BS/MS in Computer Science**

Students who want to pursue the BS/MS option must apply to the MSCS program after completing at least 60 hours of work towards the BSCS degree. Applicants should have a cumulative GPA of at least 3.4. This GPA must be maintained for the student to take graduate level courses.

Students admitted to the program will take 6 hours during their final undergraduate year to double count in both their BSCS and MSCS degrees; they should choose 3 hours of MS Core or Elective hours their fall semester and 3 hours of MS Core or Elective hours their spring semester that can count toward their thread hours and CS Specialization hours.

**Cooperative Programs**

The College of Computing participates in the undergraduate and graduate Cooperative Programs. See links below for further Information:

- Undergraduate Cooperative Plan (http://catalog.gatech.edu/academics/special-academic-programs/experiential-education/center-career-discovery-development)
- Graduate Cooperative Plan (http://catalog.gatech.edu/academics/special-academic-programs/experiential-education/graduate-cooperative-plan)

**International Plan**

The College of Computing (http://www.cc.gatech.edu) has an approved BS CS International Plan that accommodates the unique requirements of this option discussed in the International Plan section of the catalog (p. 86).

However, due to the flexible nature of the Threads curriculum, the International Plan designation may not be available with all of the Thread combinations. Efforts will be made to work with interested students to accommodate their individual circumstances with regard to the International Plan designator for the Bachelor of Science in Computer Science.

**Research Option**

To complete the Research Option in the College of Computing, students must:

1. Complete at least nine units of undergraduate research
   a. Over at least two, preferably three terms
Visit College of Computing (https://www.cc.gatech.edu) for more information.

Bachelor of Science in Computer Science - Thread: Theory & Information Internetworks

The Threads™ represent partial paths through the curriculum. Thus, a student weaves a degree from these Threads. Students are not forced to make Thread decisions very early in their academic careers; however, they may if they want. We define the Threads so they are flexible enough to allow for a variety of technical and creative experiences. Threads are coherent enough that students develop computing skills even if their focus shifts as they go along.

The Theory thread is where computing meets itself. Theory teaches students the theoretical and mathematical foundations underlying a wide range of computational disciplines. Early preparation includes discrete mathematics, algorithms, and complexity. Knowledge goals are for students to mature in development and analysis of abstract models for applications ranging from theoretical computer science to computational physics, biology, mathematics, economics, and optimization.

The Information Internetworks thread is where computing meets the data enterprise and all that this implies. The thread prepares students for all levels of information management by helping them to capture, represent, organize, transform, communicate, and present data so that it becomes information.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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<tr>
<td></td>
<td><strong>Wellness</strong></td>
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<td>APPH 1040</td>
<td>Sci Foundation of Health</td>
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<tr>
<td>or APPH 1050</td>
<td>Sci of Phys Act &amp; Health</td>
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<tr>
<td></td>
<td><strong>Core A - Essential Skills</strong></td>
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</tr>
<tr>
<td>ENGL 1101</td>
<td>English Composition I</td>
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<td>ENGL 1102</td>
<td>English Composition II</td>
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<tr>
<td>MATH 1552</td>
<td>Integral Calculus</td>
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<tr>
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<td><strong>Core B - Institutional Options</strong></td>
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<tr>
<td>CS 1301</td>
<td>Intro to Computing ¹</td>
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<tr>
<td></td>
<td><strong>Core C - Humanities</strong></td>
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<tr>
<td>Any HUM</td>
<td>(p. 93)</td>
<td>6</td>
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<tr>
<td></td>
<td><strong>Core D - Science, Math, &amp; Technology</strong></td>
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<tr>
<td>PHYS 2211</td>
<td>Intro Physics I ²</td>
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<td>Lab Science ²</td>
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<td>MATH 1551</td>
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<tr>
<td>MATH 1544</td>
<td>Linear Algebra ⁴</td>
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</tr>
<tr>
<td>or MATH 1564</td>
<td>LinAlg w Abstract Vec Sp</td>
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<td><strong>Core E - Social Sciences</strong></td>
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<td>HIST 2111</td>
<td>United States to 1877</td>
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<td>HIST 2112</td>
<td>United States since 1877</td>
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<td>American Government</td>
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<td>Government of the U.S.</td>
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<td>US Constitutional Issues</td>
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<td><strong>Core F - Courses Related to Major</strong></td>
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<td>CS 1100</td>
<td>Freshman Leap Seminar</td>
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<td>CS 1331</td>
<td>Intro-Object Orient Prog ¹</td>
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<td>CS 1332</td>
<td>Data Struct &amp; Algorithms ¹</td>
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<td>CS 2050</td>
<td>Intro Discrete Math CS ¹</td>
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<tr>
<td>or CS 2051</td>
<td>Honors Discrete Math CS</td>
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</tr>
<tr>
<td>MATH 2550</td>
<td>Intro Multivariable Calc ⁴</td>
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<td><strong>Major Requirements</strong></td>
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<tr>
<td>CS 2340</td>
<td>Objects and Design ¹</td>
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<tr>
<td>CS 4001</td>
<td>Computing &amp; Society ¹</td>
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<tr>
<td>or CS 4002</td>
<td>Robots and Society</td>
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<tr>
<td>or CS 4726</td>
<td>Privacy Tech Policy Law</td>
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<td>or SLS 3110</td>
<td>Tech and Sustain Community</td>
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<td><strong>Junior Design Options (Capstone)</strong></td>
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<td>CS 2200</td>
<td>Systems and Networks ¹</td>
<td>4</td>
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<tr>
<td>CS 3510</td>
<td>Dsgn&amp;Analysis-Algorithms ¹</td>
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<tr>
<td>or CS 3511</td>
<td>Algorithms Honors</td>
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<td>CS 4510</td>
<td>Automata and Complexity ¹</td>
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<td>CS 4540</td>
<td>Advanced Algs ¹</td>
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<td>MATH 3406</td>
<td>Second Course Linear Alg ¹</td>
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<td>CS 4235</td>
<td>Intro to Info Security</td>
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<td>Select one of the following for Advanced Information Management: ¹</td>
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<tr>
<td>CS 3251</td>
<td>Computer Networking I (if not taken for Introduction to Information Management)</td>
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<td>CS 4235</td>
<td>Intro to Info Security (if not taken for Introduction to Information Management)</td>
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<td>Comp &amp; Network Security</td>
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<td>CS 4255</td>
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<td>CS 4261</td>
<td>Mobile Apps &amp; Svcs</td>
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<td>CS 4270</td>
<td>Data Communications Lab</td>
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<td>CS 4365</td>
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<td>CS 4400</td>
<td>Inr to Database Systems (if not taken for Introduction to Information Management)</td>
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<td>CS 4420</td>
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<td>CS 4440</td>
<td>Database Technologies</td>
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<td>CS 4675</td>
<td>Internet Sys &amp; Services</td>
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<td>Select one of the following for Advanced Mathematics: ¹</td>
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<tr>
<td>MATH 4022</td>
<td>Intro to Graph Theory</td>
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<td>MATH 4032</td>
<td>Combinatorial Analysis</td>
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<td>MATH 4150</td>
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<td><strong>Other Required Courses</strong></td>
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<td>MATH 3012</td>
<td>Applied Combinatorics</td>
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<tr>
<td>Select one of the following:</td>
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</table>
International Plan designator for the Bachelor of Science in Computer Science.

Research Option
To complete the Research Option in the College of Computing, students must:

1. Complete at least nine units of undergraduate research
   a. Over at least two, preferably three terms
   b. Research may be for either pay or credit;

2. Write an undergraduate thesis/report of research on their findings;

3. Take
   a. LMC 4701: Undergraduate Research Proposal Writing (taken during the first or second semester of research)
   b. LMC 4702: Undergraduate Research Thesis Writing (taken during the thesis writing semester).

Research Classes
The following classes count toward fulfillment of the Research Option:

<table>
<thead>
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<th>Research for Credit</th>
<th>Credit Hours</th>
</tr>
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<tbody>
<tr>
<td>Code</td>
<td>Title</td>
</tr>
<tr>
<td>CS 2699</td>
<td>Undergraduate Research (Freshman and</td>
</tr>
<tr>
<td></td>
<td>Sophomore)</td>
</tr>
<tr>
<td>CS 4699</td>
<td>Undergraduate Research (Junior and Senior)</td>
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<tr>
<td>CS 4980</td>
<td>Research Capstone Proj</td>
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Research for Pay (Audit only)

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<tr>
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<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>Code</td>
<td>Title</td>
</tr>
<tr>
<td>CS 2698</td>
<td>Research Assistantship (Freshman and</td>
</tr>
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<td></td>
<td>Sophomore)</td>
</tr>
<tr>
<td>CS 4698</td>
<td>Research Assistantship (Junior and Senior)</td>
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</tbody>
</table>

To get credit toward completion of the Research Option for research for pay, students must be registered for the appropriate audit-only, research for pay class (CS 2698 or 4698). If work on research for pay begins after the close of registration and the student has not signed up for the appropriate class, unfortunately it is not possible to get credit toward the Research Option for work that term.

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Completion of the Research Option is noted on the student’s transcript. For more information, see www.urop.gatech.edu (http://www.urop.gatech.edu).

General Research Option Information (p. 90)

BS/MS in Computer Science
Students who want to pursue

the BS/MS option must apply to the MSCS program after completing at least 60 hours of work towards the BSCS degree. Applicants should have
a cumulative GPA of at least 3.4. This GPA must be maintained for the student to take graduate level courses.

Students admitted to the program will take 6 hours during their final undergraduate year to double count in both their BSCS and MSCS degrees; they should choose 3 hours of MS Core or Elective hours their fall semester and 3 hours of MS Core or Elective hours their spring semester that can count toward their thread hours and CS specialization hours.

Visit College of Computing (https://www.cc.gatech.edu) for more information.

Bachelor of Science in Computer Science - Thread: Theory & Intelligence

The Threads™ represent partial paths through the curriculum. Thus, a student weaves a degree from these Threads. Students are not forced to make Thread decisions very early in their academic careers; however, they may if they want. We define the Threads so they are flexible enough to allow for a variety of technical and creative experiences. Threads are coherent enough that students develop computing skills even if their focus shifts as they go along.

The Theory thread is where computing meets itself. Theory teaches students the theoretical and mathematical foundations underlying a wide range of computational disciplines. Early preparation includes discrete mathematics, algorithms, and complexity. Knowledge goals are for students to mature in development and analysis of abstract models for applications ranging from theoretical computer science to computational physics, biology, mathematics, economics, and optimization.

The Intelligence thread is where computing models intelligence. This thread is concerned with computational models of intelligence from top to bottom. To this end, we emphasize designing and implementing artifacts that exhibit various levels of intelligence as well as understanding and modeling natural cognitive agents such as humans, ants, or bees. Students acquire the technical knowledge and skills necessary for expressing, specifying, understanding, creating, and exploiting computational models that represent cognitive processes. It prepares students for fields as diverse as artificial intelligence, machine learning, perception, and cognitive science, as well as for fields that benefit from applications of techniques from those fields.

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<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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<tr>
<td>APPH 1040</td>
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<td>or APPH 10 Sci of Phys Act &amp; Health</td>
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<td>ENGL 1101</td>
<td>English Composition I</td>
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<tr>
<td>ENGL 1102</td>
<td>English Composition II</td>
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<td>MATH 1552</td>
<td>Integral Calculus</td>
<td>4</td>
</tr>
<tr>
<td>Core B - Institutional Options</td>
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<td>CS 1301</td>
<td>Intro to Computing</td>
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<td>Any HUM (p. 93)</td>
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<tr>
<td>Core D - Science, Math, &amp; Technology</td>
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<tr>
<td>PHYS 2211 Intro Physics I</td>
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<td>MATH 1554 Linear Algebra</td>
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<td>or MATH 156 Alg w Abstract Vec Sp</td>
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<td>Core E - Social Sciences</td>
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<td>HIST 2111 United States to 1877</td>
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<td>HIST 2112 United States since 1877</td>
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<td>INTA 1200 American Government</td>
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<td>POL 1101 Government of the U.S.</td>
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<td>PUBP 3000 US Constitutional Issues</td>
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<tr>
<td>PSYC 1101 General Psychology</td>
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<td>Any SS (p. 97)</td>
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<td>Core F - Courses Related to Major</td>
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<td>Lab Science</td>
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<td>CS 1100</td>
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<td>CS 1331</td>
<td>Intro-Object Orient Prog</td>
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<td>Data Struct &amp; Algorithms</td>
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<td>CS 2050</td>
<td>Intro Discrete Math CS</td>
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<td>or CS 2051 Honors Discrete Math CS</td>
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<td>MATH 2550</td>
<td>Intro Multivariable Calc</td>
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<td>CS 2340</td>
<td>Objects and Design</td>
<td>3</td>
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<tr>
<td>CS 4001</td>
<td>Computing &amp; Society</td>
<td>3</td>
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<tr>
<td>or CS 4002 Robots and Society</td>
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<td></td>
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<tr>
<td>or CS 4726 Privacy Tech Policy Law</td>
<td></td>
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<tr>
<td>or SLS 311 Tech and Sustain Community</td>
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<td>Junior Design Options (Capstone)</td>
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<td>Junior Design Option</td>
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<td>Concentration</td>
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<tr>
<td>CS 2110</td>
<td>Computer Organiz&amp;Program</td>
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</tr>
<tr>
<td>CS 3510</td>
<td>Dsgn&amp;Analysis-Algorithms</td>
<td>3</td>
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<tr>
<td>or CS 3511 Algorithms Honors</td>
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<tr>
<td>CS 3600</td>
<td>Intro-Artificial Intell</td>
<td>3</td>
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<tr>
<td>CS 4510</td>
<td>Automata and Complexity</td>
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<tr>
<td>CS 4540</td>
<td>Advanced Algs</td>
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<td>MATH 3406</td>
<td>Second Course Linear Alg</td>
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<tr>
<td>Select one of the following for Advanced Mathematics:</td>
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<tr>
<td>MATH 4022 Intro to Graph Theory</td>
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<tr>
<td>MATH 4032 Combinatorial Analysis</td>
<td></td>
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<tr>
<td>MATH 4150 Intro To Number Theory</td>
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<tr>
<td>Select one of the following for Embodied Intelligence:</td>
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<tr>
<td>CS 3630</td>
<td>Intro-Perception&amp;Robotic</td>
<td></td>
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<tr>
<td>CS 3790</td>
<td>Intro-Cognitive Science</td>
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<tr>
<td>PSYC 3040 Sensation &amp; Perception</td>
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<td>Select six credit hours of the following for Approaches to Intelligence:</td>
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<tr>
<td>CS 4476 Intro to Computer Vision</td>
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<td>CS 4635 Knowledge-Based AI</td>
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<td>CS 4641 Machine Learning</td>
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<tr>
<td>CS 4646 Mach Learn for Trading</td>
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</table>
International Plan

The College of Computing has an approved BS CS International Plan that accommodates the unique requirements of this option discussed in the International Plan section of the catalog (p. 86).

However, due to the flexible nature of the Threads curriculum, the International Plan designation may not be available with all of the Threads combinations. Efforts will be made to work with interested students to accommodate their individual circumstances with regard to the International Plan designator for the Bachelor of Science in Computer Science.

Research Option

To complete the Research Option in the College of Computing, students must:

1. Complete at least nine units of undergraduate research
   a. Over at least two, preferably three terms
   b. Research may be for either pay or credit;

2. Write an undergraduate thesis/report of research on their findings;

3. Take
   a. LMC 4701: Undergraduate Research Proposal Writing (taken during the first or second semester of research)
   b. LMC 4702: Undergraduate Research Thesis Writing (taken during the thesis writing semester).

Research Classes

The following classes count toward fulfillment of the Research Option:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>CS 2699</td>
<td>Undergraduate Research (Freshman and Sophomore)</td>
<td>1-12</td>
</tr>
<tr>
<td>CS 4699</td>
<td>Undergraduate Research (Junior and Senior)</td>
<td>1-12</td>
</tr>
<tr>
<td>CS 4980</td>
<td>Research Capstone Proj</td>
<td>1-21</td>
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</table>

Research for Pay (Audit only)

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
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<tbody>
<tr>
<td>CS 2698</td>
<td>Research Assistantship (Freshman and Sophomore)</td>
<td>1-12</td>
</tr>
<tr>
<td>CS 4698</td>
<td>Research Assistantship (Junior and Senior)</td>
<td>1-12</td>
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</tbody>
</table>

To get credit toward completion of the Research Option for research for pay, students must be registered for the appropriate audit-only, research for pay class (CS 2698 or 4698). If work on research for pay begins after the close of registration and the student has not signed up for the appropriate class, unfortunately it is not possible to get credit toward the Research Option for work that term.

A research project will also fulfill the capstone design requirement if the student registers for CS 4980 for one of the research terms. This is typically done the last semester of research, while taking LMC 4702.

Completion of the Research Option is noted on the student’s transcript. For more information, see www.urop.gatech.edu (http://www.urop.gatech.edu).
General Research Option Information (p. 90)

**BS/MS in Computer Science**

Students who want to pursue

the BS/MS option must apply to the MSCS program after completing at least 60 hours of work towards the BSCS degree. Applicants should have a cumulative GPA of at least 3.4. This GPA must be maintained for the student to take graduate level courses.

Students admitted to the program will take 6 hours during their final undergraduate year to double count in both their BSCS and MSCS degrees; they should choose 3 hours of MS Core or Elective hours their fall semester and 3 hours of MS Core or Elective hours their spring semester that can count toward their thread hours and CS Specialization hours.

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**Bachelor of Science in Computer Science - Thread: Theory & Media**

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The Media thread is where computing meets design. This thread prepares students by helping them to understand the technical and computational capabilities of systems in order to exploit their abilities to provide creative outlets.

The Theory thread is where computing meets itself. Theory teaches students the theoretical and mathematical foundations underlying a wide range of computational disciplines. Early preparation includes discrete mathematics, algorithms, and complexity. Knowledge goals are for students to mature in development and analysis of abstract models for applications ranging from theoretical computer science to computational physics, biology, mathematics, economics, and optimization.

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<th>Code</th>
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<tbody>
<tr>
<td></td>
<td><strong>Wellness</strong></td>
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<tr>
<td>APPH 1040</td>
<td>Sci Foundation of Health</td>
<td>2</td>
</tr>
<tr>
<td>or APPH 10</td>
<td>Sci of Phys Act &amp; Health</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Core A - Essential Skills</strong></td>
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<tr>
<td>ENGL 1101</td>
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<td>ENGL 1102</td>
<td>English Composition II</td>
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</tr>
<tr>
<td>MATH 1552</td>
<td>Integral Calculus</td>
<td>4</td>
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<tr>
<td></td>
<td><strong>Core B - Institutional Options</strong></td>
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<tr>
<td>CS 1301</td>
<td>Intro to Computing</td>
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<td></td>
<td><strong>Core C - Humanities</strong></td>
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<tr>
<td>Any HUM (p. 93)</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td></td>
<td><strong>Core D - Science, Math, &amp; Technology</strong></td>
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</tr>
<tr>
<td>PHYS 2211</td>
<td>Intro Physics I</td>
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**Lab Science**

<table>
<thead>
<tr>
<th>Code</th>
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<tbody>
<tr>
<td>MATH 1551</td>
<td>Differential Calculus</td>
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<tr>
<td>MATH 1554</td>
<td>Linear Algebra</td>
<td>4</td>
</tr>
<tr>
<td>or MATH 156 Algr w Abstract Vec Sp</td>
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**Core E - Social Sciences**

Select one of the following:

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<tr>
<th>Code</th>
<th>Title</th>
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<tbody>
<tr>
<td>HIST 2111</td>
<td>United States to 1877</td>
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</tr>
<tr>
<td>HIST 2112</td>
<td>United States since 1877</td>
<td>3</td>
</tr>
<tr>
<td>INTA 1200</td>
<td>American Government</td>
<td>3</td>
</tr>
<tr>
<td>POL 1101</td>
<td>Government of the U.S.</td>
<td>3</td>
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<tr>
<td>PUBP 3000</td>
<td>US Constitutional Issues</td>
<td>3</td>
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</table>

Any SS (p. 97) | 9

**Core F - Courses Related to Major**

<table>
<thead>
<tr>
<th>Code</th>
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<th>Credit Hours</th>
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<tbody>
<tr>
<td>CS 1100</td>
<td>Freshman Leap Seminar</td>
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<tr>
<td>CS 1331</td>
<td>Intro-Object Orient Prog</td>
<td>3</td>
</tr>
<tr>
<td>CS 1332</td>
<td>Data Struct &amp; Algorithms</td>
<td>3</td>
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<tr>
<td>CS 2050</td>
<td>Intro Discrete Math CS</td>
<td>3</td>
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<td>or CS 2051</td>
<td>Honors Discrete Math CS</td>
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<tr>
<td>MATH 2550</td>
<td>Intro Multivariable Calc</td>
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**Major Requirements**

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<td>CS 2340</td>
<td>Objects and Design</td>
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<tr>
<td>CS 4001</td>
<td>Computing &amp; Society</td>
<td>3</td>
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<tr>
<td>or CS 4002</td>
<td>Robots and Society</td>
<td>3</td>
</tr>
<tr>
<td>or CS 4726</td>
<td>Privacy Tech Policy Law</td>
<td>3</td>
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<tr>
<td>or SLS 3110Tech and Sustain Community</td>
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**Junior Design Options (Capstone)**

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<th>Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>CS 4002</td>
<td>Computing &amp; Society</td>
<td>3</td>
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<tr>
<td>or CS 4002</td>
<td>Robots and Society</td>
<td>3</td>
</tr>
<tr>
<td>or CS 4726</td>
<td>Privacy Tech Policy Law</td>
<td>3</td>
</tr>
<tr>
<td>or SLS 3110Tech and Sustain Community</td>
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**Concentration**

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<tr>
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<tr>
<td>CS 2110</td>
<td>Computer Organiz&amp;Program</td>
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<tr>
<td>CS 3451</td>
<td>Computer Graphics</td>
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<td>CS 3510</td>
<td>Dsgn&amp;Analysis-Algorithms</td>
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<td>or CS 3511</td>
<td>Algorithms Honors</td>
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<td>CS 4510</td>
<td>Automata and Complexity</td>
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<td>CS 4540</td>
<td>Advanced Algs</td>
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<td>MATH 3406</td>
<td>Second Course Linear Alg</td>
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Select two of the following for Media Technologies:

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<tr>
<td>CS 4455</td>
<td>Video Game Design</td>
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<tr>
<td>CS 4460</td>
<td>Intro Info Visualization</td>
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<td>CS 4464</td>
<td>Computational Journalism</td>
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<tr>
<td>CS 4475</td>
<td>Comp Photography</td>
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<td>CS 4480</td>
<td>Digital Video Special FX</td>
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<tr>
<td>CS 4496</td>
<td>Computer Animation</td>
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<td>CS 4590</td>
<td>Computer Audio</td>
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<tr>
<td>Select one of the following for Advanced Mathematics:</td>
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<td>MATH 4022Intro to Graph Theory</td>
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<td>MATH 4032Combinatorial Analysis</td>
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<td>MATH 4150Intro To Number Theory</td>
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**Other Required Courses**

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<tr>
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<td>MATH 3012</td>
<td>Applied Combinatorics</td>
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Select one of the following:

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<tr>
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<th>Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>MATH 3215</td>
<td>Probability &amp; Statistics</td>
<td>4</td>
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</tbody>
</table>
MATH 3670 Statistics and Applns
CEE 3770 Statistics & Applications
ISYE 3770 Statistics & Applications
or ISYE 2800 Probability With Apps
& ISYE 2828 Basic Statistical Meth

Free Electives
Free Electives 17

Total Credit Hours 126

Pass-Fail only allowed for Free Electives (max six credit hours), CS 1100, and
and ISYE 2027 (or ISYE 2028 & ISYE 2828).
1 Minimum grade of C required.
2 Two of three lab sciences MUST be a sequence.
3 Junior Design Options are as follows (students must pick one option and
may not change):
   - Option 1 - LMC 3432, LMC 3431, CS 3311, CS 3312.
   - Option 2 - ECE VIP courses and LMC 3403
   - Option 3 - Satisfy Georgia Tech Research Option.
   - Option 4 - CSE 2701 (3 hours), CS 4699-I2P (3 hours), LMC 3403 (3 hours) = 9
     hours OR CS 4699-I2P (6 hours), LMC 3403 (3 hours) = 9 hours

   Six credits of the Junior Design option are used as Major
   Requirements and the average credits of research/VIP (5 credit
   hours/2 credit hours) may be used as free electives. Students
   completing VIP for their junior design requirement will be required to
   complete at least three semesters of VIP. (VIP 1 + VIP 2 + VIP 3) (for
   a total of 5 credit hours) + LMC 3403 = 8 hours of VIP credit.

   Students using CREATE-X for junior design take at least 6 hours
   of CREATE-X Start-up Lab and Idea 2 Prototype (I2P) and 3 of the 6
   hours must be I2P. Students take these 6 hours with LMC 3403 (3
   hours) for a total of 9 hours. Extra three hours for CREATE-X option
   can be used in free electives.
4 Two credit hours of MATH 1554 may count along with MATH 2550 to
give Area F 18 credit hours.

Cooperative Programs
The College of Computing participates in the undergraduate and graduate
Cooperative Programs. See links below for further information:
   - Undergraduate Cooperative Plan (http://catalog.gatech.edu/
     academics/special-academic-programs/experiential-education/
     center-career-discovery-development)
   - Graduate Cooperative Plan (http://catalog.gatech.edu/academics/
     special-academic-programs/experiential-education/graduate-
     cooperative-plan)

International Plan
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   b. Research may be for either pay or credit;
2. Write an undergraduate thesis/report of research on their findings;
3. Take
   a. LMC 4701: Undergraduate Research Proposal Writing (taken
during the first or second semester of research)
   b. LMC 4702: Undergraduate Research Thesis Writing (taken during
the thesis writing semester).

Research Classes
The following classes count toward fulfillment of the Research Option:

Research for Credit

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 2699</td>
<td>Undergraduate Research (Freshman and Sophomore)</td>
<td>1-12</td>
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<tr>
<td>CS 4699</td>
<td>Undergraduate Research (Junior and Senior)</td>
<td>1-12</td>
</tr>
<tr>
<td>CS 4980</td>
<td>Research Capstone Proj</td>
<td>1-21</td>
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</table>

Research for Pay (Audit only)

<table>
<thead>
<tr>
<th>Code</th>
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</thead>
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<tr>
<td>CS 2698</td>
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</tr>
<tr>
<td>CS 4698</td>
<td>Research Assistantship (Junior and Senior)</td>
<td>1-12</td>
</tr>
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</table>

To get credit toward completion of the Research Option for research for
pay, students must be registered for the appropriate audit-only, research
for pay class (CS 2698 or 4698). If work on research for pay begins
after the close of registration and the student has not signed up for the
appropriate class, unfortunately it is not possible to get credit toward the
Research Option for work that term.

A research project will also fulfill the capstone design requirement if
the student registers for CS 4980 for one of the research terms. This is
typically done the last semester of research, while taking LMC 4702.

Completion of the Research Option is noted on the student’s
transcript. For more information, see www.urop.gatech.edu (http://
www.urop.gatech.edu).

General Research Option Information (p. 90)

BS/MS in Computer Science
Students who want to pursue

the BS/MS option must apply to the MSCS program after completing at
least 60 hours of work towards the BSCS degree. Applicants should have
a cumulative GPA of at least 3.4. This GPA must be maintained for the
student to take graduate level courses.
Students admitted to the program will take 6 hours during their final undergraduate year to double count in both their BSCS and MSCS degrees; they should choose 3 hours of MS Core or Elective hours their fall semester and 3 hours of MS Core or Elective hours their spring semester that can count toward their thread hours and CS Specialization hours.

Visit College of Computing (https://www.cc.gatech.edu) for more information.

**Bachelor of Science in Computer Science - Thread: Theory & People**

The Threads™ represent partial paths through the curriculum. Thus, a student weaves a degree from these Threads. Students are not forced to make Thread decisions very early in their academic careers; however, they may if they want. We define the Threads so they are flexible enough to allow for a variety of technical and creative experiences. Threads are coherent enough that students develop computing skills even if their focus shifts as they go along.

The Theory thread is where computing meets itself. Theory teaches students the theoretical and mathematical foundations underlying a wide range of computational disciplines. Early preparation includes discrete mathematics, algorithms, and complexity. Knowledge goals are for students to mature in development and analysis of abstract models for physics, biology, mathematics, economics, and optimization.

The People thread is where computing meets users. This thread prepares students by helping them to understand the theoretical and computational foundations for designing, building, and evaluating systems that treat the human as a central component.

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<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
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<tr>
<td>APPH 1040</td>
<td>Sci Foundation of Health</td>
<td>2</td>
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<tr>
<td>or APPH 10</td>
<td>Sci of Phys Act &amp; Health</td>
<td></td>
</tr>
<tr>
<td>Core A - Essential Skills</td>
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<tr>
<td>ENGL 1101</td>
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<tr>
<td>ENGL 1102</td>
<td>English Composition II</td>
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<td>MATH 1552</td>
<td>Integral Calculus</td>
<td>4</td>
</tr>
<tr>
<td>Core B - Institutional Options</td>
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<td>CS 1301</td>
<td>Intro to Computing ¹</td>
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<td>Core C - Humanities</td>
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<td>Any HUM (p. 93)</td>
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<td>6</td>
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<td>Core D - Science, Math, &amp; Technology</td>
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<td>PHYS 2211</td>
<td>Intro Physics I ²</td>
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<td>Lab Science</td>
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<td>MATH 1551</td>
<td>Differential Calculus</td>
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<td>MATH 1554</td>
<td>Linear Algebra ⁴</td>
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<td>or MATH 1564</td>
<td>Linear Alg w Abstract Vec Sp</td>
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<tr>
<td>HIST 2112</td>
<td>United States since 1877</td>
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<tr>
<td>INTA 1200</td>
<td>American Government</td>
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**Major Requirements**

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<td>CS 1100</td>
<td>Freshman Leap Seminar</td>
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<tr>
<td>CS 1331</td>
<td>Intro-Object Orient Prog   ¹</td>
<td>3</td>
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<tr>
<td>CS 1332</td>
<td>Data Struct &amp; Algorithms ¹</td>
<td>3</td>
</tr>
<tr>
<td>CS 2050</td>
<td>Intro Discrete Math ¹</td>
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<tr>
<td>or CS 2051</td>
<td>Honors Discrete Math CS</td>
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</tr>
<tr>
<td>MATH 2550</td>
<td>Intro Multivariable Calc ⁴</td>
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**Junior Design Options (Capstone)**

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<tr>
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<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
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<table>
<thead>
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<th>Concentration</th>
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<tr>
<td>CS 2110</td>
<td>Computer Organiz&amp;Program</td>
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<tr>
<td>CS 3510</td>
<td>Dsgn&amp;Analysis-Algorithms ¹</td>
<td>3</td>
</tr>
<tr>
<td>or CS 3511</td>
<td>Algorithms Honors</td>
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<tr>
<td>CS 4510</td>
<td>Automata and Complexity</td>
<td>3</td>
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<tr>
<td>CS 4540</td>
<td>Advanced Algs ¹</td>
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<td>MATH 3406</td>
<td>Second Course Linear Alg ¹</td>
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<td>PSYC 2015</td>
<td>Research Methods ¹</td>
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<tr>
<td>CS 3750</td>
<td>User Interface Design ¹</td>
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Select one of the following for Social/Behavioral Science for Computing: ¹

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<th>Credit Hours</th>
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<tbody>
<tr>
<td>PSYC 2210</td>
<td>Social Psychology</td>
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<tr>
<td>PSYC 2760</td>
<td>Human Language Process</td>
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<tr>
<td>PSYC 3040</td>
<td>Sensation &amp; Perception</td>
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Select one of the following for Advanced Mathematics: ¹

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 4022</td>
<td>Intro to Graph Theory</td>
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<tr>
<td>MATH 4150</td>
<td>Intro To Number Theory</td>
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</tr>
<tr>
<td>MATH 4032</td>
<td>Combinatorial Analysis</td>
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**Other Required Courses**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>MATH 3012</td>
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</tbody>
</table>

Select one of the following:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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<tbody>
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<td>MATH 3215</td>
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<td>MATH 3670</td>
<td>Statistics and Applns</td>
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</tr>
<tr>
<td>CEE 3770</td>
<td>Statistics&amp;Applications</td>
<td></td>
</tr>
</tbody>
</table>
International Plan

The College of Computing (http://www.cc.gatech.edu) has an approved BS CS International Plan that accommodates the unique requirements of this option discussed in the International Plan section of the catalog (p. 86).

However, due to the flexible nature of the Threads curriculum, the International Plan designation may not be available with all of the Thread combinations. Efforts will be made to work with interested students to accommodate their individual circumstances with regard to the International Plan designator for the Bachelor of Science in Computer Science.

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To complete the Research Option in the College of Computing, students must:

1. Complete at least nine units of undergraduate research
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2. Write an undergraduate thesis/report of research on their findings;

3. Take
   a. LMC 4701: Undergraduate Research Proposal Writing (taken during the first or second semester of research)
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Research for Pay (Audit only)

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<tr>
<th>Code</th>
<th>Title</th>
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<tbody>
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<td>Research Assistantship (Freshman and Sophomore)</td>
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<td>Research Assistantship (Junior and Senior)</td>
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**Bachelor of Science in Computer Science - Thread: Theory & Systems and Architecture**

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The Systems and Architecture thread is where many of the practical skills of computing are learned. Like Theory, Systems and Architecture lies at the center of computing. It prepares students to create and evaluate computer architectures, systems, and languages across a variety of paradigms and approaches.

The Theory thread is where computing meets itself. Theory teaches students the theoretical and mathematical foundations underlying a wide range of computational disciplines. Early preparation includes discrete mathematics, algorithms, and complexity. Knowledge goals are for students to mature in development and analysis of abstract models for applications ranging from theoretical computer science to computational physics, biology, mathematics, economics, and optimization.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Wellness</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>APPH 1040</td>
<td>Sci Foundation of Health</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>or APPH 10 Sci of Phys Act &amp; Health</td>
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<tr>
<td><strong>Core A - Essential Skills</strong></td>
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<td></td>
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<tr>
<td>ENGL 1101</td>
<td>English Composition I</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 1102</td>
<td>English Composition II</td>
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</tr>
<tr>
<td>MATH 1552</td>
<td>Integral Calculus</td>
<td>4</td>
</tr>
<tr>
<td><strong>Core B - Institutional Options</strong></td>
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<tr>
<td>CS 1301</td>
<td>Intro to Computing</td>
<td>3</td>
</tr>
<tr>
<td><strong>Core C - Humanities</strong></td>
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<td></td>
</tr>
<tr>
<td>Any HUM (p. 93)</td>
<td></td>
<td>6</td>
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<tr>
<td><strong>Core D - Science, Math, &amp; Technology</strong></td>
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<td>PHYS 2211</td>
<td>Intro Physics I²</td>
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<td>Lab Science ²</td>
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<td>MATH 1551</td>
<td>Differential Calculus</td>
<td>2</td>
</tr>
<tr>
<td>MATH 1554</td>
<td>Linear Algebra ⁴</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>or MATH 156#Algm w Abstract Vec Sp</td>
<td></td>
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<tr>
<td><strong>Core E - Social Sciences</strong></td>
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<tr>
<td>HIST 2111</td>
<td>United States to 1877</td>
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<table>
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<tr>
<th>Code</th>
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<th>Credit Hours</th>
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<td>CS 1100</td>
<td>Freshman Leap Seminar</td>
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<td>CS 1331</td>
<td>Intro-Object Orient Prog</td>
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<td>Data Struct &amp; Algorithms</td>
<td>3</td>
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<tr>
<td>CS 2050</td>
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<td>or CS 2051</td>
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<td>MATH 2550</td>
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<td>CS 4001</td>
<td>Computing &amp; Society</td>
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<td>Tech and Sustain Community</td>
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<td>CS 2200</td>
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<td>Design-Operating Systems</td>
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<td>Processor Design</td>
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<td>Dsgn&amp;Analysis-Algorithms</td>
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<td>or CS 3511</td>
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<td>CS 4510</td>
<td>Automata and Complexity</td>
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<td>CS 4540</td>
<td>Advanced Algs</td>
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<td>Select one of the following for Systems Software Tools: ¹</td>
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<tr>
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<td>Intro to Software Engr</td>
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<td>CS 4240</td>
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<td>Select one of the following for Advanced Systems Architectures: ¹</td>
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<td>Adv Operating Systems</td>
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<td>CS 4220</td>
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<td>CS 4290</td>
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<td>MATH 4032Combinatorial Analysis</td>
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<td>MATH 4150Intro To Number Theory</td>
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<tr>
<td><strong>Other Required Courses</strong></td>
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<td>MATH 3012</td>
<td>Applied Combinatorics</td>
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<td>ISYE 3770</td>
<td>Statistics&amp;Applications</td>
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</tbody>
</table>
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   a. LMC 4701: Undergraduate Research Proposal Writing (taken during the first or second semester of research)
   b. LMC 4702: Undergraduate Research Thesis Writing (taken during the thesis writing semester).

Research Classes

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<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 2699</td>
<td>Undergraduate Research (Freshman and Sophomore)</td>
<td>1-12</td>
</tr>
<tr>
<td>CS 4699</td>
<td>Undergraduate Research (Junior and Senior)</td>
<td>1-12</td>
</tr>
<tr>
<td>CS 4980</td>
<td>Research Capstone Proj</td>
<td>1-21</td>
</tr>
</tbody>
</table>

Research for Pay (Audit only)

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 2698</td>
<td>Research Assistantship (Freshman and Sophomore)</td>
<td>1-12</td>
</tr>
<tr>
<td>CS 4698</td>
<td>Research Assistantship (Junior and Senior)</td>
<td>1-12</td>
</tr>
</tbody>
</table>

To get credit toward completion of the Research Option for research for pay, students must be registered for the appropriate audit-only, research for pay class (CS 2698 or 4698). If work on research for pay begins after the close of registration and the student has not signed up for the appropriate class, unfortunately it is not possible to get credit toward the Research Option for work that term.

A research project will also fulfill the capstone design requirement if the student registers for CS 4980 for one of the research terms. This is typically done the last semester of research, while taking LMC 4702.

Completion of the Research Option is noted on the student’s transcript. For more information, see www.urop.gatech.edu (http://www.urop.gatech.edu).

General Research Option Information (p. 90)

BS/MS in Computer Science

Students who want to pursue

the BS/MS option must apply to the MScS program after completing at least 60 hours of work towards the BScS degree. Applicants should have a cumulative GPA of at least 3.4. This GPA must be maintained for the student to take graduate level courses.
Students admitted to the program will take 6 hours during their final undergraduate year to double count in both their BSCS and MSCS degrees; they should choose 3 hours of MS Core or Elective hours in their fall semester and 3 hours of MS Core or Elective hours in their spring semester that can count toward their thread hours and CS Specialization hours.

Visit College of Computing (https://www.cc.gatech.edu) for more information.

**Bachelor of Science in Discrete Mathematics**

Certain areas of mathematics have become increasingly important over the past thirty years due to the introduction of computing into nearly every aspect of science, technology, and business. These are the branches of mathematics that are devoted to the study of discrete as opposed to continuous structures. Methods of discrete mathematics are used whenever objects are to be counted, when the relationships between finite sets are examined, and when processes involving a finite number of steps are studied. These methods become essential when, for example, computer algorithms are analyzed, transportation networks or communications systems are designed, or when optimal schedules are sought.

Many problems associated with the transmission and storage of information, the design of complicated circuits, or the identification of organic chemicals require the tools of discrete mathematics. Several fields of application, most notably operations research and computer science, not only use the techniques of discrete mathematics, but have also contributed significantly to the development of the subject. For example, computer algorithms are analyzed, transportation networks or communications systems are designed, or when optimal schedules are sought.

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<tr>
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<tbody>
<tr>
<td></td>
<td>Mathematics</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Computer Science</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Industrial and Systems Engineering</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Approved Technical Electives in MATH, Computing, ECE, and Operations Research</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>Senior Research Project</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Free Electives</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Total Credit Hours</td>
<td>56</td>
</tr>
</tbody>
</table>

In addition to the Institute requirement of a grade-point average of at least 2.0, the School of Mathematics requires a grade of C or higher in

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<td>3</td>
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<td>MATH 4107 Abstract Algebra I</td>
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<td>3</td>
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</table>

Students may count no more than two credit hours of coursework in physical education toward graduation. Only free electives and MATH 4999 in the degree program may be taken on a pass/fail basis, and no more than nine credit hours are allowed under this option.

Math Undergraduate Website (http://www.math.gatech.edu/academics/undergraduate/undergraduate-programs)

- Bachelor of Science in Discrete Mathematics - General (p. 333)
- Bachelor of Science in Discrete Mathematics - Business Option (p. 331)

**Business and Research Options**

A student may elect to complete both the Business Option and the Research Option.

Completion of the Business and Research Options is noted by "Business Option" and "Research Option" designations on the student's transcript.

Math Undergraduate Website (http://www.math.gatech.edu/academics/undergraduate/undergraduate-programs)

**Research Option**

<table>
<thead>
<tr>
<th>Code</th>
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<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>MATH 2698 Research Assistantship</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>&amp; MATH 469 and Research Assistantship (for pay)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MATH 2699 Undergraduate Research &amp; MATH 469 and Undergraduate Research (for credit)</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>LMC 4701 US Rsch Proposal Writing (take during the first or second semester of research)</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>LMC 4702 US Rsch Thesis Writing (take during the thesis-writing semester)</td>
<td>1</td>
</tr>
</tbody>
</table>

Total Credit Hours 11

1 supervised research with a faculty advisor over two to three semesters
2 Four credit hours of MATH 4699 may be used in place of MATH 4080 and MATH 4090 for the BS in Discrete Mathematics.
3 a short proposal on their research project is developed
4 prepare a research report (research paper, project report/thesis); and make an oral presentation of the project

Completion of this Research Option is noted by the designation "Research Option in Mathematics" on the student's transcript.

For more information, visit: http://www.undergradresearch.gatech.edu/research-option/.

Math Undergraduate Website (http://www.math.gatech.edu/academics/undergraduate/undergraduate-programs)

**Bachelor of Science in Discrete Mathematics - Business Option**

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<td></td>
<td>Approved Technical Electives in MATH, Computing, ECE, and Operations Research</td>
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</tr>
<tr>
<td></td>
<td>Senior Research Project</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Free Electives</td>
<td>12</td>
</tr>
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<td></td>
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</tr>
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<td>MATH 4107 Abstract Algebra I</td>
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</tr>
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<td></td>
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Math Undergraduate Website (http://www.math.gatech.edu/academics/undergraduate/undergraduate-programs)

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<thead>
<tr>
<th>Code</th>
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<tr>
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<tr>
<td></td>
<td>APPH 1040 Sci Foundation of Health</td>
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<tr>
<td></td>
<td>or APPH 10 Sci of Phys Act &amp; Health</td>
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Core A - Essential Skills

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<tr>
<th>Code</th>
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<tbody>
<tr>
<td></td>
<td>ENGL 1101 English Composition I</td>
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<td></td>
<td>ENGL 1102 English Composition II</td>
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</tr>
<tr>
<td></td>
<td>MATH 1552 Integral Calculus</td>
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</tr>
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</table>

Core B - Institutional Options

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>CS 1301 Intro to Computing</td>
<td>3</td>
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</table>

Core C - Humanities

Any HUM (p. 93) | 6 |

Core D - Science, Math, & Technology

<table>
<thead>
<tr>
<th>Code</th>
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<th>Credit Hours</th>
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<tr>
<td></td>
<td>PHYS 2211 Intro Physics I</td>
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</tr>
<tr>
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<td>PHYS 2212 Intro Physics II</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>MATH 1551 Differential Calculus</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>MATH 1553 Intro to Linear Algebra</td>
<td>2</td>
</tr>
</tbody>
</table>

Core E - Social Sciences

Select one of the following: | 3 |
|        | HIST 2111 United States to 1877         |              |
|        | HIST 2112 United States since 1877      |              |
|        | INTA 1200 American Government           |              |
|        | POL 1101 Government of the U.S.         |              |
|        | PUBP 3000 US Constitutional Issues      |              |
|        | ECON 2106 Prin of Microeconomics        | 3            |
|        | Any SS (p. 97)                          | 6            |

Core F - Courses Related to Major

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 1331</td>
<td>Intro-Object Orient Prog</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Lab Science</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>MATH 2551 Multivariable Calculus</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>MATH 2406 Abstract Vector Spaces</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>MATH 2603 Intro Discrete Math</td>
<td>4</td>
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</table>

Upper-Level MATH

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>MATH 3012</td>
<td>Applied Combinatorics</td>
<td>3</td>
</tr>
<tr>
<td>MATH 3215</td>
<td>Probability &amp; Statistics</td>
<td>3</td>
</tr>
<tr>
<td>MATH 4022</td>
<td>Intro to Graph Theory</td>
<td>3</td>
</tr>
<tr>
<td>MATH 4080</td>
<td>Senior Project I</td>
<td>2</td>
</tr>
<tr>
<td>MATH 4090</td>
<td>Senior Project II</td>
<td>2</td>
</tr>
<tr>
<td>MATH 4107</td>
<td>Abstract Algebra I</td>
<td>3</td>
</tr>
<tr>
<td>MATH 4317</td>
<td>Analysis I</td>
<td>3</td>
</tr>
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</table>

Additional CS Coursework

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>CS 2050</td>
<td>Intro Discrete Math CS</td>
<td>3</td>
</tr>
<tr>
<td>or CS 2051</td>
<td>Honors Discrete Math CS</td>
<td></td>
</tr>
<tr>
<td></td>
<td>LAB SC</td>
<td>4</td>
</tr>
<tr>
<td>CS 3510</td>
<td>Dsgn&amp;Analysis-Algorithms</td>
<td>3</td>
</tr>
<tr>
<td>CS 4510</td>
<td>Automata and Complexity</td>
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</table>

Industrial Engineering Requirements

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>ISYE 3232</td>
<td>Stochastic Mfg&amp;Serv Sys</td>
<td>3</td>
</tr>
<tr>
<td>ISYE 3133</td>
<td>Engineering Optimization</td>
<td>3</td>
</tr>
<tr>
<td>or MATH 451</td>
<td>Linear Programming</td>
<td></td>
</tr>
</tbody>
</table>

Technical Electives

Select one of the following: | 3 |
| MATH 2551 Multivariable Calculus |          |
| MATH 4012 Coding Theory         |          |
| MATH 4032 Combinatorial Analysis |        |
| MATH 4108 Abstract Algebra II   |          |
| MATH 4150 Intro To Number Theory |        |
| MATH 4221 Stochastic Processes I |        |
| MATH 4222 Stochastic Processes II |       |
| MATH 4255 Monte Carlo Methods   |          |
| MATH 4261 Math Statistics I     |          |
| MATH 4262 Math Statistics II    |          |
MATH 4280 Information Theory
MATH 4318 Analysis II
MATH 4320 Complex Analysis
MATH 4431 Introduction to Topology
MATH 4432 Algebraic Topology
MATH 4640 Numerical Analysis I
MATH 4641 Numerical Analysis II
MATH 4777 Vector & Parallel Sci Comp
MATH 4782 Quantum Info & Quant Comp
CS 2200 Systems and Networks
CS 3220 Processor Design
CS 3240 Languages and Computation
CS 3251 Computer Networking I
CS 3451 Computer Graphics
CS 4540 Advanced Algs
ECE 2025 Intro-Signal Processing
ECE 2030 Intro to Computer Engr
ECE 2031 Digital Design Lab
ECE 3055 Computer Arch & Oper Sys
ECE 3075 Random Signals
ECE 4270 Fund-Digital Signal Proc
ISYE 3044 Simulation Analy & Dsgn
ISYE 3103 Sply Chain Mod:Logistics
ISYE 3104 Sply Chain Mod:Manf&Ware
ISYE 4833 Honors Topics

Business Option

ACCT 2101 Accounting I
or MGT 300 Financ & Managerial Acct
PSYC 2220 Industrial/Organiz Psy
or MGT 310 Orgnanizational Behavior
or MGT 315韵in of Management

Select two of the following:

MGT 3062 Financial Management
MGT 3078 Finance & Investments
MGT 3300 Marketing Management I
MGT 3660 International Business
MGT 4015 Adv Managerial Acct
MGT 4026 Fin Report & Analysis I
MGT 4028 Fin Analy & Rpt-Tech Firms
MGT 4030 International Accounting
MGT 4190 Strategic Quality Mgt
MGT 4191 Entrepreneurship Forum
MGT 4192 IMPACT Forum
MGT 4193 Serv Lead Values Systems
MGT 4194 Social Entrepreneurship
MGT 4303 Personal Sell & Sales Mgt
MGT 4304 Strategic Brand Mgt
MGT 4307 Strategic Marketing
MGT 4335 International Marketing
MGT 4610 Law, Mgt, & Economics
MGT 4670 Entrepreneurship

Free Electives
Free Electives 4
6
Total Credit Hours 122

Pass-fail only allowed for Free Electives.

1 If PHYS 2231 is taken, extra hour goes toward Free Electives.
2 If PHYS 2232 is taken, extra hour goes toward Free Electives.
3 Minimum grade of C required.
4 MATH 1113, MATH 3670, CEE 3770, and ISYE 3770 are restricted from counting towards Free Electives. Limit two credit hours of HPS coursework.

Business and Research Options

A student may elect to complete both the Business Option and the Research Option.

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Math Undergraduate Website (http://www.math.gatech.edu/academics/undergraduate/undergraduate-programs)

Research Option

Select one of the following Research Options: 1

MATH 2698 Research Assistantship
MATH 4698 Research Assistantship (for pay)

MATH 2699 Undergraduate Research
MATH 4699 Undergraduate Research (for credit)

LMC 4701 US Rsch Proposal Writing (take during the first or second semester of research) 3
LMC 4702 US Rsch Thesis Writing (take during the thesis-writing semester) 4

Total Credit Hours 11

1 supervised research with a faculty advisor over two to three semesters
2 Four credit hours of MATH 4699 may be used in place of MATH 4080 and MATH 4090 for the BS in Discrete Mathematics.
3 a short proposal on their research project is developed
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Completion of this Research Option is noted by the designation “Research Option in Mathematics” on the student’s transcript.

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<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>APPH 1040</td>
<td>Sci Foundation of Health</td>
<td>2</td>
</tr>
<tr>
<td>or APPH 10</td>
<td>Sci of Phys Act &amp; Health</td>
<td></td>
</tr>
</tbody>
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<tr>
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<tbody>
<tr>
<td>ENGL 1101</td>
<td>English Composition I</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 1102</td>
<td>English Composition II</td>
<td>3</td>
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Code | Title                                      | Credit Hours |
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<th></th>
<th></th>
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</thead>
<tbody>
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<td>MATH 1552</td>
<td>Integral Calculus</td>
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Core B - Institutional Options

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<tbody>
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<td>CS 1301</td>
<td>Intro to Computing</td>
<td>3</td>
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Core C - Humanities

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<th>Credit Hours</th>
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</table>

Core D - Science, Math, & Technology

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<tbody>
<tr>
<td>PHYS 2211</td>
<td>Intro Physics I</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 2212</td>
<td>Intro Physics II</td>
<td>4</td>
</tr>
<tr>
<td>MATH 1551</td>
<td>Differential Calculus</td>
<td>2</td>
</tr>
<tr>
<td>MATH 1553</td>
<td>Intro to Linear Algebra</td>
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Core E - Social Sciences

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</thead>
<tbody>
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</tr>
<tr>
<td>HIST 2112</td>
<td>United States since 1877</td>
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<tr>
<td>INTA 1200</td>
<td>American Government</td>
<td></td>
</tr>
<tr>
<td>POL 1101</td>
<td>Government of the U.S.</td>
<td></td>
</tr>
<tr>
<td>PUBP 3000</td>
<td>US Constitutional Issues</td>
<td></td>
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Any SS (p. 97)

Core F - Courses Related to Major

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<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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<tbody>
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<td>CS 1331</td>
<td>Intro-Object Orient Prog</td>
<td>3</td>
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<tr>
<td>Lab Science</td>
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<tr>
<td>MATH 2551</td>
<td>Multivariable Calculus</td>
<td>4</td>
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<tr>
<td>MATH 2406</td>
<td>Abstract Vector Spaces</td>
<td>3</td>
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<tr>
<td>MATH 2603</td>
<td>Intro Discrete Math</td>
<td>4</td>
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Upper-Level MATH

<table>
<thead>
<tr>
<th>Code</th>
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<tbody>
<tr>
<td>MATH 3012</td>
<td>Applied Combinatorics</td>
<td>3</td>
</tr>
<tr>
<td>MATH 3215</td>
<td>Probability &amp; Statistics</td>
<td>3</td>
</tr>
<tr>
<td>MATH 4022</td>
<td>Intro to Graph Theory</td>
<td>3</td>
</tr>
<tr>
<td>MATH 4080</td>
<td>Senior Project I</td>
<td>2</td>
</tr>
<tr>
<td>MATH 4090</td>
<td>Senior Project II</td>
<td>2</td>
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<tr>
<td>MATH 4107</td>
<td>Abstract Algebra I</td>
<td>3</td>
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<tr>
<td>MATH 4317</td>
<td>Analysis I</td>
<td>3</td>
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Additional CS Coursework

<table>
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<tbody>
<tr>
<td>CS 2050</td>
<td>Intro Discrete Math CS</td>
<td>3</td>
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<tr>
<td>or CS 2051</td>
<td>Honors Discrete Math CS</td>
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<tr>
<td>CS 3510</td>
<td>Desgn&amp;Analysis-Algorithms</td>
<td>3</td>
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<tr>
<td>CS 2110</td>
<td>Computer Organiz&amp;Program</td>
<td>4</td>
</tr>
<tr>
<td>CS 4510</td>
<td>Automata and Complexity</td>
<td>3</td>
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</table>

Industrial Engineering Requirements

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>ISYE 3232</td>
<td>Stochastic Mfg &amp; Serv Sys</td>
<td>3</td>
</tr>
<tr>
<td>ISYE 3133</td>
<td>Engineering Optimization</td>
<td>3</td>
</tr>
<tr>
<td>or MATH 45B</td>
<td>bear Programming</td>
<td></td>
</tr>
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</table>

Technical Electives

Select nine credit hours from the following:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 2552</td>
<td>Differential Equations</td>
<td>3</td>
</tr>
<tr>
<td>MATH 4012</td>
<td>Coding Theory</td>
<td></td>
</tr>
<tr>
<td>MATH 4032</td>
<td>Combinatorial Analysis</td>
<td></td>
</tr>
<tr>
<td>MATH 4108</td>
<td>Abstract Algebra II</td>
<td></td>
</tr>
<tr>
<td>MATH 4150</td>
<td>Intro To Number Theory</td>
<td></td>
</tr>
<tr>
<td>MATH 4221</td>
<td>Stochastic Processes I</td>
<td></td>
</tr>
<tr>
<td>MATH 4222</td>
<td>Stochastic Processes II</td>
<td></td>
</tr>
<tr>
<td>MATH 4255</td>
<td>Monte Carlo Methods</td>
<td></td>
</tr>
</tbody>
</table>
MATH 4261 Math Statistics I
MATH 4262 Math Statistics II
MATH 4280 Information Theory
MATH 4318 Analysis II
MATH 4320 Complex Analysis
MATH 4431 Introduction to Topology
MATH 4432 Algebraic Topology
MATH 4640 Numerical Analysis I
MATH 4641 Numerical Analysis II
MATH 4777 Vector & Parallel Sci Comp
MATH 4782 Quantum Info & Quant Comp
CS 2200 Systems and Networks
CS 3220 Processor Design
CS 3240 Languages and Computation
CS 3251 Computer Networking I
CS 3451 Computer Graphics
CS 4540 Advanced Algs
ECE 2025 Intro-Signal Processing
ECE 2030 Intro to Computer Engr
ECE 2031 Digital Design Lab
ECE 3055 Computer Arch & Oper Sys
ECE 3075 Random Signals
ECE 3085 Intro Systems & Control
ECE 4270 Fund-Digital Signal Proc
ISYE 3044 Simulation Analy & Dsgn
ISYE 3103 Sply Chain Mod: Logistics
ISYE 3104 Sply Chain Mod: Manf & Ware
ISYE 4833 Honors Topics

Free Electives
Free Electives 5 12

Total Credit Hours 122

Pass-fail only allowed for Free Electives.

1 If PHYS 2231 is taken, extra hour goes toward Free Electives.
2 If PHYS 2232 is taken, extra hour goes toward Free Electives.
3 Minimum grade of C required.
5 MATH 1113, MATH 3670, CEE 3770, and ISYE 3770 are restricted from counting towards Free Electives. Limit two credit hours of HPS coursework.

Business and Research Options

A student may elect to complete both the Business Option and the Research Option.

Completion of the Business and Research Options is noted by "Business Option" and "Research Option" designations on the student's transcript.

Math Undergraduate Website (http://www.math.gatech.edu/academics/undergraduate/undergraduate-programs)

Research Option

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 2698</td>
<td>Research Assistantship &amp; MATH 469 and Research Assistantship (for pay)</td>
<td>9</td>
</tr>
<tr>
<td>MATH 2699</td>
<td>Undergraduate Research &amp; MATH 469nd Undergraduate Research (for credit)</td>
<td>2</td>
</tr>
<tr>
<td>LMC 4701</td>
<td>US Rsch Proposal Writing (take during the first or second semester of research)</td>
<td>1</td>
</tr>
<tr>
<td>LMC 4702</td>
<td>US Rsch Thesis Writing (take during the thesis-writing semester)</td>
<td>1</td>
</tr>
</tbody>
</table>

Total Credit Hours 11

1 supervised research with a faculty advisor over two to three semesters
2 Four credit hours of MATH 4699 may be used in place of MATH 4080 and MATH 4090 for the BS in Discrete Mathematics.
3 a short proposal on their research project is developed
4 prepare a research report (research paper, project report/thesis); and make an oral presentation of the project

Completion of this Research Option is noted by the designation "Research Option in Mathematics" on the student's transcript.

For more information, visit: http://www.undergradresearch.gatech.edu/research-option/.

Math Undergraduate Website (http://www.math.gatech.edu/academics/undergraduate/undergraduate-programs)

Bachelor of Science in Earth and Atmospheric Sciences

The EAS degree is comparable to traditional degrees in meteorology and environmental sciences, but the program has several unique attributes. EAS courses provide "hands-on" experiences in collection and interpretation of environmental data and in predictive modeling. The integrated approach of the program gives a broad environmental background while still allowing students to specialize in meteorology, earth science, education, or a business option. The program prepares students for graduate study or immediate employment in fields such as meteorology, air quality, environmental chemistry, exploration geophysics, geological engineering, geological hazards, impact assessment, and environmental policy. Electives (30 hours), both within the School and in other units of Georgia Tech, allow students considerable flexibility in tailoring their degree programs according to individual career goals. The School provides incentives and encouragement for undergraduate students to participate in ongoing research with the faculty.

EAS Undergraduate Information (http://www.eas.gatech.edu/undergrad/prospective-undergraduate-students)

• Bachelor of Science in Earth and Atmospheric Sciences - General (p. 338)
• Bachelor of Science in Earth and Atmospheric Sciences - Business Option (p. 336)
Bachelor of Science in Earth and Atmospheric Sciences - Business Option

The EAS degree is comparable to traditional degrees in meteorology and environmental sciences, but the program has several unique attributes. EAS courses provide "hands-on" experiences in collection and interpretation of environmental data and in predictive modeling. The integrated approach of the program gives a broad environmental background while still allowing students to specialize in meteorology, earth science, education, or a business option. The program prepares students for graduate study or immediate employment in fields such as meteorology, air quality, environmental chemistry, exploration geophysics, geological engineering, geological hazards, impact assessment, and environmental policy. Electives (30 hours), both within the School and in other units of Georgia Tech, allow students considerable flexibility in tailoring their degree programs according to individual career goals.

EAS Undergraduate Information (http://www.eas.gatech.edu/undergrad/prospective-undergraduate-students)
ECE 4270  Fund-Digital Signal Proc  
ISYE 3044  Simulation Analy & Dsgn  
ISYE 3103  Sply Chain Mod:Logistics  
ISYE 3104  Sply Chain Mod:Manf&Ware  
ISYE 4833  Honors Topics

**Business Option**

ACCT 2101  Accounting I  3
or MGT 300  Financ & Managerial Acct

PSYC 2220  Industrial/Organiz Psy  3
or MGT 310  Organizational Behavior
or MGT 315  Prin of Management

Select two of the following:  6

- MGT 3062  Financial Management
- MGT 3078  Finance & Investments
- MGT 3300  Marketing Management I
- MGT 3660  International Business
- MGT 4015  Adv Managerial Acct
- MGT 4026  Fin Report & Analysis I
- MGT 4028  Fin Analy&Rpt-Tech Firms
- MGT 4030  International Accounting
- MGT 4190  Strategic Quality Mgt
- MGT 4191  Entrepreneurship Forum
- MGT 4192  IMPACT Forum
- MGT 4193  Serv Lead Values Systems
- MGT 4194  Social Entrepreneurship
- MGT 4303  Personal Sell& Sales Mgt
- MGT 4304  Strategic Brand Mgt
- MGT 4307  Strategic Marketing
- MGT 4335  International Marketing
- MGT 4610  Law, Mgt, & Economics
- MGT 4670  Entrepreneurship

**Free Electives**

Free Electives  4
6

**Total Credit Hours**  122

Pass-fail only allowed for Free Electives.

1. If PHYS 2231 is taken, extra hour goes toward Free Electives.
2. If PHYS 2232 is taken, extra hour goes toward Free Electives.
3. Minimum grade of C required.
4. MATH 1113, MATH 3670, CEE 3770, and ISYE 3770 are restricted from counting towards Free Electives. Limit two credit hours of HPS coursework.

**International Plan**

The EAS with International Plan (EAS-IP) is designed to give a student a solid, global competence within the context of an Earth and Atmospheric Science degree.

The major course requirements are the same for both EAS and EAS-IP. Where they differ is that for the EAS-IP degree, a student:

1. Spends 26 weeks abroad engaged in any combination of study abroad, research, or internship.
2. Takes their Social Science/Humanities electives in targeted areas:
   a. International relations
   b. Global economics
   c. A course about a particular country or region

3. Complete the equivalent to two years of college-level language study. See Georgia IP requirements for the different options: www.internationalplan.gatech.edu/ (http://www.internationalplan.gatech.edu)
4. Complete a capstone course that combines their global experience with their EAS degree.

**Research Option**

The BS in Earth and Atmospheric Sciences with Research Option allows students to emphasize their interest in research. To complete the Research Option in the School of Earth and Atmospheric Sciences, students must:

1. Complete at least nine units of undergraduate research
   a. Courses should span at least two, preferably three terms (note there is also a two semester sequence of proposal and thesis writing courses - see below)
   b. Research may be for either pay (EAS 4698) or credit (EAS 4699)
   c. At least six of the nine required credit hours should be on the same topic
2. Complete a research proposal outlining their research topic and project for the thesis while taking LMC 4701.
3. Write an undergraduate thesis/report of research on their findings while taking LMC 4702.

To submit your intent form to Undergraduate Research Opportunities Program (UROP), please go to the web form at http://undergradresearch.gatech.edu/ This form must be completed and can also be reached from the main UROP webpage.

For further information, consult the EAS Undergraduate Coordinator.

**General Research Option Information (p. 90)**

**BS/MS Earth and Atmospheric Sciences**

EAS offers a BS/MS Program. EAS majors may apply to the BS/MS program after completing at least thirty semester credit hours at Georgia Tech with a GPA of at least 3.5.

Students admitted to the program must maintain a cumulative GPA of at least 3.0.

As part of the program, students may use up to 6 credit hours of graduate-level coursework in the major discipline for both degrees.

To apply, complete the BS/MS application form, a biographical statement, and two letters of recommendation.

EAS Undergraduate Information (http://www.eas.gatech.edu/undergrad/5-year-bsms)
The Bachelor of Science in Earth and Atmospheric Sciences (EAS) degree is comparable to traditional degrees in meteorology and environmental sciences, but the program has several unique attributes. EAS courses provide "hands-on" experiences in collection and interpretation of environmental data and in predictive modeling. The integrated approach of the program gives a broad environmental background while still allowing students to specialize in meteorology, earth science, education, or a business option. The program prepares students for graduate study or immediate employment in fields such as meteorology, air quality, environmental chemistry, exploration geophysics, geological engineering, geological hazards, impact assessment, and environmental policy. Electives (30 hours), both within the School and in other units of Georgia Tech, allow students considerable flexibility in tailoring their degree programs according to individual career goals. The School provides incentives and encouragement for undergraduate students to participate in ongoing research with the faculty.

EAS Undergraduate Information (http://www.eas.gatech.edu/undergrad/prospective-undergraduate-students)

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<tr>
<th>Code</th>
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<tr>
<td>APPH 1040</td>
<td>Sci Foundation of Health</td>
<td>2</td>
</tr>
<tr>
<td>or APPH 1050</td>
<td>Sci of Phys Act &amp; Health</td>
<td></td>
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<tr>
<td>ENGL 1101</td>
<td>English Composition I</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 1102</td>
<td>English Composition II</td>
<td>3</td>
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<tr>
<td>MATH 1552</td>
<td>Integral Calculus</td>
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<tr>
<td>CS 1371</td>
<td>Computing for Engineers</td>
<td>3</td>
</tr>
<tr>
<td>Any HUM (p. 93)</td>
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</tr>
<tr>
<td>PHYS 2211</td>
<td>Intro Physics I</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 2212</td>
<td>Intro Physics II</td>
<td>4</td>
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<tr>
<td>MATH 1551</td>
<td>Differential Calculus</td>
<td>2</td>
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<tr>
<td>MATH 1553</td>
<td>Intro to Linear Algebra</td>
<td>2</td>
</tr>
<tr>
<td>HIST 2111</td>
<td>United States to 1877</td>
<td>3</td>
</tr>
<tr>
<td>HIST 2112</td>
<td>United States since 1877</td>
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</tr>
<tr>
<td>INTA 1200</td>
<td>American Government</td>
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<tr>
<td>POL 1101</td>
<td>Government of the U.S.</td>
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<td>PUBP 3000</td>
<td>US Constitutional Issues</td>
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<td>Any SS (p. 97)</td>
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<td>Multivariable Calculus</td>
<td>4</td>
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<tr>
<td>MATH 2552</td>
<td>Differential Equations</td>
<td>4</td>
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<tr>
<td>CHEM 1211K</td>
<td>Chemical Principles I</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 1212K</td>
<td>Chemical Principles II</td>
<td>4</td>
</tr>
<tr>
<td>EAS 1600</td>
<td>Intro-Environmental Sci</td>
<td>4</td>
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</tbody>
</table>
4. Complete a capstone course that combines their global experience with their EAS degree.

EAS Undergraduate Information (http://www.eas.gatech.edu/undergrad/eas-major)

Research Option
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1. Complete at least nine units of undergraduate research
   a. Courses should span at least two, preferably three terms (note there is also a two semester sequence of proposal and thesis writing courses - see below)
   b. Research may be for either pay (EAS 4698) or credit (EAS 4699)
   c. At least six of the nine required credit hours should be on the same topic
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As part of the program, students may use up to 6 credit hours of graduate-level coursework in the major discipline for both degrees.

To apply, complete the BS/MS application form, a biographical statement, and two letters of recommendation.

EAS Undergraduate Information (http://www.eas.gatech.edu/undergrad/5-year-bsms)

Bachelor of Science in Economics
The program of study provides a thorough grounding in science, the humanities, and mathematics as well as the tools of economic analysis and decision making. In addition, the curriculum provides ample opportunities for career-oriented studies in fields such as accounting, finance, management science, public policy, and international affairs. Life-enriching studies in history and literature are also available.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>APPH 1040</td>
<td>Sci Foundation of Health</td>
<td>2</td>
</tr>
<tr>
<td>ENGL 1101</td>
<td>English Composition I</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 1102</td>
<td>English Composition II</td>
<td>3</td>
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<tr>
<td>MATH 1712</td>
<td>Survey of Calculus</td>
<td>4</td>
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<td>or MATH 151</td>
<td>Integral Calculus</td>
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<tr>
<td>Core A - Essential Skills</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Core B - Institutional Options</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Core C - Humanities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Core D - Science, Math, &amp; Technology</td>
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<td></td>
</tr>
<tr>
<td>Core E - Social Sciences</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Core F - Courses Related to Major</td>
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</tr>
<tr>
<td>ECON 2105</td>
<td>Prin of Macroeconomics</td>
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<tr>
<td>ECON 2106</td>
<td>Prin of Microeconomics</td>
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<tr>
<td>ECON 2250</td>
<td>Statistics for Economist</td>
<td>3</td>
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<tr>
<td>INTA 1200</td>
<td>American Government</td>
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<td>POL 1101</td>
<td>Government of the U.S.</td>
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<td>PUBP 3000</td>
<td>US Constitutional Issues</td>
<td>9</td>
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<tr>
<td>Core Electives</td>
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<tr>
<td>Non-Major Cluster</td>
<td></td>
<td>12</td>
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<tr>
<td>Free Electives</td>
<td></td>
<td>20</td>
</tr>
<tr>
<td>Total Credit Hours</td>
<td></td>
<td>122</td>
</tr>
</tbody>
</table>

Pass-fail only allowed for Free Electives.

Students must complete 39 hours of upper level (3000-/4000-level) courses. This requirement may be satisfied with a combination of major requirements, ECON electives, Non-Major Cluster courses and/or free electives.

1. 1000- or 2000-level course from the College of Engineering or College of Sciences. Please consult with advisor.
2. Must be selected from: AE 1770 or CEE 1770 or CS 1316 or CS 1331 or CS 1332 or ECE 2030 or ME 1770 or ME 2016 or MGT 2200.
Minimum grade of C required.

All twelve credit hours must come from the same discipline, or be part of a coherent theme. Please consult with advisor on course selection.

Courses may be applied toward completion of a minor.

International Plan
All degree programs offered by the School of Economics including the BS degree in Economics offer an International Plan (IP) Designation. In general the IP designation can be obtained by completing courses in three specified area:

1. Students are required to complete a general course in Global Economics.
2. Students are also required to complete a region specific course. Any number of International Affairs course can be used to fulfill this requirement.
3. Student are also required to complete a capstone course rounding out the international experience. The IP designation also requires students to become proficient in a language as well as spending at least twenty-six weeks in a foreign culture enrolled in school and/or participating in an internship experience.

Research Option
The School of Economics also participates in the Research Option plan offered by the Undergraduate Research Opportunities Program (UROP). The Research Option offers students the opportunity for in-depth research experience working under the guidance of a faculty mentor. Requirements for participation in the Research Option include completing nine hours of undergraduate research, at least six of which are on the same topic, writing a research proposal, taking two 1-hour courses: LMC 4701 (typically taken during the first or second semester of research) and LMC 4702 (taken during the term in which the thesis is written), and completing the thesis.

Bachelor of Science in Economics and International Affairs
The primary objectives of the Bachelor of Science degree in Economics and International Affairs are to provide students with:

1. a detailed understanding of economic theory and practice in the contemporary world;
2. an understanding of the global, interdependent, and multicultural environment in which they live; and
3. a set of quantitative and qualitative analytical skills centered around policy-oriented issue areas in economics and international affairs.

These skills will provide graduates with the capabilities to engage in strategic planning and analysis efforts in economic and international contexts.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGL 1102</td>
<td>English Composition II</td>
<td>3</td>
</tr>
<tr>
<td>MATH 1712</td>
<td>Survey of Calculus</td>
<td>4</td>
</tr>
<tr>
<td>or MATH 1552</td>
<td>Integral Calculus</td>
<td></td>
</tr>
</tbody>
</table>

Core B - Institutional Options

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 1315</td>
<td>Intro Media Computation</td>
<td>3</td>
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</table>

Core C - Humanities
Modern Language

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTA 1200</td>
<td>American Government</td>
<td>3</td>
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<tr>
<td>POL 1101</td>
<td>Government of the U.S.</td>
<td>4</td>
</tr>
<tr>
<td>PUBP 3000</td>
<td>US Constitutional Issues</td>
<td>3</td>
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</tbody>
</table>

Core D - Science, Math, & Technology

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 1711</td>
<td>Finite Mathematics</td>
<td>4</td>
</tr>
<tr>
<td>or MATH 1553</td>
<td>Differential Calculus &amp; MATH 154</td>
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</table>

Core E - Social Sciences

Select one of the following:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIST 2111</td>
<td>United States to 1877</td>
<td>3</td>
</tr>
<tr>
<td>HIST 2112</td>
<td>United States since 1877</td>
<td>3</td>
</tr>
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Core F - Courses Related to Major

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Core A - Essential Skills

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Core B - Institutional Options

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Core C - Humanities

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<td>Int'l Political Econ</td>
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Bachelor of Science in Electrical Engineering

The School of Electrical and Computer Engineering offers two undergraduate degree programs:

- electrical engineering (EE) and
- computer engineering (CmpE).

Both programs include elective hours, enabling students to individually tailor their programs to provide emphasis in a particular specialization or exposure to a broad range of subjects. Engineering analysis and design concepts are integrated throughout both programs, culminating in a common major design experience involving a broad range of issues including economic and societal considerations.

The EE program offers elective courses in a wide variety of specializations including analog electronics, bioengineering, computer engineering, systems and controls, microsystems and nanosystems, electronics packaging, digital signal processing, optics and photonics, electrical energy, electromagnetics, and telecommunications. Additionally, students may elect to take advanced courses in other programs such as computer science, mathematics, physics, or management.

Program Objectives

The School of Electrical and Computer Engineering has established the following student educational objectives for its undergraduate programs:

1. Graduates will be successful in the professional practice of engineering or other related fields. They will obtain employment appropriate to their background, interests, and education and will advance in their career field.

2. Graduates will engage in life-long learning; e.g., advanced education/degrees, professional development activities, and/or other career-appropriate options.

3. Graduates who are employed within engineering fields will demonstrate technical competence, such as identifying, formulating, analyzing, and creating engineering solutions using appropriate current engineering techniques, skills, and tools.

4. As appropriate to their professional or educational positions, graduates will
   a. effectively communicate technical information in multiple formats,
   b. function effectively on teams, and
   c. develop and apply electrical/computer engineering solutions within global, societal, and environmental contexts.

Additional information about program assessment (http://www.ece.gatech.edu/academics/accreditation.html) for all of the School's programs is available on the ECE website.

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1. Modern Language courses must be in the same language as used in Core Area C.
2. All nine credit hours must come from the same discipline, or be part of a coherent theme. Please consult with advisor on course selection.
3. Minimum grade of C required.

Approved instances of CS 2803 may be applied by advisor.
### Core A - Essential Skills
- **ENGL 1101** English Composition I 3
- **ENGL 1102** English Composition II 3
- **MATH 1552** Integral Calculus 4

### Core B - Institutional Options
- **CS 1301** Intro to Computing 3

### Core C - Humanities
- Any HUM (p. 93) 1

### Core D - Science, Math, & Technology
- **PHYS 2211** Intro Physics I 2,3 4
- **PHYS 2212** Intro Physics II 3 4
- **MATH 1551** Differential Calculus 3 2
- **MATH 1553** Intro to Linear Algebra 3 2

### Core E - Social Sciences
- Select one of the following: 3
  - **HIST 2111** United States to 1877
  - **HIST 2112** United States since 1877
  - **INTA 1200** American Government
  - **POL 1101** Government of the U.S.
  - **PUBP 3000** US Constitutional Issues

### Core F - Courses Related to Major
- **ECE 2020** Digital System Design 3 3
- **MATH 2551** Multivariable Calculus 3 4
- **MATH 2552** Differential Equations 3 4
- **CHEM 1310** General Chemistry 3 4
- **or CHEM 1210** Chemical Principles I

### Ethics Requirement (p. 100) 5

### Probability/Statistics 8

### Professional Communications 9

### Major Requirements
- **ECE 2026** Intro Signal Processing 3 3
- **ECE 2031** Digital Design Lab 3 2
- **ECE 2035** Programming HW/SW System 3 4
- **or ECE 2036** Engr Software Design
- **ECE 2040** Circuit Analysis 3 3
- **ECE 3025** Electromagnetics 3 3
- **ECE 3040** Microelectronic Circuits 3 4
- **ECE 3043** Circuits & Electronics Lab 3 3
- **ECE 3072** Elec Energy Systems 3 3
- **ECE 3084** Signals and Systems 3 3
- **ECE 4011** ECE Culminating Design 1 3 2
- **ECE 4012** ECE Culminating Design 2 3

### ECE Electives
- Senior Lab Elective 3,10
- **ECE 3-4000-Level Electives** 6,14 20

### Non-ECE Engineering Electives
- Electives 11,12,13 5

### Approved Electives
- **Approved Electives** 1,7 12

### Total Credit Hours 132

Pass-fail only allowed for Approved Electives, Humanities, and Social Sciences.

Courses that are cross-listed with ECE must be taken under the ECE number.

1. Students must complete an Ethics requirement. For a complete list of Ethics courses, please see: /academics/undergraduate/core-curriculum/ethics/ (p. 100)
2. If PHYS 2231 is taken, extra hour goes to Free Electives.
3. Minimum grade of C required.
4. Science Elective must be chosen from the following list: APH 3751, BIOL 1510, BIOL 1520, BIOL 3751, CHEM 1210, CHEM 1315, EAS 1600, EAS 1601, EAS 2600, PHYS 2021, PHYS 2022, or PHYS 2213.
5. Students must complete one Ethics course during their program. For a complete list of Ethics courses, please see: /academics/undergraduate/core-curriculum/ethics/ (p. 100)
6. ECE 3811, ECE 3812, ECE 3901, ECE 3902, ECE 3903, ECE 4699, ECE 4811, ECE 4812, ECE 4901, ECE 4902, and ECE 4903 not allowed.
7. The following courses are not allowed: HPS 1XXX, LMC 2661, LMC 2662, LMC 3661, LMC 3662, MATH 1113, MUSI 1008, MUSI 1009, MUSI 2008, MUSI 3008, MUSI 3009, MUSI 4008, and MUSI 4009, PHYS 2XXX (AP Credit). Maximum of six credit hours of Special Problems.
8. CEE 3770 or ISYE 3770 or MATH 3670 or ECE 3077 (Must be taken on Letter/Grade basis)
9. ECE 3005 or ECE 3006
10. ECE 4043 or ECE 4180 or ECE 4185 or ECE 4446 or ECE 4452 or ECE 4502 or ECE 4550 or ECE 4612 or ECE 4752 or ECE 4881 or ECE 4884 (with title ‘Optical Fiber Communications’)

Non-ECE Engineering Electives (5 credit hours; 2 Courses) 2000-level or above. Each course must be at least a 2 credit hour course. Allow only subject codes of AE, BMED, CEE, CHBE, COE, ISYE, ME, MSE, or NRE.

11. Cannot include BMED 2400, BMED 4781, BMED 4782, BMED 4783, BMED 4784, CHBE 2120, CHBE 4752, COE 3002, ISYE 2027, ISYE 2028, ME 2110, ME 4781, or ME 4782.
12. Cannot include any 28XX Special Topics courses or any Special Problems courses. Can only include one Thermodynamics course and one Dynamics course.
13. 9 credit hours must be 4000-level

### Cooperative Plan

The Georgia Tech Undergraduate Cooperative Education Program allows students to combine classroom study with paid practical work experience directly related to the academic major. Co-ops alternate semesters of on-campus study with semesters of full-time employment, normally beginning the program as freshmen or sophomores. Over 30 percent of ECE undergraduates participate in the co-op program.

The degree requirements for students in the co-op program are the same as those for other students in the major. The Cooperative Plan...
Research Option

The Research Option is intended for students who seek a concentrated research experience, culminating in an undergraduate thesis, integrated into their undergraduate studies in electrical engineering. This option includes three or four semesters of structured research and provides an open evaluation of a student's research capabilities, viewable by the public via a required Web-based research portfolio. Students who complete this option receive a designation on their transcript.

The electrical engineering aspects of the BS EE - Research Option degree requirements are identical to those for the regular BS EE. Please refer to the BS EE catalog description for general information about the degree program. Students may be able to satisfy the additional requirements imposed for the Research Option designation through appropriate choices of electives without additional credit hours to complete the degree. The Research Option designation may be pursued separately, or in combination with the Cooperative Plan and/or the International Plan.

The School of Electrical and Computer Engineering (ECE) offers a two-semester Undergraduate Research Opportunity Program (UROP), which may be completed to provide a less-intensive research experience or as the initial phase of the Research Option. Contact the ECE Academic Office for additional information about the Research Option, including specific Institute and ECE requirements, and assistance in planning your schedule to allow participation in this program.

BS/MS Electrical and Computer Engineering

This program allows highly qualified students to receive the Bachelor of Science in either Electrical Engineering or Computer Engineering and a master's degree in Electrical and Computer Engineering. The joint BS/MS degree program affords undergraduate electrical or computer engineering majors the opportunity to broaden their studies and improve their career prospects.

Eligible Georgia Tech undergraduates normally apply for this program during their junior year. Contact the Electrical and Computer Engineering Graduate Affairs Office for program information, eligibility requirements, and applications.

BS/MS Information (5 Year) (https://www.ece.gatech.edu/current-students/undergraduate/joint-bsms)

Dual BS in Electrical Engineering

Georgia Tech & Korea Advanced Institute of Science and Tech

Students may pursue the BSEE degree from the Korea Advanced Institute of Science and Technology (KAIST) as they earn the BSEE or BSCmpE from Georgia Tech. KAIST offers one of the top engineering programs in Korea and the Far East. All lectures at KAIST are given in English to better serve a growing number of students from overseas. While earning their dual degrees, students spend two years each at both Georgia Tech and KAIST.

Bachelor of Science in Environmental Engineering

The School of Civil and Environmental Engineering (CEE) offers a BS degree in Environmental Engineering (BS EnvE). The curriculum is
designed to provide students with fundamental knowledge of scientific disciplines and engineering principles that are used to address emerging environmental issues such as sustainable air, water, and land resources; human health; and environmental restoration. In the first and second years, students take courses in physics, chemistry, biology, mathematics, English composition, and introductory engineering. The third year incorporates advanced engineering topics, including solid and fluid mechanics, thermodynamics, and laboratories in engineering materials, hydraulic engineering, and environmental monitoring and process engineering. The fourth year is elective based, allowing students to select courses from specific focus areas, including biological processes, sustainability, air pollution, and water resources, in addition to technical and design electives. A senior-level capstone design course serves to integrate principles from a range of disciplines. The curriculum is intended to provide students with the flexibility to develop tailored sequences of electives to meet individual education and career objectives, while ensuring a comprehensive engineering design experience.

Prerequisites and Other Requirements

Although students are not required to take courses during the indicated semester, all prerequisites must be satisfied. In addition to Institute academic requirements for graduation with a BS degree, the following requirements must be satisfied for the BS EnvE:

1. A letter grade of C or better must be earned in
   - MATH 1501 Calculus I 4
   - MATH 1502 Calculus II 4
   - PHYS 2211 Intro Physics I 4
   - CHEM 1310 General Chemistry 4
   - COE 2001 Statics 2

2. The total number of quality points earned in CEE courses used to satisfy degree requirements must be at least twice the number of credit hours in those courses. If a course is repeated, the most recent grade will be used in applying this rule. No CEE courses may be repeated for the purpose of satisfying this rule if the original grade was a C or higher.

Program Objectives

Graduates will pursue a diverse range of careers that build on their engineering education. During the initial years of their careers, graduates will:

A. apply technical proficiency in the principles and methods essential to modern environmental engineering practice.
B. demonstrate understanding of global, societal, environmental, and sustainability issues related to environmental engineering.
C. exhibit effective communication, teamwork, entrepreneurial, and leadership skills.
D. engage in ethical and responsible practice while pursuing professional growth.

### Core A - Essential Skills

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### Core C - Humanities

| Any HUM (p. 93) | 6 |

### Core D - Science, Math, & Technology

| PHYS 2211 | Intro Physics I 2,3 | 4 |
| PHYS 2212 | Intro Physics II   | 4 |
| MATH 1551 | Differential Calculus 3 | 2 |
| MATH 1553 | Intro to Linear Algebra 3 | 2 |
| or MATH 1550 | Linear Algebra     | 3 |
| or MATH 1554 | Linear Alg w Abstract Vec Sp |         |

### Core E - Social Sciences

Select one of the following:

| HIST 2111 | United States to 1877 | 3 |
| HIST 2112 | United States since 1877 | |
| INTA 1200 | American Government   | 3 |
| POL 1101 | Government of the U.S. | 3 |
| PUBP 3000 | US Constitutional Issues | |

Select one of the following:

| ECON 2100 | Economics and Policy | 3 |
| ECON 2101 | The Global Economy   | 3 |
| ECON 2105 | Prin of Macroeconomics | |
| ECON 2106 | Prin of Microeconomics | |

Any SS (p. 97) 6

### Core F - Courses Related to Major

| COE 2001 | Statics 3 | 2 |
| MATH 2551 | Multivariable Calculus | 4 |
| MATH 2552 | Differential Equations | 4 |
| CHEM 1310 | General Chemistry 3 | 4 |
| BIOL 1510 | Biological Principles | 4 |

Ethics Requirement (p. 100) 1

### Major Requirements

| CEE 2040 | Dynamics | 2 |
| CEE 2300 | Environmental Engr Prin | 3 |
| CEE 3000 | Civil Engr Systems | 3 |
| CEE 3020 | Civil Engr Materials | 3 |
| CEE 3040 | Fluid Mechanics | 3 |
| CEE 3340 | Environ Engr Laboratory | 3 |
| CEE 3770 | Statistics & Applications | 3 |
| or ISYE 3777 | Statistics & Applications |         |
| CEE 4090 | Capstone Design | 3 |
| CEE 4200 | Hydraulic Engineering | 3 |
| COE 3001 | Deformable Bodies | 3 |

### Additional Requirements

| CHEM 1315 | Survey of Organic Chem | 3 |
| EAS 2600 | Earth Processes | 4 |

Select one of the following:

| CHBE 2130 | Chem Eng Thermo I | 3 |
| CHEM 3411 | Physical Chemistry I |         |
EAS 3603 Thermodynamics-Earth Sys  
ME 3222 Thermodynamics  

Environmental Engineering Technical Elective  
Select one of the following:  
CEE 4210 Hydrology  
CEE 4405 Geotechnical Engineering  
CEE 4620 Environ Impact Assess  
CEE 4795 Groundwater Hydrology  

Design Elective  
Select one of the following:  
CEE 4310 Water Quality Engr  
CEE 4340 Env Modeling & Health  
CEE 4330 Air Pollution Engr  
CEE 4395 Environmental Sys Design  

Technical Elective Focus  
Technical Electives  
Approved Electives  
Approved Electives  
Total Credit Hours  

International Plan

The International Plan is a challenging and coherent academic program for undergraduates that develops global competence within the context of a student's major. It is a degree-long program that integrates international studies and experiences into any participating major at Georgia Tech. It helps to prepare Georgia Tech graduates professionally and personally for successful lives in the twenty-first century.

The International Plan is not intended to replace current international programs; it supplements them. Existing study abroad opportunities continue to be offered. It is also not intended to be an add-on to the current degree programs. It is intended to be another curriculum path to earn a degree in which international competence is integrated into the program of study. The plan can be completed within the normal timeframe of four years of undergraduate study.

The overarching model for the International Plan has four components:

1. International coursework: Three courses to include one from each of the following categories:
   a. International relations
   b. Global economics
   c. A course about a specific country or region

2. International experience: Two terms abroad (not less than 26 weeks) engaged in any combination of study abroad, research, or internship

3. Second language proficiency: All students in the program are expected to reach at least the proficiency level equivalent to two years of college-level language study. Students who use the language to study, conduct research, or participate in an internship during their international experience are expected to attain a higher level

Cooperative Plan

Since 1912, Georgia Tech has offered a five-year Undergraduate Cooperative Program to those students who wish to combine career-related experience with classroom studies. The program is the fourth oldest of its kind in the world and the largest optional co-op program in the country.

Students alternate between work assignments and classroom studies until they complete four or five semesters of work. Co-op students with an environmental engineering major complete the same coursework on campus that is completed by regular four-year students. Most co-op students begin the program as freshmen or sophomores and are classified as full time students regardless of whether they are attending classes on campus or are full time at an employer's location.

Students who participate in the program have the opportunity to develop career interests, become more confident in their career choices, and develop human relations skills through their work experience. Graduates of the program receive a bachelor's degree with a Cooperative Plan Designation.

The Undergraduate Professional Internship Program is for environmental engineering students who do not participate in the Cooperative Program, but want some career-related experience before graduation. Students generally work for one semester, usually in the summer, with an option for more work experiences. Students must have completed at least 30 hours of coursework at Georgia Tech before they can participate in the program.

For more information about all of the programs in the Center for Career Discovery and Development, visit www.careerdiscovery.gatech.edu

For more information about all of the programs in the Center for Career Discovery and Development, visit www.careerdiscovery.gatech.edu (http://careerdiscovery.gatech.edu).
of proficiency. Language proficiency is determined by testing (not course credits).

4. Culminating course: A capstone course in the major designed to tie the international studies and experiences together with the student's major

Completion of the International Plan is recognized by a designation on the student's diploma indicating completion of the degree with global competence.

For additional information about the International Plan visit www.oie.gatech.edu/internationalplan (http://www.internationalplan.gatech.edu).

Research Option
The Research Option is intended for students who seek a concentrated research experience, culminating in an undergraduate thesis, integrated into their undergraduate studies in environmental engineering. In order to graduate with a BS EnVE – Research Option degree, the students must:

Complete at least nine units of undergraduate research (over at least two, preferably three terms). Research may be for either pay (CEE 2698 or CEE 4698) or credit (CEE 2699 or CEE 4699). Research for credit may be used towards the BS EnVE approved elective requirements. Write an undergraduate thesis/report of research on their findings. This is usually done during the graduating term. The thesis will be published in the Georgia Tech Library.

Take two 1-hour classes: LMC 4701 (typically taken during the first or second semester of research) and LMC 4702 (taken during the thesis-writing semester).

At least six of the nine required credit hours of research should be on the same topic. A research proposal must be approved by a faculty advisor and one other faculty member. This proposal will be completed in LMC 4701 which serves as a prerequisite for LMC 4702. Completion of Research Option is noted on the student's transcript.

Joint BS/MS Degree Program
The joint BS/MS program is designed to attract the best-of-the-best undergraduate students and is especially intended for students who demonstrate an interest in, and ability for, additional education beyond the bachelor's degree.

Students will be eligible to apply for the program after completion of 30 semester credit hours at Georgia Tech and appropriate progress in their degree program. As a practical matter, students should apply for the program at least three semesters prior to graduation in order to take graduate-level courses prior to receiving their BS degree. Students must have a Georgia Tech GPA of 3.5 or higher for admission into the BS/MS Program in Environmental Engineering.

This program is available only to those completing a Bachelor’s degree with majors of Civil Engineering or Environmental Engineering.

The key components of this program are intense interaction among students and faculty, including mentoring and undergraduate research, and careful advising and course planning to enable students to begin challenging coursework in their fourth year of study.

Students in the joint BS/MS program remain undergraduates until they meet the requirements for the bachelor's degree, at which point they will receive the BSEnvE degree. Their status will then be changed to graduate status. Graduate school application fees and the GRE requirements are waived.

Once admitted, a GPA of at least 3.0 must be maintained to remain in the program. Additionally, students in the BS/MS program are eligible to use the Graduate Course Option (http://www.catalog.gatech.edu/academics/graduate/masters-degrees/graduate-course-option) even if their cumulative grade-point average is below 3.5 at the time they complete their bachelor's degree.

Bachelor of Science in Global Economics and Modern Languages
In partnership with the School of Modern Languages (http://www.modlangs.gatech.edu), the School of Economics offers a Bachelor of Science in Global Economics and Modern Languages with language concentrations in Chinese, French, German, Japanese, Russian, or Spanish. Global Economics and Modern Language graduates are especially attractive to employers with long-term interests outside the United States who demand employees prepared to successfully navigate the challenges and opportunities presented by global, economically interdependent, multilingual, and multicultural environments. Through a variety of coursework and the opportunity to spend a semester abroad, students have in-depth knowledge not only of their own cultures but also have the capacity to function effectively in a second culture. Coursework focuses on rigorous training in economics combined with extensive foreign language study. Students are expected to develop advanced communication skills and professional competency in the language of choice through courses and extracurricular opportunities that focus on current issues, classic literature, business applications, and cross-cultural perspectives.

Students pursuing this degree must complete forty-five semester hours of general education requirements, twenty-four semester hours of French, German, or Spanish courses at or above the 3000 level or twenty-four semester hours of Chinese, Japanese, or Russian courses at or above the 2002 level, and twenty-four semester hours of Economics. This degree program provides significant flexibility for students through eleven hours of free electives and six semester hours of non-major cluster electives.

- Bachelor of Science in Global Economics and Modern Languages - Chinese (p. 347)
- Bachelor of Science in Global Economics and Modern Languages - French (p. 348)
- Bachelor of Science in Global Economics and Modern Languages - German (p. 350)
- Bachelor of Science in Global Economics and Modern Languages - Japanese (p. 351)
- Bachelor of Science in Global Economics and Modern Languages - Russian (p. 353)
- Bachelor of Science in Global Economics and Modern Languages - Spanish (p. 354)
Bachelor of Science in Global Economics and Modern Languages - Chinese

In partnership with the School of Modern Languages (http://www.modlangs.gatech.edu), the School of Economics offers a Bachelor of Science in Global Economics and Modern Languages with language concentrations in Chinese, French, German, Japanese, Russian, or Spanish. Global Economics and Modern Language graduates are especially attractive to employers with long-term interests outside the United States who demand employees prepared to successfully navigate the challenges and opportunities presented by global, economically interdependent, multilingual, and multicultural environments. Through a variety of coursework and the opportunity to spend a semester abroad, students have in-depth knowledge not only of their own cultures but also have the capacity to function effectively in a second culture. Coursework focuses on rigorous training in economics combined with extensive foreign language study. Students are expected to develop advanced communication skills and professional competency in the language of choice through courses and extracurricular opportunities that focus on current issues, classic literature, business applications, and cross-cultural perspectives.

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<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>APPH 1040</td>
<td>Sci Foundation of Health</td>
<td>2</td>
</tr>
<tr>
<td>or APPH 10</td>
<td>Sci of Phys Act &amp; Health</td>
<td></td>
</tr>
<tr>
<td>ENGL 1101</td>
<td>English Composition I</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 1102</td>
<td>English Composition II</td>
<td>3</td>
</tr>
<tr>
<td>MATH 1712</td>
<td>Survey of Calculus</td>
<td>4</td>
</tr>
<tr>
<td>or MATH 15</td>
<td>Integral Calculus</td>
<td></td>
</tr>
<tr>
<td>CS 1315</td>
<td>Intro Media Computation</td>
<td>3</td>
</tr>
</tbody>
</table>

Core C - Humanities

Modern Languages 3

Core D - Science, Math, & Technology

Lab Science 4

Lab Science 4

MATH 1711 | Finite Mathematics  
& MATH 15 | Differential Calculus  
& MATH 15 | and Intro to Linear Algebra 4

Core E - Social Sciences

Select one of the following: 3

HIST 2111 | United States to 1877  
HIST 2112 | United States since 1877  
INTA 1200 | American Government

Major Requirements

ECON 2105 | Prin of Macroeconomics  
ECON 2106 | Prin of Microeconomics  
Statistics Elective 3.5  
Engineering/Science/Math Elective  
Modern Languages 2,3

Major Requirements

ECON 3110 | Adv Microeconomic Analys  
ECON 3120 | Advanced Macroeconomics  
ECON 3150 | Econ & Finance Modeling  
ECON 3161 | Econometric Analysis  
ECON 4311 | Global Enterprise  
or ECON 43 International Economics

ECON 4910 | Individual Research  
ECON Electives 3,6

Non-Major Cluster

Cluster Electives 3,4

Modern Languages

CHIN 4500 | Intercultural Seminar  
Modern Languages 2,3

Free Electives 7

Free Electives 11

Total Credit Hours 122

Note: Non-credit requirement

With the goal of enhanced educational and career prospects and in accordance with the pedagogical objectives of the degree in Global Economics and Modern Languages, all GEML students are required to fulfill an International Experience as part of their graduation requirements. This requirement can met through one of two ways:

1. Complete a minimum 6-week overseas experience. If this is not a country whose primary language is in the student’s language of study, the student must justify and receive prior approval.

2. Complete a 15-week internship or similar experience of at least 10 hours per week at an international organization such as consulate, CNN International, etc. The internship must be approved in advance.

1 Any 1000- or 2000-level course with the following prefixes: AE, APHP, BIOL, BMED, CEE, CHBE, CHEM, EAS, ECE, ISYE, MATH, ME, MSE, NRE, PHYS.

2 Students must complete 21 credit hours of Chinese electives at 2002 level or above. Six credit hours are counted in Humanities, six in Core Area F, and 9 in Modern Languages Requirements.

3 Minimum grade of C required.

4 ECON and CHIN courses not allowed for cluster electives.

5 One course from MATH 3215, ISYE 3770 or (MGT 2250 - minimum B)
Six credit hours of Econ Electives must be chosen from one of the following Specialization areas:

- Industrial Organization: ECON 4340 or ECON 4180 or ECON 4360 or
- International Economics: ECON 4311 or ECON 4350 or ECON 4355 or ECON 4610 or
- Environmental Economics: ECON 3300 or ECON 4421 or ECON 4440

CHIN courses below 2002 may count toward the free elective courses.

International Plan

The degree requirements for the Global Economics and Modern Languages (Chinese, French, German, Japanese, Russian and Spanish)-International Plan are basically the same as for the GEML degree, except that students are required to spend two terms abroad and then achieve Intermediate High (for Chinese, Japanese or Russian: Intermediate Low) on the standardized ACTFL testing scale during an oral interview. The costs of the test will be paid for by the School of Modern Languages for each student. The terms abroad may typically consist of one semester of study plus a significant amount of time spent with a research or work project abroad. Students may also opt for a second semester. GEML-IP majors are also strongly encouraged to enroll in the LBAT intensive summer programs offered by the School of Modern Languages.

In addition to gaining advanced global competence, the International Plan designation will set you apart from other applicants with recruiters from top companies and governmental agencies.

Other Required Courses include the following, and these can easily be obtained within the regular required curriculum offerings of ECON and Modern Languages. These requirements can also be met with courses taken abroad, upon consultation with ECON degree advisors.

1. At least one course focused on international relations historically and theoretically, including topics such as
   a. the role of state sovereignty and nationalism and non-state actors in the international system;
   b. international conflict, peace, security, intervention, and nation-building;
   c. international organizations, law, and ethics;
   d. transnational problems of the environment, terrorism, health, and migration;
   e. among other issues (see INTA courses).

2. At least one course that provides a historical and theoretical understanding of the global economy, including topics such as
   a. international trade, finance, investment, and production;
   b. regional economic integration (such as the EU);
   c. economic development and modernization;
   d. questions of natural resource sustainability.

3. At least one course that provides familiarity with an area of the world or a country that allows them to make systematic comparisons with their own society and culture. This course could come from various disciplinary perspectives, including history, public policy, philosophy, international affairs, literature, economics, management, architecture, among others. Upper division Modern Language course will count here.

4. A culminating course, occurring either at the end of or after the international experience that integrates knowledge of the discipline and the international experience in a global context.

Bachelor of Science in Global Economics and Modern Languages - French

In partnership with the School of Modern Languages (http://www.modlangs.gatech.edu), the School of Economics offers a Bachelor of Science in Global Economics and Modern Languages with language concentrations in Chinese, French, German, Japanese, Russian, or Spanish. Global Economics and Modern Language graduates are especially attractive to employers with long-term interests outside the United States who demand employees prepared to successfully navigate the challenges and opportunities presented by global, economically interdependent, multilingual, and multicultural environments. Through a variety of coursework and the opportunity to spend a semester abroad, students have in-depth knowledge not only of their own cultures but also have the capacity to function effectively in a second culture. Coursework focuses on rigorous training in economics combined with extensive foreign language study. Students are expected to develop advanced communication skills and professional competency in the language of choice through courses and extracurricular opportunities that focus on current issues, classic literature, business applications, and cross-cultural perspectives.

Students pursuing this degree must complete forty-five semester hours of general education requirements, twenty-four semester hours of French, German, or Spanish courses at or above the 3000 level or twenty-four semester hours of Chinese, Japanese, or Russian courses at or above the 2002 level, and twenty-four semester hours of Economics. This degree program provides significant flexibility for students through eleven hours of free electives and six semester hours of non-major cluster electives.

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<tr>
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<td>APPH 1040</td>
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Core A - Essential Skills

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<tr>
<th>Code</th>
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<tbody>
<tr>
<td>ENGL 1101</td>
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<td>ENGL 1102</td>
<td>English Composition II</td>
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<tr>
<td>MATH 1712</td>
<td>Survey of Calculus</td>
</tr>
<tr>
<td>or MATH 15 Integral Calculus</td>
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</table>

Core B - Institutional Options

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>CS 1315</td>
<td>Intro Media Computation</td>
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Core C - Humanities

<table>
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<tr>
<th>Modern Languages</th>
<th>Code</th>
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</thead>
<tbody>
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<td>Modern Languages 3</td>
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Core D - Science, Math, & Technology

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<th>Lab Science</th>
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<tr>
<td>Lab Science</td>
<td>MATH 1711</td>
<td>Finite Mathematics</td>
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<tr>
<td>or MATH 15 Differential Calculus &amp; MATH 15 and Intro to Linear Algebra</td>
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Core E - Social Sciences

Select one of the following:

<table>
<thead>
<tr>
<th>Code</th>
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<tbody>
<tr>
<td>HIST 2111</td>
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<td>HIST 2112</td>
<td>United States since 1877</td>
</tr>
<tr>
<td>INTA 1200</td>
<td>American Government</td>
</tr>
</tbody>
</table>
requirements. This requirement can be met through one of two ways: to fulfill an International Experience as part of their graduation. 

With the goal of enhanced educational and career prospects and in recognition of the notable advantages of possessing language skills, all GEML students are required to demonstrate proficiency in a language. Note: Non-credit requirement

<table>
<thead>
<tr>
<th>Core F - Courses Related to Major</th>
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</thead>
<tbody>
<tr>
<td>ECON 2105  Prin of Macroeconomics</td>
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<tr>
<td>ECON 2106  Prin of Microeconomics</td>
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<td>Statistics Elective</td>
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<td>Engineering/Science/Math Elective</td>
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<td>Modern Languages</td>
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<thead>
<tr>
<th>Major Requirements</th>
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<tr>
<td>ECON 3110  Adv Microeconomic Analysis</td>
<td>3</td>
</tr>
<tr>
<td>ECON 3120  Advanced Macroeconomics</td>
<td>3</td>
</tr>
<tr>
<td>ECON 3150  Econ &amp; Finance Modeling</td>
<td>3</td>
</tr>
<tr>
<td>ECON 3161  Econometric Analysis</td>
<td>3</td>
</tr>
<tr>
<td>ECON 4311  Global Enterprise</td>
<td>3</td>
</tr>
<tr>
<td>or ECON 43 International Economics</td>
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<tr>
<td>ECON 4910  Individual Research</td>
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<tr>
<td>Cluster Electives</td>
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<th>Modern Languages</th>
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<tbody>
<tr>
<td>FREN 4500  Intercultural Seminar</td>
<td>3</td>
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<tr>
<td>Modern Languages</td>
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</table>

<table>
<thead>
<tr>
<th>Free Electives</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Free Electives</td>
<td>7</td>
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</tbody>
</table>

Total Credit Hours | 122 |

Note: Non-credit requirement

With the goal of enhanced educational and career prospects and in accordance with the pedagogical objectives of the degree in Global Economics and Modern Languages, all GEML students are required to fulfill an International Experience as part of their graduation requirements. This requirement can be met through one of two ways:

1. Complete a minimum 6-week overseas experience. If this is not a program offered by the School of Modern Languages. IP majors are also strongly encouraged to enroll in the LBAT intensive summer programs offered by the School of Modern Languages.

In addition to gaining advanced global competence, the International Plan designation will set you apart from other applicants with recruiters from top companies and governmental agencies.

Other Required Courses include the following, and these can easily be obtained within the regular required curriculum offerings of ECON and Modern Languages. These requirements can also be met with courses taken abroad, upon consultation with ECON degree advisors.

1. At least one course focused on international relations historically and theoretically, including topics such as
   a. the role of state sovereignty and nationalism and non-state actors in the international system;
   b. international conflict, peace, security, intervention, and nation-building;
   c. international organizations, law, and ethics;
   d. transnational problems of the environment, terrorism, health, and migration;
   e. among other issues (see INTA courses).

2. At least one course that provides a historical and theoretical understanding of the global economy, including topics such as
   a. international trade, finance, investment, and production;
   b. regional economic integration (such as the EU);
   c. economic development and modernization; and
   d. questions of natural resource sustainability.

3. At least one course that provides familiarity with an area of the world or a country that allows them to make systematic comparisons with their own society and culture. This course could come from various disciplinary perspectives, including history, public policy, philosophy, international affairs, literature, economics, management, architecture, among others. Upper division Modern Language course will count here.

4. A culminating course, occurring either at the end of or after the international experience that integrates knowledge of the discipline and the international experience in a global context.

Six credit hours of Econ Electives must be chosen from one of the following Specialization areas:

- Industrial Organization: ECON 4340 or ECON 4180 or ECON 4360 or
- International Economics: ECON 4311 or ECON 4350 or ECON 4355 or ECON 4610 or
- Environmental Economics: ECON 3300 or ECON 4421 or ECON 4440

FREN courses below 2002 may count toward the free elective courses.

### International Plan

The degree requirements for the Global Economics and Modern Languages (Chinese, French, German, Japanese, Russian and Spanish) - International Plan are basically the same as for the GEML degree, except that students are required to spend two terms abroad and then achieve Intermediate High (for Chinese, Japanese or Russian: Intermediate Low) on the standardized ACTFL testing scale during an oral interview. The costs of the test will be paid for by the School of Modern Languages for each student. The terms abroad may typically consist of one semester of study plus a significant amount of time spent with a research or work project abroad. Students may also opt for a second semester. GEML-IP majors are also strongly encouraged to enroll in the LBAT intensive summer programs offered by the School of Modern Languages.

In addition to gaining advanced global competence, the International Plan designation will set you apart from other applicants with recruiters from top companies and governmental agencies.

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2. At least one course focused on international relations historically and theoretically, including topics such as
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   b. international conflict, peace, security, intervention, and nation-building;
   c. international organizations, law, and ethics;
   d. transnational problems of the environment, terrorism, health, and migration;
   e. among other issues (see INTA courses).
3. At least one course that provides a historical and theoretical understanding of the global economy, including topics such as
   a. international trade, finance, investment, and production;
   b. regional economic integration (such as the EU);
   c. economic development and modernization; and
   d. questions of natural resource sustainability.
4. A culminating course, occurring either at the end of or after the international experience that integrates knowledge of the discipline and the international experience in a global context.

### Course Requirements

- **ECON 3110  Adv Microeconomic Analysis**
- **ECON 3120  Advanced Macroeconomics**
- **ECON 3150  Econ & Finance Modeling**
- **ECON 3161  Econometric Analysis**
- **ECON 4311  Global Enterprise**
- **ECON 4910  Individual Research**

**ECON Electives**

- **ECON Electives**

**Non-Major Cluster**

- **Cluster Electives**

**Modern Languages**

- **FREN 4500  Intercultural Seminar**
- **Modern Languages**

**Free Electives**

- **Free Electives**

Note: Non-credit requirement

With the goal of enhanced educational and career prospects and in accordance with the pedagogical objectives of the degree in Global Economics and Modern Languages, all GEML students are required to fulfill an International Experience as part of their graduation. This requirement can be met through one of two ways:

1. Complete a minimum 6-week overseas experience. If this is not a program offered by the School of Modern Languages. IP majors are also strongly encouraged to enroll in the LBAT intensive summer programs offered by the School of Modern Languages.
2. Complete a 15-week internship or similar experience of at least 10 hours per week at an international organization such as consulate, CNN International, etc. The internship must be approved in advance.

Any 1000- or 2000-level course with the following prefixes: AE, APPH, BIOL, BMED, CEE, CHBE, CHEM, EAS, ECE, ISYE, MATH, ME, MSE, NRE, PHYS.

Students must complete 21 credit hours of French electives at 2002 level or above. Six credit hours are counted in Humanities, six in Core Area F, and 9 in Modern Languages Requirements.

Minimum grade of C required.

ECON and FREN courses not allowed for cluster electives.

One course from MATH 3215, ISYE 3770 or (MGT 2250 - minimum B)

Six credit hours of Econ Electives must be chosen from one of the following Specialization areas:

- Industrial Organization: ECON 4340 or ECON 4180 or ECON 4360 or
- International Economics: ECON 4311 or ECON 4350 or ECON 4355 or ECON 4610 or
- Environmental Economics: ECON 3300 or ECON 4421 or ECON 4440

FREN courses below 2002 may count toward the free elective courses.
Bachelor of Science in Global Economics and Modern Languages - German

In partnership with the School of Modern Languages (http://www.modlangs.gatech.edu), the School of Economics offers a Bachelor of Science in Global Economics and Modern Languages with language concentrations in Chinese, French, German, Japanese, Russian, or Spanish. Global Economics and Modern Language graduates are especially attractive to employers with long-term interests outside the United States who demand employees prepared to successfully navigate the challenges and opportunities presented by global, economically interdependent, multilingual, and multicultural environments. Through a variety of coursework and the opportunity to spend a semester abroad, students have in-depth knowledge not only of their own cultures but also have the capacity to function effectively in a second culture. Coursework focuses on rigorous training in economics combined with extensive foreign language study. Students are expected to develop advanced communication skills and professional competency in the language of choice through courses and extracurricular opportunities that focus on current issues, classic literature, business applications, and cross-cultural perspectives.

Students pursuing this degree must complete forty-five semester hours of general education requirements, twenty-four semester hours of French, German, or Spanish courses at or above the 3000 level or twenty-four semester hours of Chinese, Japanese, or Russian courses at or above the 2002 level, and twenty-four semester hours of Economics. This degree program provides significant flexibility for students through eleven hours of free electives and six semester hours of non-major cluster electives.

### Code | Title | Credit Hours
--- | --- | ---
**Wellness**  |  |  
APPH 1040 | Sci Foundation of Health | 2  
or APPH 10 | Sci of Phys Act & Health |  
**Core A - Essential Skills**  |  |  
ENGL 1101 | English Composition I | 3  
ENGL 1102 | English Composition II | 3  
MATH 1712 | Survey of Calculus | 4  
| or MATH 15 | Integral Calculus |  
**Core B - Institutional Options**  |  |  
CS 1315 | Intro Media Computation | 3  
**Core C - Humanities**  |  |  
Modern Languages |  | 6  
**Core D - Science, Math, & Technology**  |  |  
Lab Science |  | 4  
Lab Science |  | 4  
MATH 1711 | Finite Mathematics | 4  
| or MATH 15 | Differential Calculus |  
| & MATH 15 | and Intro to Linear Algebra |  
**Core E - Social Sciences**  |  |  
Select one of the following:  |  | 3  
HIST 2111 | United States to 1877 |  
HIST 2112 | United States since 1877 |  
INTA 1200 | American Government |  
**Core F - Courses Related to Major**  |  |  
ECON 2105 | Prin of Macroeconomics | 3  
ECON 2106 | Prin of Microeconomics | 3  
Statistics Elective | 3  
Engineering/Science/Math Elective | 1  
Modern Languages | 2,3 | 6  
**Major Requirements**  |  |  
ECON 3110 | Adv Microeconomic Analys | 3  
ECON 3120 | Advanced Macroeconomics | 3  
ECON 3150 | Econ & Finance Modeling | 3  
ECON 3161 | Econometric Analysis | 3  
ECON 4311 | Global Enterprise | 3  
| or ECON 43 | International Economics |  
ECON 4910 | Individual Research | 3  
**ECON Electives**  |  |  
ECON Electives | 3 | 6  
**Non-Major Cluster**  |  |  
Cluster Electives | 3,4 | 12  
**Modern Languages**  |  |  
GRMN 4500 | Intercultural Seminar | 3  
Modern Languages | 2,3 | 9  
**Free Electives**  |  |  
Free Electives | 7 | 11  
**Total Credit Hours**  |  | 122  

Note: Non-credit requirement

With the goal of enhanced educational and career prospects and in accordance with the pedagogical objectives of the degree in Global Economics and Modern Languages, all GEML students are required to fulfill an International Experience as part of their graduation requirements. This requirement can met through one of two ways:

1. Complete a minimum 6-week overseas experience. If this is not a country whose primary language is not in the student’s language of study, the student must justify and receive prior approval.
2. Complete a 15-week internship or similar experience of at least 10 hours per week at an international organization such as consulate, CNN International, etc. The internship must be approved in advance.

1 Any 1000- or 2000-level course with the following prefixes: AE, APPH, BIOL, BMED, CEE, CHBE, CHEM, EAS, ECE, ISYE, MATH, ME, MSE, NRE, PHYS.
2 Students must complete 21 credit hours of German electives at 2002 level or above. Six credit hours are counted in Humanities, six in Core Area F, and 9 in Modern Languages Requirements.
3 Minimum grade of C required.
4 ECON and GRMN courses not allowed for cluster electives.
5 One course from MATH 3215, ISYE 3770 or (MGT 2250 - minimum B)
Six hours of Econ Electives must be chosen from one of the following Specialization areas:

- International Organization: ECON 4340 or ECON 4180 or ECON 4360 or ECON 4610 or
- International Economics: ECON 4311 or ECON 4350 or ECON 4355 or ECON 3300 or ECON 4421 or ECON 4440

GRMN courses below 2002 may count toward the free elective courses.

International Plan

The degree requirements for the Global Economics and Modern Languages (Chinese, French, German, Japanese, Russian and Spanish)-International Plan are basically the same as for the GEML degree, except that students are required to spend two terms abroad and then achieve Intermediate High (for Chinese, Japanese or Russian: Intermediate Low) on the standardized ACTFL testing scale during an oral interview. The costs of the test will be paid for by the School of Modern Languages for each student. The terms abroad may typically consist of one semester of study plus a significant amount of time spent with a research or work project abroad. Students may also opt for a second semester. GEML-IP majors are also strongly encouraged to enroll in the LBAT intensive summer programs offered by the School of Modern Languages.

In addition to gaining advanced global competence, the International Plan designation will set you apart from other applicants with recruiters from top companies and governmental agencies.

Other Required Courses include the following, and these can easily be obtained within the regular required curriculum offerings of ECON and Modern Languages. These requirements can also be met with courses taken abroad, upon consultation with ECON degree advisors.

1. At least one course focused on international relations historically and theoretically, including topics such as:
   a. the role of state sovereignty and nationalism and non-state actors in the international system;
   b. international conflict, peace, security, intervention, and nation-building;
   c. international organizations, law, and ethics;
   d. transnational problems of the environment, terrorism, health, and migration;
   e. among other issues (see INTA courses).

2. At least one course that provides a historical and theoretical understanding of the global economy, including topics such as:
   a. international trade, finance, investment, and production;
   b. regional economic integration (such as the EU);
   c. economic development and modernization;
   d. questions of natural resource sustainability.

3. At least one course that provides familiarity with an area of the world or a country that allows them to make systematic comparisons with their own society and culture. This course could come from various disciplinary perspectives, including history, public policy, philosophy, international affairs, literature, economics, management, architecture, among others. Upper division Modern Language course will count here.

4. A culminating course, occurring either at the end of or after the international experience that integrates knowledge of the discipline and the international experience in a global context.

Bachelor of Science in Global Economics and Modern Languages - Japanese

In partnership with the School of Modern Languages (http://www.modlangs.gatech.edu), the School of Economics offers a Bachelor of Science in Global Economics and Modern Languages with language concentrations in Chinese, French, German, Japanese, Russian, or Spanish. Global Economics and Modern Language graduates are especially attractive to employers with long-term interests outside the United States who demand employees prepared to successfully navigate the challenges and opportunities presented by global, economically interdependent, multilingual, and multicultural environments. Through a variety of coursework and the opportunity to spend a semester abroad, students have in-depth knowledge not only of their own cultures but also have the capacity to function effectively in a second culture. Coursework focuses on rigorous training in economics combined with extensive foreign language study. Students are expected to develop advanced communication skills and professional competency in the language of choice through courses and extracurricular opportunities that focus on current issues, classic literature, business applications, and cross-cultural perspectives.

Students pursuing this degree must complete forty-five semester hours of general education requirements, twenty-four semester hours of French, German, or Spanish courses at or above the 3000 level or twenty-four semester hours of Chinese, Japanese, or Russian courses at or above the 2002 level, and twenty-four semester hours of Economics. This degree program provides significant flexibility for students through eleven hours of free electives and six semester hours of non-major cluster electives.

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<tr>
<th>Code</th>
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<th>Credit Hours</th>
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<td>or APPH 10</td>
<td>Sci of Phys Act &amp; Health</td>
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<td>English Composition I</td>
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<td>ENGL 1102</td>
<td>English Composition II</td>
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<td>MATH 1712</td>
<td>Survey of Calculus</td>
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<tr>
<td>or MATH 15</td>
<td>Integral Calculus</td>
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<td>CS 1315</td>
<td>Intro Media Computation</td>
<td>3</td>
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<td>MODERN</td>
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<td>Lab Science</td>
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<td>or MATH 15</td>
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<td>&amp; MATH 15</td>
<td>and Intro to Linear Algebra</td>
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<td>HIST 2111</td>
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<td>HIST 2112</td>
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<tr>
<td>INTA 1200</td>
<td>American Government</td>
<td></td>
</tr>
</tbody>
</table>
Six credit hours of Econ Electives must be chosen from one of the following Specialization areas:

- Industrial Organization: ECON 4340 or ECON 4180 or ECON 4360 or ECON 4355 or ECON 4610
- International Economics: ECON 4311 or ECON 4350 or ECON 4355 or ECON 4610 or ECON 4440
- Environmental Economics: ECON 3300 or ECON 4421 or ECON 4440

JAPN courses below 2002 may count toward the free elective courses.

### International Plan

The degree requirements for the Global Economics and Modern Languages (Chinese, French, German, Japanese, Russian and Spanish)-International Plan are basically the same as for the GEML degree, except that students are required to spend two terms abroad and then achieve Intermediate High (for Chinese, Japanese or Russian: Intermediate Low) on the standardized ACTFL testing scale during an oral interview. The costs of the test will be paid for by the School of Modern Languages for each student. The terms abroad may typically consist of one semester of study plus a significant amount of time spent with a research or work project abroad. Students may also opt for a second semester. GEML-IP majors are also strongly encouraged to enroll in the LBAT intensive summer programs offered by the School of Modern Languages.

In addition to gaining advanced global competence, the International Plan designation will set you apart from other applicants with recruiters from top companies and governmental agencies.

Other Required Courses include the following, and these can easily be obtained within the regular required curriculum offerings of ECON and Modern Languages. These requirements can also be met with courses taken abroad, upon consultation with ECON degree advisors.

1. At least one course focused on international relations historically and theoretically, including topics such as:
   a. the role of state sovereignty and nationalism and non-state actors in the international system;
   b. international conflict, peace, security, intervention, and nation-building;
   c. international organizations, law, and ethics;
   d. transnational problems of the environment, terrorism, health, and migration;
   e. among other issues (see INTA courses).

2. At least one course that provides a historical and theoretical understanding of the global economy, including topics such as:
   a. international trade, finance, investment, and production;
   b. regional economic integration (such as the EU);
   c. economic development and modernization; and
   d. questions of natural resource sustainability.

3. At least one course that provides familiarity with an area of the world or a country that allows them to make systematic comparisons with their own society and culture. This course could come from various disciplinary perspectives, including history, public policy, philosophy, international affairs, literature, economics, management, architecture, among others. Upper division Modern Language course will count here.

4. A culminating course, occurring either at the end of or after the international experience that integrates knowledge of the discipline and the international experience in a global context.
Bachelor of Science in Global Economics and Modern Languages - Russian

In partnership with the School of Modern Languages (http://www.modlangs.gatech.edu), the School of Economics offers a Bachelor of Science in Global Economics and Modern Languages with language concentrations in Chinese, French, German, Japanese, Russian, or Spanish. Global Economics and Modern Language graduates are especially attractive to employers with long-term interests outside the United States who demand employees prepared to successfully navigate the challenges and opportunities presented by global, economically interdependent, multilingual, and multicultural environments. Through a variety of coursework and the opportunity to spend a semester abroad, students have in-depth knowledge not only of their own cultures but also have the capacity to function effectively in a second culture. Coursework focuses on rigorous training in economics combined with extensive foreign language study. Students are expected to develop advanced communication skills and professional competency in the language of choice through courses and extracurricular opportunities that focus on current issues, classic literature, business applications, and cross-cultural perspectives.

Students pursuing this degree must complete forty-five semester hours of general education requirements, twenty-four semester hours of French, German, or Spanish courses at or above the 3000 level or twenty-four semester hours of Economics. This degree program provides significant flexibility for students through eleven hours of free electives and six semester hours of non-major cluster electives.

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<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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<td>APPH 1040</td>
<td>Sci Foundation of Health</td>
<td>2</td>
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<td>or APPH 10</td>
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<tr>
<td>ENGL 1101</td>
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<tr>
<td>MATH 1712</td>
<td>Survey of Calculus</td>
<td>3</td>
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<tr>
<td>or MATH 15</td>
<td>Integral Calculus</td>
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<tr>
<td>CS 1315</td>
<td>Intro Media Computation</td>
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<tr>
<td>Modern Languages</td>
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<tr>
<td>Core D - Science, Math, &amp; Technology</td>
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<td>Lab Science</td>
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<td>4</td>
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<td>Lab Science</td>
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<td>MATH 1711</td>
<td>Finite Mathematics</td>
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<td>&amp; MATH 15</td>
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<td>HIST 2112</td>
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<tr>
<td>INTA 1200</td>
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<td></td>
</tr>
</tbody>
</table>

### Major Requirements

- **ECON Electives**: 3 credit hours
- **ECON Electives**: 6 credit hours
- **Non-Major Cluster**: 12 credit hours
- **Modern Languages**: 3 credit hours
- **Free Electives**: 9 credit hours

**Total Credit Hours**: 122

**Note**: Non-credit requirement

With the goal of enhanced educational and career prospects and in accordance with the pedagogical objectives of the degree in Global Economics and Modern Languages, all GEML students are required to fulfill an International Experience as part of their graduation requirements. This requirement can be met through one of two ways:

1. Complete a minimum 6-week overseas experience. If this is not a country whose primary language is in the student’s language of study, the student must justify and receive prior approval.
2. Complete a 15-week internship or similar experience of at least 10 hours per week at an international organization such as consulate, CNN International, etc. The internship must be approved in advance.

This requirement can be fulfilled through the following courses:

- Any 1000- or 2000-level course with the following prefixes: AE, APPH, BIOL, BMED, CEE, CHBE, CHEM, EAS, ECE, ISYE, MATH, ME, MSE, NRE, PHYS.

- Students must complete 21 credit hours of Russian electives at 2002 level or above. Six credit hours are counted in Humanities, six in Core Area F, and 9 in Modern Languages Requirements.

- Minimum grade of C required.

- ECON and RUSS courses not allowed for cluster electives.

- One course from MATH 3215, ISYE 3770 or (MGT 2250 - minimum B)
Six credit hours of Econ Electives must be chosen from one of the following Specialization areas:

- Industrial Organization: ECON 4340 or ECON 4180 or ECON 4360 or ECON 4610 or ECON 4421

RUSS courses below 2002 may count toward the free elective courses.

### International Plan

The degree requirements for the Global economics and Modern Languages (Chinese, French, German, Japanese, Russian and Spanish)-International Plan are basically the same as for the GEML degree, except that students are required to spend two terms abroad and then achieve Intermediate High (for Chinese, Japanese or Russian: Intermediate Low) on the standardized ACTFL testing scale during an oral interview. The costs of the test will be paid for by the School of Modern Languages for each student. The terms abroad may typically consist of one semester of study plus a significant amount of time spent with a research or work project abroad. Students may also opt for a second semester. GEML-IP majors are also strongly encouraged to enroll in the LBAT intensive summer programs offered by the School of Modern Languages.

In addition to gaining advanced global competence, the International Plan designation will set you apart from other applicants with recruiters from top companies and governmental agencies.

Other Required Courses include the following, and these can easily be obtained within the regular required curriculum offerings of ECON and Modern Languages. These requirements can also be met with courses taken abroad, upon consultation with ECON degree advisors.

1. At least one course focused on international relations historically and theoretically, including topics such as:
   a. the role of state sovereignty and nationalism and non-state actors in the international system;
   b. international conflict, peace, security, intervention, and nation-building;
   c. international organizations, law, and ethics;
   d. environmental problems of the environment, terrorism, health, and migration;
   e. among other issues (see INTA courses).

2. At least one course that provides a historical and theoretical understanding of the global economy, including topics such as:
   a. international trade, finance, investment, and production;
   b. regional economic integration (such as the EU);
   c. economic development and modernization; and
   d. questions of natural resource sustainability.

3. At least one course that provides familiarity with an area of the world or a country that allows them to make systematic comparisons with their own society and culture. This course could come from various disciplinary perspectives, including history, public policy, philosophy, international affairs, literature, economics, management, architecture, among others. Upper division Modern Language course will count here.

4. A culminating course, occurring either at the end of or after the international experience that integrates knowledge of the discipline and the international experience in a global context.

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### Bachelor of Science in Global Economics and Modern Languages - Spanish

In partnership with the School of Modern Languages (http://www.modlangs.gatech.edu), the School of Economics offers a Bachelor of Science in Global Economics and Modern Languages with language concentrations in Chinese, French, German, Japanese, Russian, or Spanish. Global Economics and Modern Language graduates are especially attractive to employers with long-term interests outside the United States who demand employees prepared to successfully navigate the challenges and opportunities presented by global, economically interdependent, multilingual, and multicultural environments. Through a variety of coursework and the opportunity to spend a semester abroad, students have in-depth knowledge not only of their own cultures but also have the capacity to function effectively in a second culture. Coursework focuses on rigorous training in economics combined with extensive foreign language study. Students are expected to develop advanced communication skills and professional competency in the language of choice through courses and extracurricular opportunities that focus on current issues, classic literature, business applications, and cross-cultural perspectives.

Students pursuing this degree must complete forty-five semester hours of general education requirements, twenty-four semester hours of French, German, or Spanish courses at or above the 3000 level or twenty-four semester hours of Chinese, Japanese, or Russian courses at or above the 2002 level, and twenty-four semester hours of Economics. This degree program provides significant flexibility for students through eleven hours of free electives and six semester hours of non-major cluster electives.

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<td>or MATH 15BRegral Calculus</td>
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<td>CS 1315</td>
<td>Intro Media Computation</td>
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<td>&amp; MATH 15:and Intro to Linear Algebra</td>
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<td>Core E - Social Sciences</td>
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<td>INTA 1200 American Government</td>
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</tbody>
</table>
to fulfill an International Experience as part of their graduation. Economics and Modern Languages, all GEML students are required.

With the goal of enhanced educational and career prospects and in

Note: Non-credit requirement

With the goal of enhanced educational and career prospects and in accordance with the pedagogical objectives of the degree in Global Economics and Modern Languages, all GEML students are required to fulfill an International Experience as part of their graduation requirements. This requirement can meet through one of two ways:

1. Complete a minimum 6-week overseas experience. If this is not a country whose primary language is in the student’s language of study, the student must justify and receive prior approval.

2. Complete a 15-week internship or similar experience of at least 10 hours per week at an international organization such as consulate, CNN International, etc. The internship must be approved in advance.

The degree requirements for the Global Economics and Modern Languages (Chinese, French, German, Japanese, Russian and Spanish)-International Plan are basically the same as for the GEML degree, except that students are required to spend two terms abroad and then achieve Intermediate High (for Chinese, Japanese or Russian: Intermediate Low) on the standardized ACTFL testing scale during an oral interview. The costs of the test will be paid for by the School of Modern Languages for each student. The terms abroad may typically consist of one semester of study plus a significant amount of time spent with a research or work project abroad. Students may also opt for a second semester. GEML-IP majors are also strongly encouraged to enroll in the LBAT intensive summer programs offered by the School of Modern Languages.

In addition to gaining advanced global competence, the International Plan designation will set you apart from other applicants with recruiters from top companies and governmental agencies.

Other Required Courses include the following, and these can easily be obtained within the regular required curriculum offerings of ECON and Modern Languages. These requirements can also be met with courses taken abroad, upon consultation with ECON degree advisors.

### International Plan

1. At least one course focused on international relations historically and theoretically, including topics such as:
   - the role of state sovereignty and nationalism and non-state actors in the international system;
   - international conflict, peace, security, intervention, and nation-building;
   - international organizations, law, and ethics;
   - transnational problems of the environment, terrorism, health, and migration;
   - among other issues (see INTA courses).

2. At least one course that provides a historical and theoretical understanding of the global economy, including topics such as:
   - international trade, finance, investment, and production;
   - regional economic integration (such as the EU);
   - economic development and modernization; and
   - questions of natural resource sustainability.

3. At least one course that provides familiarity with an area of the world or a country that allows them to make systematic comparisons with their own society and culture. This course could come from various disciplinary perspectives, including history, public policy, philosophy, international affairs, literature, economics, management, architecture, among others. Upper division Modern Language course will count here.

4. A culminating course, occurring either at the end of or after the international experience that integrates knowledge of the discipline and the international experience in a global context.

### Core F - Courses Related to Major

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<td>ECON 2106</td>
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### Major Requirements

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### ECON Electives

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### Non-Major Cluster

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### Modern Languages

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### Free Electives

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<tbody>
<tr>
<td>Total</td>
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<td></td>
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</table>
Bachelor of Science in History, Technology, and Society

The bachelor’s degree in History, Technology, and Society (BS-HTS) is comparable to traditional degrees in history and sociology, but has several attributes that make it unique and give our students an edge over other liberal arts majors. A degree in HTS requires broad-based training in humanities, mathematics, computing, science, and social sciences, giving our majors a truly rigorous and broad education. The program’s focus on global issues related to the origin and impact of technology and science is also distinctive, providing students with the critical tools needed to understand the development of the modern world. Students earning a degree in HTS may participate in both the International Plan and the Research Option, which enhance the undergraduate experience. Finally, the HTS curriculum allows one of the largest numbers of free electives of any major at Georgia Tech, giving our students a chance to pursue minor degrees, certificates, and other interests that prepare them for the broadest possible range of careers, from government and politics to law and medicine to journalism and business.

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<td>HITS 2081</td>
<td>Scientific Revolution</td>
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<td>HITS 2082</td>
<td>Tech&amp; Sci-Industrial Age</td>
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<td>Technology and Society</td>
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<td>Sci, Tech &amp; Modern World</td>
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<td>History of Rocketry</td>
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<td>Tech &amp; American Society</td>
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<td>Culture &amp; Technology</td>
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Select 8 credit hours of the following: 3

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<td>HTS 4086</td>
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<td>HTS 4091</td>
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Select three classes from one of the following specialization groups:

**U.S. Society**

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**Global Studies**

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**Politics, Economics, and Innovation**

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**Science, Technology, and Medicine**

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HTS 2082 Tech & Sci-Industrial Age
HTS 2084 Technology and Society
HTS 2100 Sci, Tech & Modern World
HTS 3020 Gender and Technology
HTS 3021 Women in Science & Engr
HTS 3046 Sci Pol Culture Nazi Ger
HTS 3080 History of Rocketry
HTS 3081 Tech and Environment
HTS 3082 Sociology of Science
HTS 3083 Tech & American Society
HTS 3084 Culture & Technology
HTS 3085 Law, Technology & Politics
HTS 3086 Soc of Medicine & Health
HTS 3087 History of Medicine
HTS 3088 Race Medicine & Science
HTS 3089 Science Tech & Sports

Communities, Environment, and Sustainability
HTS 3005 Amer Environmental Hist
HTS 3011 City in American Hist
HTS 3012 Urban Sociology
HTS 3026 Race and Ethnicity
HTS 3064 Sociology of Development
HTS 3071 Sociology of Crime
HTS 3072 Sociology of Education
HTS 3081 Tech and Environment

Power, Inequality, and Social Justice
HTS 2016 Soc Issues & Public Policy
HTS 3006 United States Labor Hist
HTS 3008 Class, Power & Inequality
HTS 3011 City in American Hist
HTS 3012 Urban Sociology
HTS 3016 Women & Gender in U.S.
HTS 3017 Sociology of Gender
HTS 3020 Gender and Technology
HTS 3021 Women in Science & Engr
HTS 3022 Gender and Sports
HTS 3023 Free People of Color
HTS 3024 African-Amer Hist to 1865
HTS 3025 Afr-Amer Hist since 1865
HTS 3026 Race and Ethnicity
HTS 3027 Civil Rights Movement
HTS 3031 European Labor History
HTS 3051 Women & Gender-Middle East
HTS 3067 Revolutionary Movement
HTS 3068 Social Movements
HTS 3071 Sociology of Crime
HTS 3072 Sociology of Education

Culture and Society
HTS 2015 History Sports America
HTS 2085 Reel History I
HTS 3022 Gender and Sports
HTS 3046 Sci Pol Culture Nazi Ger
HTS 3070 Culture and Society
HTS 3073 Sociology of Sports
HTS 3084 Culture & Technology
HTS 3100 Intro to Museum Studies

Custom Specialization

Non-Major Cluster
Non-Major Cluster 4.5 12

Free Electives
Free Electives 5 18

Total Credit Hours 122

Pass/fail: Students can do pass/fail for HTS electives, non-major cluster, and free electives. However, students who complete at least 91 credit hours at Georgia Tech are limited to 6 pass/fail credit hours in HTS electives and students who complete less than 90 credit hours at Tech are limited to 3 pass/fail credit hours in HTS electives.

All courses in the HTS core must be taken for a letter grade and the student must earn a C or better.

One grade of D (three credits) is allowed in HTS electives.

1 This must be a different class from that used to satisfy the Legislative Requirement.
2 Any HTS course that carries a Social Science attribute.
3 Minimum grade of C required.
4 12 credits required in either the same prefix or part of a coherent theme. Please consult with advisor on course selection.
5 Free Electives and Non-Major Cluster electives can be satisfied with a minor, certificate, or other coursework. Please consult with the advisor on course selection.
6 In consultation with an advisor, students choose three HTS classes with a coherent theme that is not reflected in the other seven pre-approved areas of specialization.
7 Please see an advisor for additional Math sequence options for Core D Math requirement.

International Plan

This degree program combines the traditional benefits of an HTS degree with the additional benefits of international education. The School of History and Sociology strongly encourages study abroad programs and believes that international experiences greatly enhance one’s undergraduate education.

The number of credit hours needed for this degree (BS in History, Technology, and Society-International Plan, or BSHTS-IP) is the same as for the traditional bachelor’s degree in HTS. However, the International Plan (IP) degree has different requirements. These requirements are discussed briefly in the next paragraph. In most cases, HTS majors will be able to use their non-major cluster and free-elective hours to fulfill the HTS-IP requirements.

There are two IP tracks:

• the English Language Option and
• the Foreign Language Option.

The HTS degree supports both options, which the Institute deems to be equal in difficulty and value. Both tracks require a total of twenty-
six weeks in residence in a specific foreign country or region. These weeks must be accumulated in one or two trips abroad; any combination of coursework, research, internship, or work may apply to this twenty-six week total, given the approval of the advisor. Both IP tracks require a minimum of twelve credit hours in one foreign language and demonstration of proficiency in that language. Both require participants to take a cluster of courses from a menu of IP-designated electives; both require completion of a capstone course, which will be offered through the HTS degree program.

For more complete information, see the official Institute IP website through Georgia Tech's Office of International Education.

Office of International Education (http://www.oie.gatech.edu)

Research Option

The School of History and Sociology Research Option allows students to incorporate additional research, writing, and presentation experiences into the HTS major program of study. Students interested in going on to graduate or professional school are encouraged to consider the research option, which allows a student to complete a significant scholarly work for presentation at a professional conference and/or publication.

In addition to the courses required of all HTS majors, including eight credit hours of research seminars and the three-credit HTS research methods course, students enrolled in the Research Option will also complete six hours of supervised individual undergraduate research and two 1-hour writing courses: LMC 4701 (typically taken during the first or second semester of research) and LMC 4702 (taken during the term in which the thesis is written).

Bachelor of Science in Industrial Design

Undergraduate education in industrial design at Georgia Tech leads to the Bachelor of Science Degree in Industrial Design that is accredited by the National Association of Schools of Art and Design (NASAD). The undergraduate program prepares students for a career in design practice as well as for graduate education in industrial design and in related fields. The School of Industrial Design at Georgia Tech offers the only industrial design degree program in the University System of Georgia.

Industrial design is the professional practice of creating products that enhance the function, usability, value, and appearance of products with the goal of benefiting the user, manufacturer, community, and the environment. Also known as product design, industrial design education prepares students to design systems and tangible artifacts including consumer and recreational products, business and industrial products, medical and computer equipment, and transportation and environments. Both generalist and specialist, industrial designers tend to be part artist, part entrepreneur and engineer.

Cross-disciplinary education is the primary focus of the four-year industrial design program. The university education provides:

1. an understanding of the arts (liberal and visual arts), technology (engineering and sciences), humanities (sociology and psychology), and management (marketing and branding).
2. a collaborative and shared education through an emphasis on the design studio, and
3. an opportunity to periodically participate in real-life design projects through sponsored studio projects.

The undergraduate program offers a well-rounded course of study with an emphasis on critical thinking, basic design, design skills, and design communication. There are 6 industrial design studios after the first year suite of introductory design classes. The industrial design studios focus on a sequential learning path which begins with form making to product design to post design that involves development and manufacturing. Design projects stress developing a broad education through an exposure to academic and professional considerations. The School encourages students to develop a diverse background in order to expand individual talents and respond to emerging opportunities in the field. Faculty members are scholars and design practitioners, giving students the opportunity to learn about both.

All work executed in the College becomes the property of the College and will be retained or returned at the discretion of the faculty. The faculty also reserves the right to refuse credit for any project executed outside the precincts of the College or otherwise executed without proper coordination with the instructor.

Grade Requirements

All required industrial design courses must be completed with a grade of C or higher. A student may not enter a more advanced studio design course until this requirement is met; students with such academic deficiencies may be required to delay their studies for one year. Studio design courses must be taken in sequence beginning fall semester. A minimum of 9 credit hours may be taken on a pass/fail basis. Only courses taken as free electives in the undergraduate curriculum maybe taken for pass/fail credit. See "Information for Undergraduate Students" for Institute regulations regarding pass/fail courses.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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<tr>
<td></td>
<td>Wellness</td>
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<tr>
<td>APPH 1040</td>
<td>Sci Foundation of Health</td>
<td>2</td>
</tr>
<tr>
<td>or APPH 10</td>
<td>Sci of Phys Act &amp; Health</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Core A - Essential Skills</td>
<td></td>
</tr>
<tr>
<td>ENGL 1101</td>
<td>English Composition I</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 1102</td>
<td>English Composition II</td>
<td>3</td>
</tr>
<tr>
<td>MATH 1552</td>
<td>Integral Calculus</td>
<td>4</td>
</tr>
<tr>
<td>Core B - Institutional Options</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CS 1315</td>
<td>Intro Media Computation</td>
<td>3</td>
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<tr>
<td></td>
<td>Core C - Humanities</td>
<td></td>
</tr>
<tr>
<td>Any HUM (p. 93)</td>
<td>History of Art II</td>
<td>3</td>
</tr>
<tr>
<td>COA 2242</td>
<td>History of Art II</td>
<td>3</td>
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<td>Core D - Science, Math, &amp; Technology</td>
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<tr>
<td>Lab Science</td>
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<td>PHYS 2211</td>
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<tr>
<td>MATH 1551</td>
<td>Differential Calculus</td>
<td>2</td>
</tr>
<tr>
<td>MATH 1553</td>
<td>Intro to Linear Algebra</td>
<td>2</td>
</tr>
<tr>
<td>Core E - Social Sciences</td>
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<tr>
<td>Select one of the following:</td>
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<td></td>
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<tr>
<td>HIST 2111</td>
<td>United States to 1877</td>
<td>3</td>
</tr>
<tr>
<td>HIST 2112</td>
<td>United States since 1877</td>
<td></td>
</tr>
<tr>
<td>INTA 1200</td>
<td>American Government</td>
<td></td>
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<tr>
<td>POL 1101</td>
<td>Government of the U.S.</td>
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</tr>
<tr>
<td>PUBP 3000</td>
<td>US Constitutional Issues</td>
<td></td>
</tr>
<tr>
<td>Any SS (p. 97)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
is structured to allow for the Fall and Spring third year semester to be completed at an industrial design program in another country. Students are responsible for locating those courses at the host institution that will serve as equivalents to the courses listed in the curriculum.

Degree requirements are not modified but are satisfied with specialized courses and appropriate choices of elective courses, which includes globally focused courses within the major area and a capstone Senior Studio: Global Awareness. Consult with the Industrial Design Program for the suggested curriculum.

All International Plan participants must develop proficiency in a language other than English. Unless otherwise approved, the language chosen to fulfill this requirement will have a relationship to the country or region in which the student plans to fulfill the 26 week requirement. Any variance will require approval from the IP faculty representative and the IP Committee.

**Admission Requirements**

- Applicants must be undergraduate degree-seeking Georgia Tech students in one of the participating majors.
- Students must submit an application via the International Plan website. Notification of acceptance will be communicated via the student’s Georgia Tech e-mail address.
- There is no GPA requirement for first-semester freshmen applying to the International Plan. All other applicants must have at least a 2.5 GPA at the time of application.

International Plan (http://www.internationalplan.gatech.edu)
Industrial Design International Studies (http://www.id.gatech.edu/academics/international-studies)

**Bachelor of Science in Industrial Engineering**

The principal strength of the academic program leading to the Bachelor of Science in Industrial Engineering (BS IE) is its blend of mathematics, physical sciences and business applications. The methodology foundation is built on probability, optimization, statistics, computing, and economics. The program features a unique concentration system that allows students to get a broad industrial engineering education and to specialize in areas such as

- Economic and Financial Systems (p. 364),
- Operations Research (p. 369),
- Quality and Statistics (p. 361),
- Supply Chain Engineering (p. 371), and
- General Industrial Engineering (p. 366).

This blend produces the flexibility that is inherent in the field of industrial and systems engineering, and that affords BSIE graduates a wide array of career options. Our graduates are constantly looking for ways to make anything in life work better, more efficiently and more productively.

**Program Educational Objectives**

The Stewart School of Industrial & Systems Engineering expects our graduates (in 3 to 6 years):

- to become successful Industrial Engineers;
- to take leadership in their endeavors;

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**Core F - Courses Related to Major**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
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<tr>
<td>ID 1101</td>
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<td></td>
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<tr>
<td>ID 1102</td>
<td>Intro Industrial Des 2</td>
<td></td>
</tr>
<tr>
<td>ID 1401</td>
<td>Intro Graphic Comm 1</td>
<td></td>
</tr>
<tr>
<td>ID 1402</td>
<td>Intro Graphic Comm 2</td>
<td></td>
</tr>
<tr>
<td>ID 1418</td>
<td>Intro Sketch &amp; Model 1</td>
<td></td>
</tr>
<tr>
<td>ID 1419</td>
<td>Intro Sketch &amp; Model 2</td>
<td></td>
</tr>
<tr>
<td>ID 2024</td>
<td>Ind Des Studio 2</td>
<td></td>
</tr>
<tr>
<td>ID 2023</td>
<td>Ind Des Studio 1</td>
<td></td>
</tr>
</tbody>
</table>

**Major Requirements**

- ID 2101: Digital Design Methods 3
- ID 2102: 3D Modeling 2
- ID 2202: Hist-Modern Indus Dsgn 3
- ID 2320: Human Factors in Design 3
- ID 2325: User Cent Design Methods 3
- ID 2510: Intro Smart Product Des 3
- ID 3031: Health Des Studio 1 4
- ID 3032: Health Des Studio 2 4
- ID 3301: Materials I 3
- ID 3302: Materials II 3
- ID 4061: ID Capstone Des Studio 1 4
- ID 4062: ID Capstone Des Studio 2 4
- ID 3320: Design Methods 3
- ID 4206: Culture of Objects 3

**Departmental Electives**

- Any ID course 12

**Free Electives**

- Free Electives 12

**Total Credit Hours**

130

Pass-fail only allowed for Free Electives.

1 If PHYS 2231 (5 credit hours) is taken, excess hour applies to Free Electives.

**International Plan**

The International Plan offers a challenging academic program that develops global competence within the context of Industrial Design.

The International Plan is a four-year program that builds global competence by requiring students to spend two full terms at an Industrial Design program in another country to develop a proficiency in a second language, and to take internationally oriented coursework. This experience provides students a deeper global competency than traditional international opportunities. The eight-semester sequence
The major components of International Plan include:

1. Twenty six weeks of international experience (work, research or study)
2. Foreign language requirements. This can be satisfied by oral proficiency measured tested by an exam by the American Council for the Teaching of Foreign Languages (ACTFL). The foreign language requirement can also be satisfied by course work. It means the passing of two 2XXX level language classes.
3. Three internationally oriented courses plus an addendum in the capstone design on international perspective.

Cooperative Plan

The Co-op Program enhances the student’s education, employability and earnings potential. For more details, visit co-op pages from Georgia Tech's co-op Website [http://www.coop.gatech.edu](http://www.coop.gatech.edu).

- Co-op courses are designated in the schedule of classes as co-op. All students interested in registering for this course(s) must have been accepted into the co-op Program. Students must have met with their co-op advisor to be issued a permit to register for restricted course(s). Students must register for the co-op course every semester they are at work in order to receive credit for the work term.
- Students who are in the Co-op Program (U.S. citizens and Permanent Residents) and are returning to work should automatically receive a permit but are advised to remain in close contact with their co-op advisor.
- International students must receive work authorization from the Office of International Education prior to each work term before a course registration permit will be issued.
- Neither co-op nor internship courses count for credit towards the industrial engineering degree; however, successful completion of the Co-op Program leads to a degree designator.

For more information about all of the programs in the Center for Career Discovery and Development, visit Center for Career Discovery and Development [http://www.careerdiscovery.gatech.edu](http://www.careerdiscovery.gatech.edu).

International Plan

The Georgia Tech International Plan is designed to prepare graduates to develop significant global competence. Many Industrial Engineers work in consulting companies, supply chain, economic decision systems, etc. Global perspectives are very important. The significant global competence will give them an additional advantage on the job market and on the jobs.

The major components of International Plan include:

- to be self-learners and starters;
- to succeed in professional and educational advancement.
- Bachelor of Science in Industrial Engineering - General (p. 366)
- Bachelor of Science in Industrial Engineering - Economic and Financial Systems (p. 364)
- Bachelor of Science in Industrial Engineering - Operations Research (p. 369)
- Bachelor of Science in Industrial Engineering - Quality and Statistics (p. 361)
- Bachelor of Science in Industrial Engineering - Supply Chain Engineering (p. 371)


BS/MS Program

A combined BS/MS program that will allow students to graduate with a Bachelor of Science in Industrial Engineering and a Master of Science in Supply Chain Engineering. Contact the School of Industrial Engineering for more information.

Bachelor of Science in Industrial Engineering - Quality and Statistics

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<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>APPH</td>
<td>Science Foundation of Health</td>
<td>2</td>
</tr>
<tr>
<td>or APPH 10</td>
<td>Sci of Phys Act &amp; Health</td>
<td></td>
</tr>
<tr>
<td>ENGL 1101</td>
<td>English Composition I</td>
<td>3</td>
</tr>
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<td>ENGL 1102</td>
<td>English Composition II</td>
<td>3</td>
</tr>
<tr>
<td>MATH 1552</td>
<td>Integral Calculus</td>
<td>1</td>
</tr>
<tr>
<td>CS 1301</td>
<td>Intro to Computing</td>
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<tr>
<td>Any HUM (p. 93)</td>
<td>Humanities</td>
<td>6</td>
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</tbody>
</table>

For more information, visit the Office of International Education [http://www.coop.gatech.edu](http://www.coop.gatech.edu).

<table>
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS 2211</td>
<td>Intro Physics I</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 2212</td>
<td>Intro Physics II</td>
<td>4</td>
</tr>
<tr>
<td>MATH 1551</td>
<td>Differential Calculus</td>
<td>2</td>
</tr>
<tr>
<td>MATH 1553</td>
<td>Intro to Linear Algebra</td>
<td>2</td>
</tr>
</tbody>
</table>

**Core E - Social Sciences**

Select one of the following:

- HIST 2111 United States to 1877
- HIST 2112 United States since 1877
- INTA 1200 American Government
- POL 1101 Government of the U.S.
- PUBP 3000 US Constitutional Issues
- ECON 2100 Economics and Policy
- PSYC 1101 General Psychology
- Any SS (p. 97)

**Core F - Courses Related to Major**

CS 2316 Data Input/Manipulation 3
CS 4400 Intr to Database Systems 3
MATH 2551 Multivariable Calculus 1, 2 4
Lab Science 3 8

**Ethics Requirement (p. 100) 4**

**Environmental Requirement 5**

**Major Requirements**

ACCT 2101 Accounting I
or MGT 300 Financ & Managerial Acct
MATH 2603 Intro Discrete Math 1 4
ISYE 2027 Probability With Apps 3
ISYE 2028 Basic Statistical Meth 3
ISYE 3025 Engineering Economy 1
ISYE 3133 Engineering Optimization 3
ISYE 3232 Stochastic Mfg&Serv Sys 3
ISYE 3044 Simulation Analy & Dsgn 3
ISYE 4106 Senior Design 4

**Engineering Electives 6**

Select one of the following:

- ECE 2020 Digital System Design
- ECE 2026 Intro Signal Processing
- ECE 3710 Circuits & Electronics & ECE 3741 and Instrum & Electronic Lab

Select 6 credits of the following: 7, 8

**Group 1**

- AE 2220 Dynamics
- AE 3450 Thermodynamics&Comp Flow
- BMED 2210 Conservation Prin in BME
- BMED 3100 Systems Physiology
- CHBE 2100 Chem Process Principles
- CHBE 2110 Chem Engr. Thermo I
- CHBE 4763 Pulping & Chem Recovery
- CHBE 4764 Bleaching & Papermaking
- COE 2001 Statics
- COE 3001 Deformable Bodies
- CEE 2040 Dynamics
- CEE 2300 Environmental Engr Prin
- CEE 3010 Geometrics
- CEE 4100 Construction Engr & Mgt
- CEE 4300 Environmental Engr Sys
- CEE 4600 Transportation Plan&Dsgn
- CS 2110 Computer Organiz&Program
- CS 4641 Machine Learning
- CX 4010 Computational Prob Solv
- CX 4240 Computing for Data Analy
- CX 4242 Data & Visual Analytics
- ECE 2020 Digital System Design
- ECE 2026 Intro Signal Processing
- ECE 2040 Circuit Analysis
- ECE 3035 Mechanisms-Computing Sys
- ECE 3076 Computer Communications
- ECE 3090 Software for Engr System
- ECE 3710 Circuits & Electronics
- ECE 3741 Instrum & Electronic Lab
- ECE 4606 Wireless Communications
- ME 2202 Dynamics of Rigid Bodies
- ME 3015 Sys Dynamics & Control
- ME 3322 Thermodynamics
- ME 3720 Intro-Fluid&Thermal Engr
- ME 4763 Pulping & Chem Recovery
- ME 4764 Bleaching and Papermaking
- MSE 2001 Prin&Appl-Engr Materials
- MSE 3012 Thermal&Transport Props
- MSE 3015 Elec,Optical&Magnet Prop
- NRE 3301 Radiation Physics

**Group 2: 9**

- AE 4370 Life Cycle Cost Analysis
- AE 4701 Wind Engineering
- AE 4793 Composite Mater& Process
- ARCH 6271 Healthcare Des Of Future
- BIOL 2400 Math Models in Biol
- BIOL 4740 Bio-Inspired Design
- BIOL 4755 Mathematical Biology
- BMED 2300 Problems-Biomed Engr II
- BMED 3400 Intro to Biomechanics
- BMED 4751 Intro to Biomaterials
- CHBE 4793 Composite Mater& Process
- COE 3002 Micro/Nano Revolution
- CEE 4225 Coastal Engineering
- CEE 4330 Air Pollution Engr
- CEE 4793 Composite Mater& Process
- CP 4310 Urban Transportation
- CP 4510 Geographic Info Sys
- ECE 2031 Digital Design Lab
- ECE 2040 Circuit Analysis
- ECE 4755 Packaging Substrate Fab
- ISYE 4740 Bio-Inspired Design
- MATH 4755 Mathematical Biology
- ME 2110 Creative Decisions& Dsgn
Students must achieve a minimum GPA of 2.0 in the BSIE Major.

Quality and Statistics Concentration

<table>
<thead>
<tr>
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<th>Course Title</th>
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<td>ISYE 3039</td>
<td>Methods-Quality Improve</td>
</tr>
<tr>
<td>ISYE 4031</td>
<td>Regression/Forecasting</td>
</tr>
<tr>
<td>CS 4641</td>
<td>Machine Learning</td>
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</table>

or MATH 4260 Statistics II

Select three of the following:

<table>
<thead>
<tr>
<th>Course Code</th>
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<tbody>
<tr>
<td>ECON 3150</td>
<td>Econ &amp; Finance Modeling</td>
</tr>
<tr>
<td>ECON 4340</td>
<td>Industrial Organization</td>
</tr>
<tr>
<td>ECON 4350</td>
<td>International Economics</td>
</tr>
<tr>
<td>ISYE 3103</td>
<td>Sply Chain Mod:Logistics</td>
</tr>
<tr>
<td>ISYE 3104</td>
<td>Sply Chain Mod:Man&amp;Ware</td>
</tr>
<tr>
<td>ISYE 4111</td>
<td>Adv Supply Chain Logists</td>
</tr>
<tr>
<td>ISYE 4133</td>
<td>Advanced Optimization</td>
</tr>
<tr>
<td>ISYE 4301</td>
<td>Supply Chain Economics</td>
</tr>
<tr>
<td>ISYE 4232</td>
<td>Advanced Stochastic Sys</td>
</tr>
<tr>
<td>ISYE 4311</td>
<td>Capital Invest Analysis</td>
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<tr>
<td>ISYE 4803</td>
<td>Special Topics</td>
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<td>MGT 3078</td>
<td>Finance &amp; Investments</td>
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Free Electives

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<td>ECON 4340</td>
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<td>Capital Invest Analysis</td>
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<tr>
<td>ISYE 4803</td>
<td>Special Topics</td>
</tr>
<tr>
<td>MGT 3078</td>
<td>Finance &amp; Investments</td>
</tr>
</tbody>
</table>

Free Electives

Total Credit Hours 128

Pass-fail only allowed for Free Electives, Humanities, and the Social Sciences elective.

Students must achieve a minimum GPA of 2.0 in the BSIE Major.

1. Students must earn a C or better in all required MATH courses in the BSIE curriculum.
2. Students may also complete MATH 1554 and MATH 2550 to satisfy math requirements. If MATH 1554/MATH 2550 combination is taken, then two hours from MATH 1554 may be used in Area F to give Area F 18 hours.
3. Only one EAS course can be used toward ISYE Lab Science requirements.
4. PSYC 1101 will satisfy the Ethics requirement.
5. Students must choose from the following to meet the Environmental requirement: BIOL 1510, BIOL 2335, CEE 2300, CEE 4300, EAS 1600, EAS 1601, EAS 2600, EAS 2750, EAS 3110, EAS 4480, ECON 4440, ISYE 4803 titled "Energy and Environmental Analysis," ISYE 4501, SLS 3120, or PHYS 2750.
6. Students must complete courses from two different eligible engineering elective subjects.
7. Only one computing course (CX or CS) may count toward engineering elective requirements, unless given approval from ISyE Associate Chair.
8. Students must take at least 9 credits of engineering electives. Three credits must be chosen from ECE 2020, ECE 2026, or ECE 3710/ECE 3741. For the remaining 6 credits, at least 2 credits must be from Group 1.
9. To count toward the Engineering Elective Group 2 requirement, all Vertically-Integrated Projects (VIP) courses must be approved by the ISyE Associate Chair.
10. Students must complete 6 concentration courses: 3 depth courses and 3 breadth courses. A minimum of 5 of the 6 required concentration courses must be ISYE courses.
11. These 3 courses must be from least 2 of the following groups:
    - Supply Chain Engineering (ISYE 3103 or ISYE 3104 or ISYE 4111 or ISYE 4803 titled "Advanced Manufacturing" or ISYE 4803 titled "Facility Layout and Warehousing")
    - Economic and Financial Systems (ISYE 4301 or ISYE 4311 or ECON 3150 or ECON 4340 or ECON 4350 or MGT 3078)
    - Operations Research (ISYE 4133 or ISYE 4232 or ISYE 4803 titled "Advanced Simulation")
12. ISYE 4803 must be titled "Advanced Manufacturing" or "Advanced Simulation" or "Facility Layout and Warehousing" or "Supply Chain Project" or "Linear and Convex Optimization" or "Energy and Environmental Analysis."
13. MATH 1113, MGT 2250, ISYE 3770, and PHYS 2XXX (AP credit) not allowed.

Cooperative Plan

The Co-op Program enhances the student's education, employability and earnings potential. For more details, visit co-op pages from Georgia Tech's co-op Website (http://www.coop.gatech.edu).

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International Plan

The Georgia Tech International Plan is designed to prepare graduates to develop significant global competence. Many Industrial Engineers work in consulting companies, supply chain, economic decision systems, etc. Global perspectives are very important. The significant global competence will give them an additional advantage on the job market and on the jobs.
The major components of International Plan include

1. Twenty six weeks of international experience (work, research or study)
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3. Three internationally oriented courses plus an addendum in the capstone design on international perspective.

For more details of the International Plan, including application materials, visit the Office of International Education (http://www.internationalplan.gatech.edu). Please also see The International Plan Option in ISyE (http://www.isye.gatech.edu/academics/undergraduate/international/isyemainplan.pdf).

**BS/MS Program**

A combined BS/MS program that will allow students to graduate with a Bachelor of Science in Industrial Engineering and a Master of Science in Supply Chain Engineering. Contact the School of Industrial Engineering for more information.

### Bachelor of Science in Industrial Engineering - Economic and Financial Systems

The principal strength of the academic program leading to the Bachelor of Science in Industrial Engineering (BS IE) is its blend of mathematics, physical sciences and business applications. The methodology foundation is built on probability, optimization, statistics, computing, and economics. The program features a unique concentration system that allows students to get a broad industrial engineering education and to specialize in areas such as

- Economic and Financial Systems
- Operations Research
- Quality and Statistics
- Supply Chain Engineering
- General Industrial Engineering

This blend produces the flexibility that is inherent in the field of industrial and systems engineering, and that affords BSIE graduates a wide array of career options. Our graduates are constantly looking for ways to make anything in life work better, more efficiently and more productively.

### Program Educational Objectives

The Stewart School of Industrial & Systems Engineering expects our graduates (in 3 to 6 years):

- to become successful Industrial Engineers;
- to take leadership in their endeavors;
- to be self-learners and starters;
- to succeed in professional and educational advancement.

### Code | Title | Credit Hours
--- | --- | ---
APPH 1040 | Sci Foundation of Health | 2
APPH 10 | Sci of Phys Act & Health | 2

### Core A - Essential Skills

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### Core B - Institutional Options

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### Core C - Humanities

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### Core D - Science, Math, & Technology

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### Core E - Social Sciences

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### Core F - Courses Related to Major

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<td>Lab Science</td>
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### Major Requirements

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<td>or MGT 300</td>
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<td>MATH 2603</td>
<td>Intro Discrete Math</td>
<td>4</td>
</tr>
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<td>ISYE 2027</td>
<td>Probability With Apps</td>
<td>3</td>
</tr>
<tr>
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<td>Basic Statistical Meth</td>
<td>3</td>
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<td>ISYE 3025</td>
<td>Engineering Economy</td>
<td>1</td>
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<td>ISYE 3133</td>
<td>Engineering Optimization</td>
<td>3</td>
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<td>ISYE 3232</td>
<td>Stochastic Mfg&amp;Serv Sys</td>
<td>3</td>
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<td>ISYE 3044</td>
<td>Simulation Analy &amp; Dsgn</td>
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<tr>
<td>ISYE 4106</td>
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### Engineering Electives

Select one of the following:

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<td>ECE 2026</td>
<td>Intro Signal Processing</td>
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<tr>
<td>ECE 3710</td>
<td>Circuits &amp; Electronics</td>
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<tr>
<td>&amp; ECE 3741</td>
<td>and Instrum &amp; Electronic Lab</td>
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Select 6 credits of the following: 7,8

Group 1:

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364 Bachelor of Science in Industrial Engineering - Economic and Financial Systems
AE 3450    Thermodynamics&Comp Flow
BMED 2210 Conservation Prin in BME
BMED 3100 Systems Physiology
CHBE 2100 Chem Process Principles
CHBE 2110 Chem Engr. Thermo I
CHBE 4763 Pulping & Chem Recovery
CHBE 4764 Bleaching & Papermaking
COE 2001 Statics
COE 3001 Deformable Bodies
CEE 2300 Environmental Engr Prin
CEE 3010 Geomatics
CEE 4100 Construction Engr & Mgt
CEE 4300 Environmental Engr Sys
CEE 4600 Transportation Plan&Dsgn
CS 2110 Computer Organiz&Program
CS 4641 Machine Learning
CX 4010 Computational Prob Solv
CX 4240 Computing for Data Analy
CX 4242 Data & Visual Analytics
ECE 2020 Digital System Design
ECE 2026 Intro Signal Processing
ECE 2040 Circuit Analysis
ECE 3035 Mechanisms-Computing Sys
ECE 3076 Computer Communications
ECE 3090 Software for Engr System
ECE 3710 Circuits & Electronics
ECE 3741 Instrum & Electronic Lab
ECE 4606 Wireless Communications
ME 2202 Dynamics of Rigid Bodies
ME 3015 Sys Dynamics & Control
ME 3322 Thermodynamics
ME 3720 Intro-Fluid&Thermal Engr
ME 4763 Pulping & Chem Recovery
ME 4764 Bleaching and Papermaking
MSE 2001 Prin&Appl-Engr Materials
MSE 3012 Thermal&Transport Props
MSE 3015 Elec,Optical&Magnet Prop
NRE 3301 Radiation Physics

Group 2: 9
AE 4370 Life Cycle Cost Analysis
AE 4701 Wind Engineering
AE 4793 Composite Mater& Process
ARCH 6271 Healthcare Des Of Future
BIOL 2400 Math Models in Biol
BIOL 4740 Bio-Inspired Design
BIOL 4755 Mathematical Biology
BMED 2300 Problems-Biomed Engr II
BMED 3400 Intro to Biomechanics
BMED 4751 Intro to Biomaterials
CHBE 4793 Composite Mater& Process
COE 3002 Micro/Nano Revolution

CEE 4225 Coastal Engineering
CEE 4330 Air Pollution Engr
CEE 4793 Composite Mater& Process
CP 4310 Urban Transportation
CP 4510 Geographic Info Sys
ECE 2031 Digital Design Lab
ECE 2040 Circuit Analysis
ECE 4755 Packaging Substrate Fab
ISYE 4740 Bio-Inspired Design
MATH 4755 Mathematical Biology
ME 2110 Creative Decisions& Dsgn
ME 3057 Experimental Methodology
ME 4740 Bio-Inspired Design
ME 4793 Composite Mater& Process
MSE 2021 Matls Characterization
MSE 3720 Intro Poly/Fib Enterpris
MSE 4751 Intro to Biomaterials
MSE 4755 Packaging Substrate Fab
MSE 4793 Composite Mater& Process

Economic and Financial Systems Concentration 10
ISYE 4301 Supply Chain Economics 3
ISYE 4311 Capital Invest Analysis 3
Select one of the following: 3
ECON 3150 Econ & Finance Modeling
ECON 4340 Industrial Organization
ECON 4350 International Economics
MGT 3078 Finance & Investments
Select three of the following: 11 9
ISYE 3039 Methods-Quality Improve
ISYE 3103 Sply Chain Mod:Logistics
ISYE 3104 Sply Chain Mod:Manf&Ware
ISYE 4031 Regression/Forecasting
ISYE 4111 Adv Supply Chain Logists
ISYE 4133 Advanced Optimization
ISYE 4232 Advanced Stochastic Sys
ISYE 4803 Special Topics 12

Free Electives 13
Free Electives 11
Total Credit Hours 128

Pass-fail only allowed for Free Electives, Humanities, and the Social Sciences elective.

Students must achieve a minimum GPA of 2.0 in the BSIE Major Requirements to graduate.

1 Students must earn a C or better in all required MATH courses in the BSIE curriculum.
2 Students may also complete MATH 1554 and MATH 2550 to satisfy Math requirements. If MATH 1554/MATH 2550 combination is taken, then two hours from MATH 1554 may be used in Area F to give Area F 18 hours.
3 Only one EAS course can be used toward ISYE Lab Science requirements.
4 PSYC 1101 will satisfy the Ethics requirement.
Students should choose from the following for Environmental Requirement: BIOL 1510, BIOL 2335, CEE 2300, CEE 4300, EAS 1600, EAS 1601, EAS 2600, EAS 2750, EAS 3110, EAS 4480, ECON 4440, ISYE 4803 titled "Energy and Environmental Analysis", ISYE 4501, SLS 3120, or PHYS 2750.

Students must complete courses from two different eligible engineering elective subjects.

Only one computing course (CX or CS) may count toward engineering elective requirements, unless given approval from ISyE Associate Chair.

Students must take at least 9 credits of engineering electives. Three credits must be chosen from ECE 2020, ECE 2026, or ECE 3710/ECE 3741. For the remaining 6 credits, at least 2 credits must be from Group 1.

To count toward the Engineering Elective Group 2 requirement, all Vertically-Integrated Projects (VIP) courses must be approved by the ISyE Associate Chair.

Students must complete 6 concentration courses: 3 depth courses and 3 breadth courses. A minimum of 5 of the 6 required concentration courses must be ISYE courses.

These 3 courses must be from at least 2 of the following groups:

- Supply Chain Engineering (ISYE 3103 or ISYE 3104 or ISYE 4111 or ISYE 4803 titled "Advanced Manufacturing," or ISYE 4803 titled "Facility Layout and Warehousing") or
- Quality and Statistics (ISYE 3039 or ISYE 4031 or ISYE 4034 or ISYE 4803 titled "Business Analytics" or CS 4641 or CX 4010 or CX 4210 or CX 4240 or CX 4242 or MATH 4262) or
- Operations Research (ISYE 4133 or ISYE 4232 or ISYE 4803 titled "Advanced Simulation")

ISYE 4803 must be titled "Advanced Manufacturing" or "Advanced Simulation" or "Facility Layout and Warehousing" or "Supply Chain Project" or "Business Analytics" or "Linear and Convex Optimization" or "Energy and Environmental Analysis".

MATH 1113, MGT 2250, ISYE 3770, and PHYS 2XXX(AP credit) not allowed.

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<td>or APPH 10</td>
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<td></td>
<td>Core A - Essential Skills</td>
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<td>(p. 93)</td>
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<td>Core F - Courses Related to Major</td>
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<td>Simulation Analy &amp; Dsgn</td>
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<td>&amp; ECE 3741</td>
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<td>CS 2110</td>
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<td>CS 4641</td>
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<td>Sys Dynamics &amp; Control</td>
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<td>MSE 2001</td>
<td>Prin&amp;Appl-Engr Materials</td>
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<td>MSE 3012</td>
<td>Thermal&amp;Transport Props</td>
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<td>MSE 3015</td>
<td>Elec,Optical&amp;Magnet Prop</td>
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<td>Group 2:</td>
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<tr>
<td>AE 4370</td>
<td>Life Cycle Cost Analysis</td>
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4 PSYC 1101 will satisfy the Ethics requirement.

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8 Students must take at least 9 credits of engineering electives. Three credits must be chosen from ECE 2000, ECE 2026, or ECE 3710/ECE 3741. For the remaining 6 credits, at least 2 credits must be from Group 1.

9 To count toward the Engineering Elective Group 2 requirement, all Vertically-Integrated Projects (VIP) courses must be approved by the ISyE Associate Chair.

10 Students must complete 6 concentration courses. A minimum of 5 of the 6 required concentration courses must be ISYE courses.

11 ISYE 4803 must be titled “Advanced Manufacturing” or “Linear and Convex Optimization” or “Advanced Simulation.”

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The Georgia Tech International Plan is designed to prepare graduates to develop significant global competence. Many Industrial Engineers work in consulting companies, supply chain, economic decision systems, etc. Global perspectives are very important. The significant global competence will give them an additional advantage on the job market and on the jobs.

The major components of International Plan include

1. Twenty six weeks of international experience (work, research or study)
2. Foreign language requirements. This can be satisfied by oral proficiency measured tested by an exam by the American Council for the Teaching of Foreign Languages (ACTFL). The foreign language requirement can also be satisfied by course work. It means the passing of two 2XXX level language classes.
3. Three internationally oriented courses plus an addendum in the capstone design on international perspective.

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BS/MS Program

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Bachelor of Science in Industrial Engineering - Operations Research

The principal strength of the academic program leading to the Bachelor of Science in Industrial Engineering (BS IE) is its blend of mathematics, physical sciences and business applications. The methodology foundation is built on probability, optimization, statistics, computing, and economics. The program features a unique concentration system that allows students to get a broad industrial engineering education and to specialize in areas such as

- Economic and Financial Systems (p. 364),
- Operations Research (p. 369),
- Quality and Statistics (p. 361),
- Supply Chain Engineering (p. 371), and
- General Industrial Engineering (p. 366).

This blend produces the flexibility that is inherent in the field of industrial and systems engineering, and that affords BSIE graduates a wide array of career options. Our graduates are constantly looking for ways to make anything in life work better, more efficiently and more productively.

Program Educational Objectives

The Stewart School of Industrial & Systems Engineering expects our graduates (in 3 to 6 years):

- to become successful Industrial Engineers;
- to take leadership in their endeavors;
- to be self-learners and starters;
- to succeed in professional and educational advancement.

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<tr>
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<td>ENGL 1101</td>
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<td>ENGL 1102</td>
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<td>MATH 1552</td>
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<td>Core B - Institutional Options</td>
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<td>Stochastic Mfg&amp;Serv Sys</td>
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<td>ECE 2026</td>
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Select 6 credits of the following:

Group 1

AE 2220  Dynamics
AE 3450  Thermodynamics & Comp Flow
BMED 2210  Conservation Prin in BME
BMED 3100  Systems Physiology
CHBE 2100  Chem Process Principles
CHBE 2110  Chem Engr. Thermo I
CHBE 4763  Pulping & Chem Recovery
CHBE 4764  Bleaching & Papermaking
COE 2001  Statics
COE 3001  Deformable Bodies
CEE 2300  Environmental Engr Prin
CEE 3010  Geomatics
CEE 4100  Construction Engr & Mgt
CEE 4300  Environmental Engr Sys
CEE 4600  Transportation Plan & Dsgn
CS 2110  Computer Organiz & Program
CS 4641  Machine Learning
CX 4010  Computational Prob Solv
CX 4240  Computing for Data Analy
CX 4242  Data & Visual Analytics
ECE 2020  Digital System Design
ECE 2026  Intro Signal Processing
ECE 2031  Digital Design Lab
ECE 3035  Mechanisms-Computing Sys
ECE 3076  Computer Communications
ECE 3090  Software for Engr System
ECE 3710  Circuits & Electronics
ECE 3741  Instrum & Electronic Lab
ECE 4606  Wireless Communications
ME 2202  Dynamics of Rigid Bodies
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MSE 2001  Prin & Appl-Eng Matls
MSE 3012  Thermal & Transport Props
MSE 3015  Elec, Optical & Magnet Prop
NRE 3301  Radiation Physics

Group 2

AE 3430  Life Cycle Cost Analysis
AE 4701  Wind Engineering
AE 4793  Composite Mater & Process
ARCH 6271  Healthcare Des Of Future
BIOL 2400  Math Models in Biol
BIOL 4740  Bio-Inspired Design
BIOL 4755  Mathematical Biology

BMED 2300  Problems-Biomed Engr II
BMED 3400  Intro to Biomechanics
BMED 4751  Intro to Biomaterials
CHBE 4793  Composite Mater & Process
COE 3002  Micro/Nano Revolution
CEE 4225  Coastal Engineering
CEE 4330  Air Pollution Engr
CEE 4793  Composite Engineering
CP 4310  Urban Transportation
CP 4510  Geographic Info Sys
ECE 2031  Digital Design Lab
ECE 2040  Circuit Analysis
ECE 4755  Packaging Substrate Fab
ME 2110  Creative Decisions & Dsgn
ME 3057  Experimental Methodology
ME 4740  Bio-Inspired Design
ME 4793  Composite Mater & Process
MSE 2021  Matls Characterization
MSE 3720  Intro Poly/Fib Enterpris
MSE 4751  Intro to Biomaterials
MSE 4755  Packaging Substrate Fab
MSE 4793  Composite Mater & Process

Operations Research Concentration

ISYE 4803  Special Topics 11 3
ISYE 4133  Advanced Optimization
ISYE 4803  Special Topics 12 3
ISYE 4232  Advanced Stochastic Sys 3

Select three of the following: 13 9

CS 4641  Machine Learning
ECON 3150  Econ & Finance Modeling
ECON 4340  Industrial Organization
ECON 4350  International Economics
ISYE 3039  Methods-Quality Improve
ISYE 3103  Sply Chain Mod Logic
ISYE 3104  Sply Chain Mod Manf & Ware
ISYE 4031  Regression/Forecasting
ISYE 4111  Adv Supply Chain Logist
ISYE 4301  Supply Chain Economics
ISYE 4311  Capital Invest Analysis
ISYE 4803  Special Topics 14
MATH 4262  Math Statistics II
MGT 3078  Finance & Investments

Free Electives 15

Free Electives 11

Total Credit Hours 128

Pass-fail only allowed for Free Electives, Humanities, and the Social Sciences elective.

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ISYE 4803 must be titled "Linear and Convex Optimization."

ISYE 4803 must be titled "Advanced Simulation."

These 3 courses must be from at least 2 of the following groups:

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- Economic and Financial Systems (ISYE 4301 or ISYE 4311 or ECON 3150 or ECON 4340 or ECON 4350 or MGT 3078)
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<th>Credit Hours</th>
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<td>Sci Foundation of Health</td>
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<tr>
<td>or APPH 1050</td>
<td>Sci of Phys Act &amp; Health</td>
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<tr>
<td>Core A - Essential Skills</td>
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<td></td>
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<tr>
<td>ENGL 1101</td>
<td>English Composition I</td>
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<td>Core B - Institutional Options</td>
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<td>Core C - Humanities</td>
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<tr>
<td>INTA 1200</td>
<td>American Government</td>
<td></td>
</tr>
<tr>
<td>POL 1101</td>
<td>Government of the U.S.</td>
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<tr>
<td>PUBP 3000</td>
<td>US Constitutional Issues</td>
<td></td>
</tr>
<tr>
<td>ECON 2100</td>
<td>Economics and Policy</td>
<td>3</td>
</tr>
<tr>
<td>PSYC 1101</td>
<td>General Psychology</td>
<td>3</td>
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<tr>
<td>Any SS (p. 97)</td>
<td></td>
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<td>Core F - Courses Related to Major</td>
<td></td>
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<td>CS 2316</td>
<td>Data Input/Manipulation</td>
<td>3</td>
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<td>CS 4400</td>
<td>Intr to Database Systems</td>
<td>3</td>
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<tr>
<td>MATH 2551</td>
<td>Multivariable Calculus</td>
<td>4</td>
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<tr>
<td>Lab Science</td>
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<td>8</td>
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<tr>
<td>Ethics Requirement (p. 100)</td>
<td></td>
<td>4</td>
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<tr>
<td>Environmental Requirement</td>
<td></td>
<td>5</td>
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</tbody>
</table>

Major Requirements

ACCT 2101  Accounting I
or MGT 300  Financ & Managerial Acct
MATH 2603  Intro Discrete Math
ISYE 2027  Probability With Apps
ISYE 2028  Basic Statistical Meth
ISYE 3025  Engineering Economy
ISYE 3133  Engineering Optimization
ISYE 3232  Stochastic Mfg&Serv Sys
ISYE 3044  Simulation Analy & Dsgn
ISYE 4106  Senior Design

Engineering Electives 5
Select one of the following: 3

ECE 2020  Digital System Design
ECE 2026  Intro Signal Processing
ECE 3710  Circuits & Electronics
& ECE 3741 and Instrum & Electronic Lab

Select 6 credits of the following: 7,8 6

Group 1:

AE 2220  Dynamics
AE 3450  Thermodynamics&Comp Flow
BMED 2210  Conservation Prin in BME
BMED 3100  Systems Physiology
CHBE 2100  Chem Process Principles
CHBE 2110  Chem Engr, Thermo I
CHBE 4763  Pulping & Chem Recovery
CHBE 4764  Bleaching & Papermaking
COE 2001  Statics
COE 3001  Deformable Bodies
CEE 2040  Dynamics
CEE 2300  Environmental Engr Prin
CEE 3010  Geomatics
CEE 4100  Construction Engr & Mgt
CEE 4300  Environmental Engr Sys
CEE 4600  Transportation Plan&Dsgn
CS 2110  Computer Organiz&Program
CS 4641  Machine Learning
CX 4010  Computational Prob Solv
CX 4240  Computing for Data Analy
CX 4242  Data & Visual Analytics
ECE 2020  Digital System Design
ECE 2026  Intro Signal Processing
ECE 2040  Circuit Analysis

ECE 3035  Mechanisms-Computing Sys
ECE 3076  Computer Communications
ECE 3090  Software for Engr System
ECE 3710  Circuits & Electronics
ECE 3741  Instrum & Electronic Lab
ECE 4606  Wireless Communications
ME 2202  Dynamics of Rigid Bodies
ME 3015  Sys Dynamics & Control
ME 3322  Thermodynamics
ME 3720  Intro-Fluid&Thermal Engr
Select three of the following:

ISYE 4803 Special Topics
MATH 4262 Math Statistics II
MGT 3078 Finance & Investments

Free Electives

Total Credit Hours: 128

Pass-fail only allowed for Free Electives, Humanities, and the Social Sciences elective.

Requirements to graduate.

1. Students must earn a C or better in all required MATH courses in the BSIE curriculum.
2. Students may also complete MATH 1554 and MATH 2550 to satisfy math requirements. If MATH 1554/MATH 2550 combination is taken, then two hours from MATH 1554 may be used in Area F to give Area F 18 hours.
3. Only one EAS course can be used toward ISYE Lab Science requirements.
4. PSYC 1101 will satisfy the Ethics requirement.
5. Students must choose from the following to meet the Environmental requirement: BIOL 1510, BIOL 2335, CEE 2300, CEE 4300, EAS 1600, EAS 1601, EAS 2600, EAS 2750, EAS 3110, EAS 4480, ECON 4440, ISYE 4803 titled “Energy and Environmental Analysis,” ISYE 4501, SLS 3120, or PHYS 2750.
6. Students must complete courses from two different eligible engineering elective subjects.
7. Only one computing course (CX or CS) may count toward engineering elective requirements, unless given approval from ISyE Associate Chair.
8. Students must take at least 9 credits of engineering electives. Three credits must be chosen from ECE 2020, ECE 2026, or ECE 3710/ECE 3741. For the remaining 6 credits, at least 2 credits must be from Group 1.
9. To count toward the Engineering Elective Group 2 requirement, all Vertically-Integrated Projects (VIP) courses must be approved by the ISyE Associate Chair.
10. Students must complete 6 concentration courses: 3 depth courses and 3 breadth courses. A minimum of 5 of the 6 required concentration courses must be ISYE courses.
11. ISYE 4803 must be titled “Advanced Manufacturing” or “Facility Layout and Warehousing.”
12. These 3 courses must be from at least 2 of the following groups:
   - Economic and Financial Systems (ISYE 4301 or ISYE 4311 or ECON 3150 or ECON 4340 or ECON 4350 or MGT 3078)
   - Quality and Statistics (ISYE 3039 or ISYE 4031 or ISYE 4034 or ISYE 4803 titled “Business Analytics” or CS 4641 or CS 4010 or CS 4210 or CS 4240 or CX 4242 or MATH 4262.
   - Operations Research (ISYE 4137 or ISYE 4232 or ISYE 4803 titled “Advanced Simulation”)
13. ISYE 4803 must be titled “Supply Chain Project” or “Business Analytics” or “Advanced Simulation” or “Linear and Convex Optimization” or “Energy and Environmental Analysis.”
Bachelor of Science in International Affairs

14 MATH 1113, MGT 2250, ISYE 3770, and PHYS 2XXX (AP credit) not allowed.

Cooperative Plan
The Co-op Program enhances the student’s education, employability and earnings potential. For more details, visit co-op pages from Georgia Tech’s co-op Website (http://www.coop.gatech.edu).

- Co-op courses are designated in the schedule of classes as co-op. All students interested in registering for this course(s) must have been accepted into the co-op Program. Students must have met with their co-op advisor to be issued a permit to register for restricted course(s). Students must register for the co-op course every semester they are at work in order to receive credit for the work term.
- Students who are in the Co-op Program (U.S. citizens and Permanent Residents) and are returning to work should automatically receive a permit but are advised to remain in close contact with their co-op advisor.
- International students must receive work authorization from the Office of International Education prior to each work term before a course registration permit will be issued.
- Neither co-op nor internship courses count for credit towards the industrial engineering degree; however, successful completion of the Co-op Program leads to a degree designator.

For more information about all of the programs in the Center for Career Discovery and Development, visit Center for Career Discovery and Development (http://www.careerdiscovery.gatech.edu).

International Plan
The Georgia Tech International Plan is designed to prepare graduates to develop significant global competence. Many Industrial Engineers work in consulting companies, supply chain, economic decision systems, etc. Global perspectives are very important. The significant global competence will give them an additional advantage on the job market and on the jobs.

The major components of International Plan include

1. Twenty six weeks of international experience (work, research or study)
2. Foreign language requirements. This can be satisfied by oral proficiency measured tested by an exam by the American Council for the Teaching of Foreign Languages (ACTFL). The foreign language requirement can also be satisfied by course work. It means the passing of two 2XXX level language classes.
3. Three internationally oriented courses plus an addendum in the capstone design on international perspective.

For more details of the International Plan, including application materials, visit the Office of International Education (http://www.internationalplan.gatech.edu). Please also see The International Plan Option in ISyE (http://www.isye.gatech.edu/academics/undergraduate/international/isyeintplan.pdf).

BS/MS Program
A combined BS/MS program that will allow students to graduate with a Bachelor of Science in Industrial Engineering and a Master of Science in Supply Chain Engineering. Contact the School of Industrial Engineering for more information.

Bachelor of Science in International Affairs
The Bachelor of Science in International Affairs (BS INTA) program includes instruction in international affairs, foreign languages, ethics and philosophy, social and natural sciences, and computer science. Upper-division coursework provides training in four substantive areas:

- technology, and scientific analysis, and ethics;
- international security and diplomacy;
- comparative politics, cultures, and societies; and
- international political economy.

Graduates of the BS INTA program are prepared for advanced graduate and professional study and are ready for employment in internationally oriented firms, government agencies, and nonprofit organizations.

International Affairs majors are expected to enhance their education through participation in the International Plan, study abroad programs, internships, and a host of on- and off-campus programs. In addition to the numerous opportunities afforded through Georgia Tech’s Office of International Education, the Sam Nunn School sponsors rigorous summer study abroad programs in the European Union (Brussels), East Asia (China, Japan, Taiwan), South Asia (Cambodia, Singapore, Thailand), Latin America (Argentina and Brazil), and Iberia (Portugal and Spain). Recognizing the importance of professional experience in enhancing a student’s education, the Sam Nunn School encourages majors to pursue an internship or participate in the Cooperative Plan in their field of interest. In addition, students are strongly encouraged to get involved in a range of extracurricular activities, including Model United Nations; AIESEC; Sigma Iota Rho (the International Affairs honor society); the Center for International Strategy, Technology, and Policy; the International Affairs Student Organization; and student conferences. Students are actively involved in the guest lecture series and participate in the biennial Sam Nunn/Bank of America Policy Forum.

INTA Undergraduate Information (http://inta.gatech.edu/current-students/undergraduate)

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>APPH 1040</td>
<td>Sci Foundation of Health</td>
<td>2</td>
</tr>
<tr>
<td>or APPH 10</td>
<td>Sci of Phys Act &amp; Health</td>
<td></td>
</tr>
<tr>
<td>ENGL 1101</td>
<td>English Composition I</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 1102</td>
<td>English Composition II</td>
<td>3</td>
</tr>
<tr>
<td>MATH 1712</td>
<td>Survey of Calculus</td>
<td>4</td>
</tr>
<tr>
<td>or MATH 15</td>
<td>Integral Calculus</td>
<td></td>
</tr>
<tr>
<td>CS 1315</td>
<td>Intro Media Computation</td>
<td>3</td>
</tr>
<tr>
<td>Core A - Essential Skills</td>
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<td></td>
</tr>
<tr>
<td>Modern Languages</td>
<td>2</td>
<td></td>
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<tr>
<td>Core B - Institutional Options</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lab Science</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Lab Science</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>
MATH 1711  Finite Mathematics 4
or MATH 1511 Differential Calculus & MATH 1512 Intro to Linear Algebra

Core E - Social Sciences
Select one of the following: 3
HIST 2111 United States to 1877
HIST 2112 United States since 1877
INTA 1200 American Government
POL 1101 Government of the U.S.
PUBP 3000 US Constitutional Issues

Select one of the following: 3
ECON 2100 Economics and Policy
ECON 2101 The Global Economy
ECON 2105 Prin of Macroeconomics
ECON 2106 Prin of Microeconomics

Select one of the following: 3
INTA 1110 Intro to Int'l Relations

Core F - Courses Related to Major
INTA 2001 Careers In Intl Affairs
INTA 3110 U.S. Foreign Policy
INTA 3203 Comparative Politics
INTA 3301 Intl Political Econ
INTA 4500 INTA Pro-Seminar

Additional INTA Electives
INTA Electives 3/4000 level 2 12
Modern Languages 1 6
Non-Major Cluster
Non-Major Cluster 3 15

Free Electives
Free Electives 13

Total Credit Hours 122

1 Students must complete twelve credit hours of the same language. Six credit hours are counted in Humanities, and six in major requirements.
2 Minimum grade of C required.
3 15 credits required in either the same prefix or part of a coherent theme. Please consult with advisor on course selection.
4 Technical elective.

Research Option
The Sam Nunn School of International Affairs also participates in the Research Option plan offered by the Undergraduate Research Opportunities Program (UROP). The Research Option offers students the opportunity for in-depth research experience working under the guidance of a faculty mentor. Requirements for participation in the Research Option include completing nine hours of undergraduate research, at least six of which are on the same topic, writing a research proposal, taking two 1-hour courses: LMC 4701 Undergraduate Research Proposal Writing (typically taken during the first or second semester of research) and LMC 4702 Undergraduate Research Thesis Writing (taken during the term in which the thesis is written), and completing the thesis. Students are also required to send a weekly update of progress of research to the faculty mentor. Along with their application, students must explain
how the faculty mentor’s research experience will benefit the student’s research.

**International Plan**

International Affairs majors with the International Plan are engaged in a combination of study, research, or internship abroad for a total of twenty-six weeks. This overseas experience must be obtained over two terms (a summer and semester, or two semesters). In addition to gaining advanced global competence, the International Plan designation will set INTA students apart from other applicants with recruiters from top companies and governmental agencies. Required coursework for the International Plan is easily satisfied by the International Affairs core curriculum as follows:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTA 1110</td>
<td>Intro to Int'l Relations</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>INTA 3301</td>
<td>Int'l Political Econ</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Select one of the following:</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>INTA 3203</td>
<td>Comparative Politics</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>INTA approved elective or upper-division Modern Language course</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Select one of the following:</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>INTA 4500</td>
<td>INTA Pro-Seminar</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ML 4500</td>
<td>Intercultural Seminar</td>
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<tr>
<td>Total Credit Hours</td>
<td>12</td>
<td></td>
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</table>

1. focuses on international relations historically and theoretically
2. provides a historical and theoretical understanding of the global economy, including topics such as international trade, finance, investment, and production; regional economic integration, economic development and modernization; and questions of natural resource sustainability
3. provides familiarity with an area of the world or a country that allows students to make systematic comparisons with their own society and culture
4. A culminating course, occurring either at the end of or after the international experience that integrates knowledge of the discipline and the international experience in a global context.

**BS/MS International Affairs**

The Sam Nunn School of International Affairs offers a joint Bachelor of Science in International Affairs and Modern Language (IAML) with separate concentrations in Chinese, French, German, Japanese, Russian, and Spanish. Students in this program take the same required core courses as for the Bachelor of Science in International Affairs, but also receive intensive foreign language training and learn the fundamentals of dealing with foreign cultures and societies. IAML students learn how to formulate the policy decisions that must be made in an increasingly multilingual and multicultural global forum. Our graduates are prepared for advanced graduate and professional study and are ready for employment in a large arena of globally oriented businesses, government agencies, as well as social service and not-for-profit organizations.

Students in the BS/MS program will remain undergraduates until they meet requirements for the undergraduate degree, at which point they will receive their BS degree and be changed to graduate status. Students will be eligible to apply for the program after completion of 45 semester credit hours at Georgia Tech (i.e., at the end of their third semester), and if they show appropriate progress in their degree program thereafter. Any student in good standing in the BS INTA program is eligible to apply to the program. Admissions decisions will be based on GPA and judgments of the faculty who have served as advisors or instructors. Continuation in the program will require the student to maintain a GPA of 3.5 or higher in Ivan Allen College courses. The program will not penalize students who opt out after the bachelor’s degree. Students participating in this program will be eligible for the six semester credit-hour Graduate Course Option, which allows students completing both the bachelor’s and master’s in the same discipline to use up to 6 credit hours of graduate-level coursework in the major discipline for both degrees.

The Graduate-level Credits Required in the BS/MS Program are usually as follows:

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core (includes 6 hours of shared courses)</td>
<td>15</td>
</tr>
<tr>
<td>Electives</td>
<td>24</td>
</tr>
<tr>
<td>Technical Requirement</td>
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<tr>
<td>Total Credit Hours</td>
<td>42</td>
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</table>

**Specific Requirements for the Program**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>INTA 6202</td>
<td>Comparative Politics (Taken at Undergraduate Level)</td>
<td>3</td>
</tr>
<tr>
<td>INTA 6302</td>
<td>Intl Political Economy (Taken at Undergraduate Level)</td>
<td>3</td>
</tr>
<tr>
<td>INTA 6003</td>
<td>Empirical Research Meth</td>
<td>3</td>
</tr>
<tr>
<td>INTA 6102</td>
<td>Intl Relations Theory</td>
<td>3</td>
</tr>
<tr>
<td>INTA 6103</td>
<td>International Security</td>
<td>3</td>
</tr>
<tr>
<td>MS Track and Free Electives</td>
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<tr>
<td>Technical Requirement (or, INTA/Free elective, if waived)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Total Credit Hours</td>
<td>42</td>
<td></td>
</tr>
</tbody>
</table>

Contact the BS/MS program director for further information. http://www.inta.gatech.edu/current-students/graduate/Syrbms

INTA Undergraduate Information (http://www.inta.gatech.edu)

**Bachelor of Science in International Affairs and Modern Language**

In partnership with the Sam Nunn School of International Affairs, the School of Modern Languages offers a joint Bachelor of Science in International Affairs and Modern Language (IAML) with separate concentrations in Chinese, French, German, Japanese, Russian, and Spanish. Students in this program take the same required core courses as for the Bachelor of Science in International Affairs, but also receive intensive foreign language training and learn the fundamentals of dealing with foreign cultures and societies. IAML students learn how to formulate the policy decisions that must be made in an increasingly multilingual and multicultural global forum. Our graduates are prepared for advanced graduate and professional study and are ready for employment in a large arena of globally oriented businesses, government agencies, as well as social service and not-for-profit organizations.

- Bachelor of Science in International Affairs and Modern Language - Chinese (p. 377)
- Bachelor of Science in International Affairs and Modern Language - French (p. 379)
- Bachelor of Science in International Affairs and Modern Language - German (p. 381)
- Bachelor of Science in International Affairs and Modern Language - Japanese (p. 383)
- Bachelor of Science in International Affairs and Modern Language - Russian (p. 385)
• Bachelor of Science in International Affairs and Modern Language - Spanish (p. 387)

Bachelor of Science in International Affairs and Modern Language - Chinese

In partnership with the Sam Nunn School of International Affairs, the School of Modern Languages offers a joint Bachelor of Science in International Affairs and Modern Language (IAML) with separate concentrations in Chinese, French, German, Japanese, Russian, and Spanish. Students in this program take the same required core courses as for the Bachelor of Science in International Affairs, but also receive intensive foreign language training and learn the fundamentals of dealing with foreign cultures and societies. IAML students learn how to formulate the policy decisions that must be made in an increasingly multilingual and multicultural global forum. Our graduates are prepared for advanced graduate and professional study and are ready for employment in a large arena of globally oriented businesses, government agencies, as well as social service and not-for-profit organizations.

<table>
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<th>Credit Hours</th>
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<tbody>
<tr>
<td>APPH 1040</td>
<td>Sci Foundation of Health</td>
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<td>or APPH 1050</td>
<td>Sci of Phys Act &amp; Health</td>
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<td>ENGL 1101</td>
<td>English Composition I</td>
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<tr>
<td>ENGL 1102</td>
<td>English Composition II</td>
<td>3</td>
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<tr>
<td>MATH 1712</td>
<td>Survey of Calculus</td>
<td>4</td>
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<tr>
<td>or MATH 15 Integral Calculus</td>
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<tr>
<td>CS 1315</td>
<td>Intro Media Computation</td>
<td>3</td>
</tr>
<tr>
<td>INTA 1110</td>
<td>Intro to Int’l Relations</td>
<td>2</td>
</tr>
</tbody>
</table>

Select one of the following:
- BMED 2400 Intro-Biengr Stats
- CP 4510 Geographic Info Sys
- CS 1301 Intro to Computing
- CS 1315 Intro Media Computation
- CS 1316 Rep Structure & Behavior
- CS 1331 Intro-Object Orient Prog
- CS 2316 Data Input/Manipulation
- EAS 3110 Energy, Environ, Society
- EAS 4480 Environ Data Analysis
- ECE 2020 Digital System Design
- ID 3103 Indust Dsgn Computing I
- LMC 3402 Graphic & Visual Design
- LMC 3410 Non-Linear Documents
- ME 2016 Computing Techniques
- MGT 2200 Information Technology
- MGT 4051 Decision Supp&Expert Sys
- MGT 4052 Systems Analysis& Design

Major Requirements

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>HTS 1031</td>
<td>Europe Since Renaissance</td>
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<td>HTS 2036</td>
<td>Revolutionary Europe</td>
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<td>HTS 2037</td>
<td>20th Century Europe</td>
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<tr>
<td>HTS 2040</td>
<td>Hist Islamic Societies</td>
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<td>HTS 2041</td>
<td>Hist-Modernt Middle East</td>
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<tr>
<td>HTS 2061</td>
<td>Traditional Asia</td>
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<tr>
<td>HTS 2062</td>
<td>Asia in the Modern World</td>
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<td>HTS 3028</td>
<td>Ancient Greece</td>
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<td>HTS 3029</td>
<td>Ancient Rome</td>
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<td>HTS 3030</td>
<td>Medieval Europe</td>
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<tr>
<td>HTS 3031</td>
<td>European Labor History</td>
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<tr>
<td>HTS 3032</td>
<td>Europe Intellectual Hist</td>
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<td>HTS 3033</td>
<td>Medieval England</td>
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<td>HTS 3035</td>
<td>Britain 1815-1914</td>
<td></td>
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<td>HTS 3036</td>
<td>Britain Since 1914</td>
<td></td>
</tr>
<tr>
<td>HTS 3038</td>
<td>French Revolution</td>
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<tr>
<td>HTS 3039</td>
<td>Modern France</td>
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<tr>
<td>HTS 3041</td>
<td>Modern Spain</td>
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<tr>
<td>HTS 3043</td>
<td>Modern Germany</td>
<td></td>
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<td>HTS 3045</td>
<td>Nazi Germany-Holocaust</td>
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<td>HTS 3046</td>
<td>Sci Pol Culture Nazi Ger</td>
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<td>HTS 3051</td>
<td>Women&amp;Gender-Middle East</td>
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<td>HTS 3061</td>
<td>Modern China</td>
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<td>HTS 3062</td>
<td>Modern Japan</td>
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<td>British Colonization</td>
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<td>HTS 3065</td>
<td>Hist Global Societies</td>
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<tr>
<td>INTA 2010</td>
<td>Empirical Methods</td>
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<td>LMC 3402 Graphic &amp; Visual Design</td>
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<tr>
<td>MGT 4052 Systems Analysis&amp; Design</td>
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International Plan

The degree requirements for the International Affairs and Modern Language (Chinese, French, German, Japanese, Russian, and Spanish) are basically the same as for the IAML degree, except that students are required to spend two terms abroad and then achieve Intermediate High (for Chinese, Japanese, Russian: Intermediate Low) on the standardized ACTFL testing scale during an oral interview. The costs of the test will be paid for by the School of Modern Languages for each student. The terms abroad must total a minimum of twenty-six weeks; typically these consist of one semester of study plus a significant amount of time spent with a research or work project abroad. Only one summer semester abroad will count in this total. IAML-IP majors are strongly encouraged to enroll in the Language for Business and Technology (LBAT) intensive summer programs offered by the School of Modern Languages.

In addition to gaining advanced global competence, the International Plan designation will set IAML majors apart from other applicants with recruiters from top companies and governmental agencies. Other required courses include the following, which can easily be obtained within the regular required curriculum offerings of INTA and Modern Languages (these requirements can also be met with courses taken abroad, upon consultation with IAML degree advisors):

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<thead>
<tr>
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<td>INTA 3301</td>
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<td>INTA 4500</td>
<td>INTA Pro-Seminar 4</td>
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<td>INTA approved elective or upper-division Modern Language course</td>
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<td>INTA 4500</td>
<td>INTA Pro-Seminar 4</td>
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<td>CHIN/FREN</td>
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1. INTA 1110 focuses on international relations historically and theoretically, including topics such as the role of state sovereignty and nationalisms and non-state actors in the international system; international conflict, peace, security, intervention, and nation-building; international organizations, law, and ethics; and transnational problems of the environment, terrorism, health, and migration; among other issues.

2. INTA 3301 provides a historical and theoretical understanding of the global economy, including topics such as international trade, finance, investment, and production; regional economic integration (such as the EU); economic development and modernization; and questions of natural resource sustainability.

3. INTA 3203 or approved INTA elective or upper-division Modern Language courses provide familiarity with an area of the world or a country that allows them to make systematic comparisons with their own society and culture.
A culminating course, occurring either at the end of or after the international experience that integrates knowledge of the discipline and the international experience in a global context.

Degree Information (http://www.modlangs.gatech.edu/degrees)

**BS in International Affairs and Modern Languages/MS in International Affairs**

Students with a GPA of 3.5 or higher in IAC courses are eligible to apply for the program after completion of 30 semester credit hours at Georgia Tech, but before the completion of 75 semester credit hours, including transfer and advanced placement credits. Students who have more than 75 credit hours will be considered for the program on a case-by-case basis. Depending on demand, the required minimum GPA may be higher. Admissions decisions will be based on GPA and judgments of the Graduate Committee and faculty who have served as advisors or instructors. Continuation in the program will require the student to maintain a GPA of 3.5 or higher in IAC courses. The program will not penalize students who opt out after the bachelor’s degree.

Visit International Affairs and Modern Languages (https://modlangs.gatech.edu/degrees/iaml)/International Affairs (https://inta.gatech.edu) for more information.

**Bachelor of Science in International Affairs and Modern Language - French**

In partnership with the Sam Nunn School of International Affairs, the School of Modern Languages offers a joint Bachelor of Science in International Affairs and Modern Language (IAML) with separate concentrations in Chinese, French, German, Japanese, Russian, and Spanish. Students in this program take the same required core courses as for the Bachelor of Science in International Affairs, but also receive intensive foreign language training and learn the fundamentals of dealing with foreign cultures and societies. IAML students learn how to formulate the policy decisions that must be made in an increasingly multilingual and multicultural global forum. Our graduates are prepared for advanced graduate and professional study and are ready for employment in a large arena of globally oriented businesses, government agencies, as well as social service and not-for-profit organizations.

<table>
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<tr>
<th>Code</th>
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<td><strong>Core A - Essential Skills</strong></td>
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<td></td>
<td>or APPH 10 Sci of Phys Act &amp; Health</td>
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<td><strong>Core B - Institutional Options</strong></td>
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<td>HTS 2061 Traditional Asia</td>
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<td>HTS 3045 Nazi Germany-Holocaust</td>
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<td>HTS 3046 Sci Pol Culture Nazi Ger</td>
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<td>HTS 3051 Women&amp;Gender-Middle East</td>
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<td>HTS 3061 Modern China</td>
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<td>HTS 3069 Modern Cuba</td>
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Georgia Institute of Technology - DRAFT COPY 379
Bachelor of Science in International Affairs and Modern Language - French

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**Major Requirements**

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<td>INTA 3110</td>
<td>U.S. Foreign Policy</td>
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<td>INTA 3203</td>
<td>Comparative Politics</td>
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<td>INTA 3301</td>
<td>Int'l Political Econ</td>
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<td>INTA 4500</td>
<td>INTA Pro-Seminar</td>
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<td>INTA 3000-</td>
<td>or 4000-level Electives</td>
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**Modern Language**

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<th>Credit Hours</th>
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**Modern Languages**

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**Free Electives**

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<td>Free Electives</td>
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**Total Credit Hours**

122

*Note: Non-credit requirement*

With the goal of enhanced educational and career prospects and in accordance with the pedagogical objectives of the degree in International Affairs and Modern Language, all IAML students are required to fulfill an International Experience as part of their graduation requirements. This requirement can be met through one of two ways:

1. Complete a minimum 6-week overseas experience. If this is not a country whose primary language is in the student's language of study, the student must justify and receive prior approval.

2. Complete a 15-week internship or similar experience of at least 10 credit hours per week at an international organization such as consulate, CNN International, etc. The internship must be approved in advance.

Students must complete 39 hours of upper division coursework (3000/4000-level courses). Fifteen hours of free electives, language, or technology requirements must be upper division (3000/4000-level courses).

1. Students must complete 21 credit hours of FREN electives from 3000- or 4000-level courses. Six credit hours are counted in Humanities, and 15 in Modern Languages Electives.

2. Minimum grade of C required.

3. FREN courses below 3000 may count toward the free elective courses.

4. Technical elective.

5. Approved instances of CS 2803 may be applied here by advisor.

**Research Option**

The Sam Nunn School of International Affairs also participates in the Research Option plan offered by the Undergraduate Research Opportunities Program (UROP). The Research Option offers students the opportunity for in-depth research experience working under the guidance of a faculty mentor. Requirements for participation in the Research Option include completing nine hours of undergraduate research, at least six of which are on the same topic, writing a research proposal, taking two 1-hour courses: LMC 4701 Undergraduate Research Proposal Writing (typically taken during the first or second semester of research) and LMC 4702 Undergraduate Research Thesis Writing (taken during the term in which the thesis is written), and completing the thesis. Students are also required to send a weekly update of progress of research to the faculty mentor. Along with their application, students must explain how the faculty mentor's research experience will benefit the student's research.

**International Plan**

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<td>INTA 3203</td>
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<tr>
<td>INTA 4500</td>
<td>INTA Pro-Seminar</td>
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**Required Courses**
and multicultural global forum. Our graduates are prepared for advanced graduate and professional study and are ready for employment in a large arena of globally oriented businesses, government agencies, as well as social service and not-for-profit organizations.

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**Bachelor of Science in International Affairs and Modern Language - German**

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HTS 3038 French Revolution
HTS 3039 Modern France
HTS 3041 Modern Spain
HTS 3043 Modern Germany
HTS 3045 Nazi Germany-Holocaust
HTS 3046 Sci Pol Culture Nazi Ger
HTS 3051 Women&Gender-Middle East
HTS 3061 Modern China
HTS 3062 Modern Japan
HTS 3063 British Colonization
HTS 3065 Hist Global Societies
HTS 3067 Revolutionary Movement
HTS 3069 Modern Cuba
INTA 1110 Intro to Int'l Relations  
3
Core F - Courses Related to Major
INTA 2010 Empirical Methods  
3
INTA 2040 Sci,Tech & Int'l Affairs  
3
INTA 1000- or 2000-level Electives  
9
Select one of the following:  
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BMED 2400 Intro-Bioengr Stats  
3
CP 4510 Geographic Info Sys  
3
CS 1301 Intro to Computing  
3
CS 1315 Intro Media Computation  
3
CS 1316 Rep Structure & Behavior  
3
CS 1331 Intro-Object Orient Prog  
3
CS 2316 Data Input/Manipulation  
3
ID 3103 Indust Dsgn Computing I  
3
EAS 3110 Energy, Environ, Society  
3
ECE 2020 Digital System Design  
3
LMC 3402 Graphic & Visual Design  
3
LMC 3410 Non-Linear Documents  
3
ME 2016 Computing Techniques  
3
MG 2200 Information Technology  
3
MG 4051 Decision Supp&Expert Sys  
3
MG 4052 Systems Analysis&Design  
3
Major Requirements
INTA 2001 Careers In Int'l Affairs  1
INTA 3110 U.S. Foreign Policy  
3
INTA 3203 Comparative Politics  
3
INTA 3301 Int'l Political Econ  
3
INTA 4500 INTA Pro-Seminar  
3
INTA 3000- or 4000-level Electives  
12
Modern Language
GRMN 4500 Intercultural Seminar  
3
Modern Languages  
15
Free Electives
Free Electives  
16
Total Credit Hours  122
Note: Non-credit requirement

With the goal of enhanced educational and career prospects and in accordance with the pedagogical objectives of the degree in International Affairs and Modern Language, all IAML students are required to fulfill an International Experience as part of their graduation requirements. This requirement can be met through one of two ways:

1. Complete a minimum 6-week overseas experience. If this is not a country whose primary language is in the student’s language of study, the student must justify and receive prior approval.

2. Complete a 15-week internship or similar experience of at least 10 credit hours per week at an international organization such as consulate, CNN International, etc. The internship must be approved in advance.

Students must complete 39 hours of upper division coursework (3000/4000-level courses). Fifteen hours of free electives, language, or technology requirements must be upper division (3000/4000-level courses).

1. Students must complete 21 credit hours of GRMN electives from 3000- or 4000-level courses. Six credit hours are counted in Humanities, and 15 in Modern Languages Electives.

2. Minimum grade of C required.

3. GRMN courses below 3000-level may count toward the free elective courses.

4. Technical elective.

5. Approved instances of CS 2803 may be applied here by advisor.

Research Option
The Sam Nunn School of International Affairs also participates in the Research Option plan offered by the Undergraduate Research Opportunities Program (UROP). The Research Option offers students the opportunity for in-depth research experience working under the guidance of a faculty mentor. Requirements for participation in the Research Option include completing nine hours of undergraduate research, at least six of which are on the same topic, writing a research proposal, taking two 1-hour courses: LMC 4701 Undergraduate Research Proposal Writing (typically taken during the first or second semester of research) and LMC 4702 Undergraduate Research Thesis Writing (taken during the term in which the thesis is written), and completing the thesis. Students are also required to send a weekly update of progress of research to the faculty mentor. Along with their application, students must explain how the faculty mentor’s research experience will benefit the student’s research.

International Plan
The degree requirements for the International Affairs and Modern Language (Chinese, French, German, Japanese, Russian, and Spanish) - International Plan (IAML - IP) are basically the same as for the IAML degree, except that students are required to spend two terms abroad and then achieve Intermediate High (for Chinese, Japanese, Russian: Intermediate Low) on the standardized ACTFL testing scale during an oral interview. The costs of the test will be paid for by the School of Modern Languages for each student. The terms abroad must total a minimum of twenty-six weeks; typically these consist of one semester of study plus a significant amount of time spent with a research or work project abroad. Only one summer semester abroad will count in this total. IAML-IP majors are strongly encouraged to enroll in the Language for Business and Technology (LBAT) intensive summer programs offered by the School of Modern Languages.
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<thead>
<tr>
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<tbody>
<tr>
<td>INTA 1110</td>
<td>Intro to Int’l Relations 1</td>
<td>3</td>
</tr>
<tr>
<td>INTA 3301</td>
<td>Int’l Political Econ 2</td>
<td>3</td>
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<tr>
<td>Select one of the following: 3</td>
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</tr>
<tr>
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<td>Comparative Politics</td>
<td></td>
</tr>
<tr>
<td>INTA 4500</td>
<td>INTA Pro-Seminar 4</td>
<td>3</td>
</tr>
<tr>
<td>CHIN/FREN/ GRMN/JAPN/ RUSS/SPAN 4500</td>
<td></td>
<td>3</td>
</tr>
</tbody>
</table>

Total Credit Hours 15

1 INTA 1110 focuses on international relations historically and theoretically, including topics such as the role of state sovereignty and nationalism and non-state actors in the international system; international conflict, peace, security, intervention, and nation-building; international organizations, law, and ethics; and transnational problems of the environment, terrorism, health, and migration; among other issues.

2 INTA 3301 provides a historical and theoretical understanding of the global economy, including topics such as international trade, finance, investment, and production; regional economic integration (such as the EU); economic development and modernization; and questions of natural resource sustainability.

3 INTA 3203 or approved INTA elective or upper-division Modern Language courses provide familiarity with an area of the world or a country that allows them to make systematic comparisons with their own society and culture.

4 A culminating course, occurring either at the end of or after the international experience that integrates knowledge of the discipline and the international experience in a global context.

Degree Information (http://www.modlangs.gatech.edu/degrees)

**Bachelor of Science in International Affairs and Modern Language - Japanese**

In partnership with the Sam Nunn School of International Affairs, the School of Modern Languages offers a joint Bachelor of Science in International Affairs and Modern Language (IAML) with separate concentrations in Chinese, French, German, Japanese, Russian, and Spanish. Students in this program take the same required core courses as for the Bachelor of Science in International Affairs, but also receive intensive foreign language training and learn the fundamentals of dealing with foreign cultures and societies. IAML students learn how to formulate the policy decisions that must be made in an increasingly multilingual and multicultural global forum. Our graduates are prepared for advanced graduate and professional study and are ready for employment in a large arena of globally oriented businesses, government agencies, as well as social service and not-for-profit organizations.

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<tr>
<td>or MATH 151</td>
<td>Integral Calculus</td>
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<tr>
<td>CS 1315</td>
<td>Intro Media Computation</td>
<td>3</td>
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<tr>
<td>MATH 1711</td>
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<td>&amp; MATH 151</td>
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</tr>
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<td>INTA 3203</td>
<td>Comparative Politics</td>
<td>3</td>
</tr>
<tr>
<td>INTA approved elective or upper-division Modern Language course</td>
<td></td>
<td></td>
</tr>
<tr>
<td>INTA 4500</td>
<td>INTA Pro-Seminar 4</td>
<td>3</td>
</tr>
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<td>Intercultural Seminar 4</td>
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<td>GRMN/JAPN/</td>
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<tr>
<td>RUSS/SPAN</td>
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<td>4500</td>
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</table>

Note: Non-credit requirement

With the goal of enhanced educational and career prospects and in accordance with the pedagogical objectives of the degree in Global Economics and Modern Languages, all GEML students are required to fulfill an International Experience as part of their graduation requirements. This requirement can meet through one of two ways:

1. Complete a minimum 6-week overseas experience. If this is not a country whose primary language is in the student’s language of study, the student must justify and receive prior approval.
2. Complete a 15-week internship or similar experience of at least 10 hours per week at an international organization such as consulate, CNN International, etc. The internship must be approved in advance.

Any 1000- or 2000-level course with the following prefixes: AE, APPH, BIOL, BMED, CEE, CHBE, CHEM, EAS, ECE, ISYE, MATH, ME, MSE, NRE, PHYS.

Students must complete 21 credit hours of Japanese electives at 2002 level or above. Six credit hours are counted in Humanities, six in Core Area F, and 9 in Modern Languages Requirements.

Minimum grade of C required.

ECON and JAPN courses not allowed for cluster electives.

One course from MATH 3215, ISYE 3770 or (MGT 2250 - minimum B)

Six credit hours of Econ Electives must be chosen from one of the following Specialization areas:
- Industrial Organization: ECON 4340 or ECON 4180 or ECON 4360 or ECON 4361 or
- International Economics: ECON 4311 or ECON 4350 or ECON 4355 or ECON 4610 or
- Environmental Economics: ECON 3300 or ECON 4421 or ECON 4440

JAPN courses below 2002 may count toward the free elective courses.
1. INTA 1110 focuses on international relations historically and theoretically, including topics such as the role of state sovereignty and nationalism and non-state actors in the international system; international conflict, peace, security, intervention, and nation-building; international organizations, law, and ethics; and transnational problems of the environment, terrorism, health, and migration; among other issues.

2. INTA 3301 provides a historical and theoretical understanding of the global economy, including topics such as international trade, finance, investment, and production; regional economic integration (such as the EU); economic development and modernization; and questions of natural resource sustainability.

3. INTA 3203 or approved INTA elective or upper-division Modern Language courses provide familiarity with an area of the world or a country that allows them to make systematic comparisons with their own society and culture.

4. A culminating course, occurring either at the end of or after the international experience that integrates knowledge of the discipline and the international experience in a global context.

Degree Information (http://www.modlangs.gatech.edu/degrees)

**BS in International Affairs and Modern Languages/MS in International Affairs**

Students with a GPA of 3.5 or higher in IAC courses are eligible to apply for the program after completion of 30 semester credit hours at Georgia Tech, but before the completion of 75 semester credit hours, including transfer and advanced placement credits. Students who have more than 75 credit hours will be considered for the program on a case-by-case basis. Depending on demand, the required minimum GPA may be higher. Admissions decisions will be based on GPA and judgments of the Graduate Committee and faculty who have served as advisors or instructors. Continuation in the program will require the student to maintain a GPA of 3.5 or higher in IAC courses. The program will not penalize students who opt out after the bachelor’s degree.

Visit International Affairs and Modern Languages (https://modlangs.gatech.edu/degrees) /International Affairs (https://inta.gatech.edu) for more information.

**Bachelor of Science in International Affairs and Modern Language - Russian**

In partnership with the Sam Nunn School of International Affairs, the School of Modern Languages offers a joint Bachelor of Science in International Affairs and Modern Language (IAML) with separate concentrations in Chinese, French, German, Japanese, Russian, and Spanish. Students in this program take the same required core courses as for the Bachelor of Science in International Affairs, but also receive intensive foreign language training and learn the fundamentals of dealing with foreign cultures and societies. IAML students learn how to formulate the policy decisions that must be made in an increasingly multilingual and multicultural global forum. Our graduates are prepared for advanced graduate and professional study and are ready for employment in a large arena of globally oriented businesses, government agencies, as well as social service and not-for-profit organizations.
**Bachelor of Science in International Affairs and Modern Language - Russian**

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<tr>
<td>HTS 3046</td>
<td>Sci Pol Culture Nazi Ger</td>
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<tr>
<td>HTS 3051</td>
<td>Women&amp;Gender-Middle East</td>
</tr>
<tr>
<td>HTS 3061</td>
<td>Modern China</td>
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<td>HTS 3062</td>
<td>Modern Japan</td>
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<td>HTS 3063</td>
<td>British Colonization</td>
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<td>HTS 3065</td>
<td>Hist Global Societies</td>
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<td>HTS 3067</td>
<td>Revolutionary Movement</td>
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<td>HTS 3069</td>
<td>Modern Cuba</td>
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<td>Empirical Methods</td>
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<td>INTA 2040</td>
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<td>Intro-Bioengr Stats</td>
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<td>CP 4510</td>
<td>Geog Info Sys</td>
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<tr>
<td>CS 1301</td>
<td>Intro to Computing</td>
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<tr>
<td>CS 1315</td>
<td>Intro Media Computation</td>
</tr>
<tr>
<td>CS 1316</td>
<td>Rep Structure &amp; Behavior</td>
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<td>CS 1331</td>
<td>Intro-Object Orient Prog</td>
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<td>CS 2316</td>
<td>Data Input/Manipulation</td>
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<td>Energy, Environ, Society</td>
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<td>EAS 4480</td>
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<td>ECE 2020</td>
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<td>LMC 3402</td>
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<td>LMC 3410</td>
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<td>MGT 4052</td>
<td>Systems Analysis&amp; Design</td>
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**Major Requirements**

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<td>INTA 3110</td>
<td>U.S. Foreign Policy</td>
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<td>INTA 3203</td>
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<td>INTA 3301</td>
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<td>INTA 4500</td>
<td>INTA Pro-Seminar</td>
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**Modern Language**

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<td>Modern Languages</td>
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**Free Electives**

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<td>Free Electives</td>
<td>Additional Courses</td>
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**Total Credit Hours**

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1. Students must complete 21 credit hours of RUSS electives from 2002, 3000- 4000-level courses. Six credit hours are counted in Humanities, and 15 in Modern Languages Electives.
2. Minimum grade of C required.
3. RUSS courses below 2002 may count toward the free elective courses.
4. Technical elective.
5. Approved instances of CS 2803 may be applied here by advisor.

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3 INTA 3203 or approved INTA elective or upper-division Modern Language courses provide familiarity with an area of the world or a country that allows them to make systematic comparisons with their own society and culture.

4 A culminating course, occurring either at the end of or after the international experience that integrates knowledge of the discipline and the international experience in a global context.

Bachelor of Science in International Affairs and Modern Language - Spanish

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<td>Sci of Phys Act &amp; Health</td>
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Core A - Essential Skills

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Core C - Humanities

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<tr>
<td>Modern Languages 2</td>
<td></td>
<td>6</td>
</tr>
</tbody>
</table>

Core D - Science, Math, & Technology

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lab Science</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Lab Science</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>MATH 1711</td>
<td>Finite Mathematics</td>
<td>4</td>
</tr>
<tr>
<td>or MATH 151</td>
<td>Differential Calculus</td>
<td></td>
</tr>
<tr>
<td>&amp; MATH 151</td>
<td>and Intro to Linear Algebra</td>
<td></td>
</tr>
</tbody>
</table>

Core E - Social Sciences

Select one of the following: 3

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIST 2111</td>
<td>United States to 1877</td>
<td></td>
</tr>
<tr>
<td>HIST 2112</td>
<td>United States since 1877</td>
<td></td>
</tr>
<tr>
<td>INTA 1200</td>
<td>American Government</td>
<td></td>
</tr>
<tr>
<td>POL 1101</td>
<td>Government of the U.S.</td>
<td></td>
</tr>
<tr>
<td>PUBP 3000</td>
<td>US Constitutional Issues</td>
<td></td>
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</table>

Select one of the following: 3

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECON 2100</td>
<td>Economics and Policy</td>
<td></td>
</tr>
<tr>
<td>ECON 2101</td>
<td>The Global Economy</td>
<td></td>
</tr>
<tr>
<td>ECON 2105</td>
<td>Prin of Macroeconomics</td>
<td></td>
</tr>
<tr>
<td>ECON 2106</td>
<td>Prin of Microeconomics</td>
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</tr>
</tbody>
</table>

Select one of the following: 3

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>HTS 1031</td>
<td>Europe Since Renaissance</td>
<td></td>
</tr>
<tr>
<td>HTS 2036</td>
<td>Revolutionary Europe</td>
<td></td>
</tr>
<tr>
<td>HTS 2037</td>
<td>20th Century Europe</td>
<td></td>
</tr>
</tbody>
</table>
Bachelor of Science in International Affairs and Modern Language - Spanish

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>HTS 2040</td>
<td>Hist Islamic Societies</td>
<td></td>
</tr>
<tr>
<td>HTS 2041</td>
<td>Hist-Modern Middle East</td>
<td></td>
</tr>
<tr>
<td>HTS 2061</td>
<td>Traditional Asia</td>
<td></td>
</tr>
<tr>
<td>HTS 2062</td>
<td>Asia in the Modern World</td>
<td></td>
</tr>
<tr>
<td>HTS 3028</td>
<td>Ancient Greece</td>
<td></td>
</tr>
<tr>
<td>HTS 3029</td>
<td>Ancient Rome</td>
<td></td>
</tr>
<tr>
<td>HTS 3030</td>
<td>Medieval Europe</td>
<td></td>
</tr>
<tr>
<td>HTS 3031</td>
<td>European Labor History</td>
<td></td>
</tr>
<tr>
<td>HTS 3032</td>
<td>Europe Intellectual Hist</td>
<td></td>
</tr>
<tr>
<td>HTS 3033</td>
<td>Medieval England</td>
<td></td>
</tr>
<tr>
<td>HTS 3035</td>
<td>Britain 1815-1914</td>
<td></td>
</tr>
<tr>
<td>HTS 3036</td>
<td>Britain Since 1914</td>
<td></td>
</tr>
<tr>
<td>HTS 3038</td>
<td>French Revolution</td>
<td></td>
</tr>
<tr>
<td>HTS 3039</td>
<td>Modern France</td>
<td></td>
</tr>
<tr>
<td>HTS 3041</td>
<td>Modern Spain</td>
<td></td>
</tr>
<tr>
<td>HTS 3043</td>
<td>Modern Germany</td>
<td></td>
</tr>
<tr>
<td>HTS 3045</td>
<td>Nazi Germany-Holocaust</td>
<td></td>
</tr>
<tr>
<td>HTS 3046</td>
<td>Sci Pol Culture Nazi Ger</td>
<td></td>
</tr>
<tr>
<td>HTS 3051</td>
<td>Women &amp; Gender-Middle East</td>
<td></td>
</tr>
<tr>
<td>HTS 3061</td>
<td>Modern China</td>
<td></td>
</tr>
<tr>
<td>HTS 3062</td>
<td>Modern Japan</td>
<td></td>
</tr>
<tr>
<td>HTS 3063</td>
<td>British Colonization</td>
<td></td>
</tr>
<tr>
<td>HTS 3065</td>
<td>Hist Global Societies</td>
<td></td>
</tr>
<tr>
<td>HTS 3067</td>
<td>Revolutionary Movement</td>
<td></td>
</tr>
<tr>
<td>HTS 3069</td>
<td>Modern Cuba</td>
<td></td>
</tr>
<tr>
<td>INTA 1110</td>
<td>Intro to Int'l Relations</td>
<td>2</td>
</tr>
</tbody>
</table>

**Core F - Courses Related to Major**

- INTA 2010  | Empirical Methods                                     | 3            |
- INTA 2040  | Sci, Tech & Int'l Affairs                              | 3            |
- INTA 1000- | or 2000-level Electives                               | 9            |

Select one of the following: 4, 5

- BMED 2400  | Intro-Bioengr Stats                                   | 3            |
- CP 4510    | Geographic Info Sys                                   |              |
- CS 1301    | Intro to Computing                                     |              |
- CS 1315    | Intro Media Computation                                |              |
- CS 1316    | Rep Structure & Behavior                               |              |
- CS 1331    | Intro-Object Orient Prog                               |              |
- CS 2316    | Data Input/Manipulation                                |              |
- EAS 3110   | Energy, Environ, Society                               |              |
- EAS 4480   | Environ Data Analysis                                   |              |
- ECE 2020   | Digital System Design                                  |              |
- ID 3103    | Indus Dsgn Computing I                                 |              |
- LMC 3402   | Graphic & Visual Design                                |              |
- LMC 3410   | Non-Linear Documents                                   |              |
- ME 2016    | Computing Techniques                                   |              |
- MGT 2200   | Information Technology                                 |              |
- MGT 4051   | Decision Supp & Expert Sys                             |              |
- MGT 4052   | Systems Analysis & Design                              |              |

**Major Requirements**

- INTA 2001  | Careers In Intl Affairs                               | 1            |
- INTA 3110  | U.S. Foreign Policy                                    | 3            |
- INTA 3203  | Comparative Politics                                   | 3            |

- INTA 3301  | Int'l Political Econ                                    | 3            |
- INTA 4500  | INTA Pro-Seminar                                       | 3            |
- INTA 3000- | or 4000-level Electives                                 | 12           |

**Capstone Requirement**

- SPAN 4500  | Intercultural Seminar                                  | 3            |

**Modern Language**

- Modern Languages 1, 2  | 15 |

**Free Electives**

- Free Electives 3            | 16 |

Total Credit Hours 122

Note: Non-credit requirement

With the goal of enhanced educational and career prospects and in accordance with the pedagogical objectives of the degree in International Affairs and Modern Languages, all IAML students are required to fulfill an International Experience as part of their graduation requirements. This requirement can be met through one of two ways:

1. Complete a minimum 6-week overseas experience. If this is not a country whose primary language is in the student’s language of study, the student must justify and receive prior approval.

2. Complete a 15-week internship or similar experience of at least 10 credit hours per week at an international organization such as consulate, CNN International, etc. The internship must be approved in advance.

Students must complete 39 hours of upper division coursework (3000/4000-level courses). Fifteen hours of free electives, language, or technology requirements must be upper division (3000/4000-level courses).

1. Students must complete 21 credit hours of SPAN electives from 3000- or 4000-level courses. Six credit hours are counted in Humanities, and 15 in Modern Languages Electives.

2. Minimum grade of C required.

3. SPAN courses below 3000-level may count toward the free elective courses.

4. Technical elective.

5. Approved instances of CS 2803 may be applied here by advisor.

**Research Option**

The Sam Nunn School of International Affairs also participates in the Research Option plan offered by the Undergraduate Research Opportunities Program (UROP). The Research Option offers students the opportunity for in-depth research experience working under the guidance of a faculty mentor. Requirements for participation in the Research Option include completing nine hours of undergraduate research, at least six of which are on the same topic, writing a research proposal, taking two 1-hour courses: LMC 4701 Undergraduate Research Proposal Writing (typically taken during the first or second semester of research) and LMC 4702 Undergraduate Research Thesis Writing (taken during the term in which the thesis is written), and completing the thesis. Students are also required to send a weekly update of progress of research to the faculty mentor. Along with their application, students must explain how the faculty mentor’s research experience will benefit the student’s research.
International Plan

The degree requirements for the International Affairs and Modern Language (Chinese, French, German, Japanese, Russian, and Spanish) - International Plan (IAML - IP) are basically the same as for the IAML degree, except that students are required to spend two terms abroad and then achieve Intermediate High (for Chinese, Japanese, Russian: Intermediate Low) on the standardized ACTFL testing scale during an oral interview. The costs of the test will be paid for by the School of Modern Languages for each student. The terms abroad must total a minimum of twenty-six weeks; typically these consist of one semester of study plus a significant amount of time spent with a research or work project abroad. Only one summer semester abroad will count in this total. IAML-IP majors are strongly encouraged to enroll in the Language for Business and Technology (LBAT) intensive summer programs offered by the School of Modern Languages.

In addition to gaining advanced global competence, the International Plan designation will set IAML majors apart from other applicants with recruiters from top companies and governmental agencies. Other required courses include the following, which can easily be obtained within the regular required curriculum offerings of INTA and Modern Languages (these requirements can also be met with courses taken abroad, upon consultation with IAML degree advisors):

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTA 1110</td>
<td>Intro to Int'l Relations</td>
<td>3</td>
</tr>
<tr>
<td>INTA 3301</td>
<td>INTA Poltical Econ</td>
<td>3</td>
</tr>
<tr>
<td>Select one of the following:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>INTA 3203</td>
<td>Comparative Politics</td>
<td>3</td>
</tr>
<tr>
<td>INTA approved elective or upper-division Modern Language course</td>
<td></td>
<td></td>
</tr>
<tr>
<td>INTA 4500</td>
<td>INTA Pro-Seminar</td>
<td>3</td>
</tr>
<tr>
<td>CHIN/FREN/GRMN/JAPN/4500</td>
<td>Intercultural Seminar</td>
<td>3</td>
</tr>
</tbody>
</table>

Total Credit Hours 15

1. INTA 1110 focuses on international relations historically and theoretically, including topics such as the role of state sovereignty and nationalism and non-state actors in the international system; international conflict, peace, security, intervention, and nation-building; international organizations, law, and ethics; and transnational problems of the environment, terrorism, health, and migration; among other issues.

2. INTA 3301 provides a historical and theoretical understanding of the global economy, including topics such as international trade, finance, investment, and production; regional economic integration (such as the EU); economic development and modernization; and questions of natural resource sustainability.

3. INTA 3203 or approved INTA elective or upper-division Modern Language courses provide familiarity with an area of the world or a country that allows them to make systematic comparisons with their own society and culture.

4. A culminating course, occurring either at the end of or after the international experience that integrates knowledge of the discipline and the international experience in a global context.

Degree Information (http://www.modlangs.gatech.edu/degrees)

BS in International Affairs and Modern Languages/MS in International Affairs

Students with a GPA of 3.5 or higher in IAC courses are eligible to apply for the program after completion of 30 semester credit hours at Georgia Tech, but before the completion of 75 semester credit hours, including transfer and advanced placement credits. Students who have more than 75 credit hours will be considered for the program on a case-by-case basis. Depending on demand, the required minimum GPA may be higher. Admissions decisions will be based on GPA and judgments of the Graduate Committee and faculty who have served as advisors or instructors. Continuation in the program will require the student to maintain a GPA of 3.5 or higher in IAC courses. The program will not penalize students who opt out after the bachelor’s degree.

Visit International Affairs and Modern Languages (https://modlangs.gatech.edu/degrees) for more information.

Bachelor of Science in Literature, Media, and Communication

The BS in Literature, Media, and Communication (formerly named Science, Technology, and Culture) is the oldest undergraduate degree program in the Ivan Allen College for the Liberal Arts at Georgia Tech. This program offers a thorough education in the different modes of representation that structure our increasingly technological and global world. Program graduates will have both significant theoretical and hands-on experience with novels, films, games, comic books, web pages, and scientific documents. By learning the modes of communication common to science, technology, and the humanities, LMC graduates are prepared to become leaders in education, business, and the arts.

LMC students take classes across six paths or “threads” of study, eventually choosing two threads as their major fields of study. These threads include Literature; Media; Communication; Social Justice Studies; Interaction Design; and Science, Technology, and Culture. This prepares them to intern in fields including journalism, marketing, graphic design, videography, and educational policy. Many LMC alumni go on to graduate school in literature, communication sciences, and interactive entertainment studies or professional school in law, health, and social work. Other graduates pursue careers in fields ranging from graphic art and photography to client advocacy and medical administration to library services and arts administration.

LMC Information (http://iac.gatech.edu/academics/schools/lcc)

• Bachelor of Science in Literature, Media, and Communication - Thread: Literature & Media (p. 405)
• Bachelor of Science in Literature, Media, and Communication - Thread: Literature & Communication (p. 401)
• Bachelor of Science in Literature, Media, and Communication - Thread: Literature & Design (p. 403)
• Bachelor of Science in Literature, Media, and Communication - Thread: Literature & Social Justice (p. 410)
• Bachelor of Science in Literature, Media, and Communication - Thread: Literature & Science, Technology, and Culture (p. 408)

• Bachelor of Science in Literature, Media, and Communication - Thread: Media & Communication (p. 413)

• Bachelor of Science in Literature, Media, and Communication - Thread: Media & Design (p. 415)

• Bachelor of Science in Literature, Media, and Communication - Thread: Media & Social Justice (p. 419)

• Bachelor of Science in Literature, Media, and Communication - Thread: Media & Science, Technology and Culture (p. 417)

• Bachelor of Science in Literature, Media, and Communication - Thread: Communication & Design (p. 390)

• Bachelor of Science in Literature, Media, and Communication - Thread: Communication & Social Justice (p. 394)

• Bachelor of Science in Literature, Media, and Communication - Thread: Communication & Science, Technology, and Culture (p. 392)

• Bachelor of Science in Literature, Media, and Communication - Thread: Design & Social Justice (p. 399)

• Bachelor of Science in Literature, Media, and Communication - Thread: Design & Science, Technology, Culture (p. 396)

• Bachelor of Science in Literature, Media, and Communication - Thread: Social Justice and Science, Technology, and Culture (p. 422)

Bachelor of Science in Literature, Communication, and Media: Thread - Communication & Design

The BS in Literature, Media, and Communication (formerly named Science, Technology, and Culture) is the oldest undergraduate degree program in the Ivan Allen College for the Liberal Arts at Georgia Tech. This program offers a thorough education in the different modes of representation that structure our increasingly technological and global world. Program graduates will have both significant theoretical and hands-on experience with novels, films, games, comic books, web pages, and scientific documents. By learning the modes of communication common to science, technology, and the humanities, LMC graduates are prepared to become leaders in education, business, and the arts.

LMC students take classes across six paths or "threads" of study, eventually choosing two threads as their major fields of study. These threads include Literature; Media; Communication; Social Justice Studies; Interaction Design; and Science, Technology, and Culture. This prepares them to intern in fields including journalism, marketing, graphic design, videography, and educational policy. Many LMC alumni go on to graduate school in literature, communication sciences, and interactive entertainment studies or professional school in law, health, and social work. Other graduates pursue careers in fields ranging from graphic art and photography to client advocacy and medical administration to library services and arts administration.

LMC Information (http://www.iac.gatech.edu/academics/schools/lcc)
While all of the LMC degree combinations provide students with 14 credit hours of free electives, different options provide students with different numbers of free LMC elective hours. Students should contact the LMC advisor to learn about options for particular thread combinations.
Research Option (All Thread Combinations)

This degree option offers LMC students on all degree tracks the opportunity for a substantial, in-depth research experience. Students who pursue this degree option will learn how to design and complete advanced, multi-semester research projects through a combination of independent research, group writing instruction, and one-to-one work with a faculty mentor. Students are strongly encouraged at the end of their experience to work with their faculty mentor to develop a journal publication or conference presentation on the research in addition to the actual thesis. All students who successfully complete the research thesis option will receive the “research option” designation on their transcripts.

To fulfill the requirements of the LMC Research Option, students must:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>LMC 2699/4699</td>
<td>Undergraduate Research ¹</td>
<td>6</td>
</tr>
<tr>
<td>LMC 4701</td>
<td>US Rsch Proposal Writing</td>
<td>1</td>
</tr>
<tr>
<td>LMC 4702</td>
<td>US Rsch Thesis Writing</td>
<td>1</td>
</tr>
<tr>
<td>LMC 4102</td>
<td>Senior Thesis</td>
<td>3</td>
</tr>
</tbody>
</table>

Students will meet these requirements without adding additional hours to their schedules by

- Dedicating six credit hours of undefined LMC elective and/or free elective credit hours to undergraduate research
- Dedicating two more credit hours of free elective credit to LMC 4701 and LMC 4702
- Dedicating 3 hours of capstone coursework in the LMC major to LMC 4102: Senior Thesis.

¹ Students may substitute audit hours of LMC 2698/LMC 4698 for equivalent hours of LMC 2699/LMC 4699. If they elect this option, they must add corresponding credit hours of an elective, for-credit class.

While all of the LMC degree thread combinations provide students with 14 credit hours of free electives, different options provide students with different numbers of free LMC elective hours. Students should contact the LMC advisor to learn about options for particular thread combinations.

LMC Information

BS/MS Degree Program

Students who wish to pursue the BS/MS combination in LMC and DM must apply to the School after completing at least seventy-five credit hours of work toward an LMC degree that includes the Interaction Design thread. Applicants should have a 3.5 GPA.

Students admitted to the program will select the LMC 4400 seminar option and take a total of twelve credit hours of graduate coursework during their final undergraduate year. Six credit hours of that work, in DM media courses, will replace the STAC free electives and will count for both undergraduate and graduate credit. During the summer term after their fourth year, students will participate in an approved internship program. During the fifth year, students will take a total of twenty-four credit hours, including either LMC 6800 (Project) or LMC 7000 (Thesis), and with no more than three courses taken outside the DM program.

Bachelor of Science in Literature, Media, and Communication - Thread: Communication & Science, Technology, and Culture

The BS in Literature, Media, and Communication (formerly named Science, Technology, and Culture) is the oldest undergraduate degree program in the Ivan Allen College for the Liberal Arts at Georgia Tech. This program offers a thorough education in the different modes of representation that structure our increasingly technological and global world. Program graduates will have both significant theoretical and hands-on experience with novels, films, games, comic books, web pages, and scientific documents. By learning the modes of communication common to science, technology, and the humanities, LMC graduates are prepared to become leaders in education, business, and the arts.

LMC students take classes across six paths or “threads” of study, eventually choosing two threads as their major fields of study. These threads include Literature; Media; Communication; Social Justice Studies; Interaction Design; and Science, Technology, and Culture. This prepares them to intern in fields including journalism, marketing, graphic design, videography, and educational policy. Many LMC alumni go on to graduate school in literature, communication sciences, and interactive entertainment studies or professional school in law, health, and social work. Other graduates pursue careers in fields ranging from graphic art and photography to client advocacy and medical administration to library services and arts administration.

LMC Information (http://www.iac.gatech.edu/academics/schools/llc)

<table>
<thead>
<tr>
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<th>Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>APPH 1040</td>
<td>Sci Foundation of Health</td>
<td>2</td>
</tr>
<tr>
<td>or APPH 10</td>
<td>Sci of Phys Act &amp; Health</td>
<td></td>
</tr>
<tr>
<td>ENGL 1101</td>
<td>English Composition I</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 1102</td>
<td>English Composition II</td>
<td>3</td>
</tr>
<tr>
<td>MATH 1712</td>
<td>Survey of Calculus</td>
<td>4</td>
</tr>
<tr>
<td>or MATH 151</td>
<td>Integral Calculus</td>
<td></td>
</tr>
<tr>
<td>CS 1301</td>
<td>Intro to Computing</td>
<td>3</td>
</tr>
<tr>
<td>or CS 1315</td>
<td>Intro Media Computation</td>
<td></td>
</tr>
<tr>
<td>HIST 2111</td>
<td>United States to 1877</td>
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<td>United States since 1877</td>
<td></td>
</tr>
<tr>
<td>INTA 1200</td>
<td>American Government</td>
<td></td>
</tr>
</tbody>
</table>

³ Students may substitute audit hours of LMC 2698/LMC 4698 for equivalent hours of LMC 2699/LMC 4699. If they elect this option, they must add corresponding credit hours of an elective, for-credit class.

Title

Wellness

APPH 1040  Sci Foundation of Health  2
or APPH 10  Sci of Phys Act & Health
Core A - Essential Skills

ENGL 1101  English Composition I  3
ENGL 1102  English Composition II  3
MATH 1712  Survey of Calculus  4
or MATH 151  Integral Calculus
Core B - Institutional Options

CS 1301  Intro to Computing  3
or CS 1315  Intro Media Computation
Core C - Humanities

Any HUM (p. 93)  6
Core D - Science, Math, & Technology

Lab Science  4
Lab Science  4
MATH 1711  Finite Mathematics  6
or MATH 151  Differential Calculus
&MATH 151  and Intro to Linear Algebra
Core E - Social Sciences

Select one of the following:  3
HIST 2111  United States to 1877
HIST 2112  United States since 1877
INTA 1200  American Government

³ Students may substitute audit hours of LMC 2698/LMC 4698 for equivalent hours of LMC 2699/LMC 4699. If they elect this option, they must add corresponding credit hours of an elective, for-credit class.

While all of the LMC degree thread combinations provide students with 14 credit hours of free electives, different options provide students with different numbers of free LMC elective hours. Students should contact the LMC advisor to learn about options for particular thread combinations.
**POL 1101** Government of the U.S.  
**PUBP 3000** US Constitutional Issues

**International Requirement**  
[1]  
Any SS (p. 97)  
[6]  
**Core F - Courses Related to Major**  
Science or Computing Electives  
[2]  
3  
[6]  
Modern Language Elective  
[4]  
3  
[3]  
Ethics Requirement (p. 100)  
[5]  
3  
LMC 2000 Intro-Lit, Media, & Comm  
[3]  
3  
LMC 2050 Lit, Media, Comm Seminar  
[3]  
3  

**Major Requirements**  
Select one of the following:  
[3]  
LMC 4100 Seminar in STAC  
LMC 4200 Seminar Lit/Cult Theory  
LMC 4300 Seminar Biomed & Culture  
LMC 4400 Seminar in Media Studies  
LMC 4500 Seminar in Film Studies  
LMC 4600 Seminar Perform Studies  
LMC 4102 Senior Thesis

**Concentration**  
Science, Technology and Culture

LMC 2100 Intro to STAC  
[3]  
3  
Select two Foundation courses:  
[6]  
LMC 2300 Intro Biomedicine & Cult  
LMC 3102 The Classical Tradition  
LMC 3104 Age Scientific Discovery  
LMC 3108 Sci Tech & Enlightenment  
LMC 3110 Sci, Tech & Romanticism  
LMC 3112 Evolution&Industrial Age  
LMC 3114 Sci, Tech & Modernism  
LMC 3116 Sci Tech & Postmodernisms  
LMC 3118 Sci Tech&American Empire

Select three Specialty courses:  
[9]  
LMC 3214 Science Fiction  
LMC 3215 Science Fiction Film TV  
LMC 3219 Literature & Medicine  
LMC 3225 Gender Study-Disciplines  
LMC 3302 Sci, Tech & Ideology  
LMC 3304 Science, Tech & Gender  
LMC 3306 Science, Tech & Race  
LMC 3308 Environment Ecocritic  
LMC 3310 Rhetoric Sci Inquiry  
LMC 3314 Tech of Representation  
LMC 3316 Postcolonialism  
LMC 3318 Biomedicine & Culture  
LMC 3352 Film Technology  
LMC 3362 Sci, Tech & Performance  
LMC 3833 Special Topics in STAC

**Communication**  
LMC 3403 Tech Communication  
[3]  
Select two Foundation courses:  
[6]  
LMC 2720 Prin of Visual Design  
LMC 3402 Graphic & Visual Design  
LMC 3406 Video Production  
LMC 3408 Rhetoric-Tech Narratives  
LMC 3410 Non-Linear Documents  
LMC 3412 Communicating Sci/Tech

Select three Specialty courses:  
[9]  
LMC 3206 Communication & Culture  
LMC 3234 Creative Writing  
LMC 3258 Documentary Film  
LMC 3314 Tech of Representation  
LMC 3414 Intellectual Property  
LMC 3705 Prin Information Design  
LMC 3710 Prin Interaction Design  
LMC 3843 Spec Topic-Communication  
LMC 4602 Performance Practicum  
LMC Electives  
[6]  

**Free Electives**  
Free Electives  
[14]  
Total Credit Hours  
[122]  

1. Must be selected from the following list: Allow ECON 2101 or ECON 3300 or ECON 4311 or ECON 4350 or ECON 4351 or ECON 4355 or ECON 4411 or ECON 4415 or ECON 4620 or HTS 1031 or HTS 2036 or HTS 2037 or HTS 2041 or HTS 2061 or HTS 2062 or HTS 2082 or HTS 3012 or HTS 3015 or HTS 3028 or HTS 3030 or HTS 3031 or HTS 3032 or HTS 3035 or HTS 3036 or HTS 3038 or HTS 3039 or HTS 3041 or HTS 3043 or HTS 3045 or HTS 3051 or HTS 3061 or HTS 3062 or HTS 3063 or HTS 3064 or HTS 3065 or HTS 3069 or HTS 3087 or INTA 1110 or INTA 2030 or INTA 2040 or INTA 2100 or INTA 2210 or INTA 2220 or INTA 2230 or INTA 3010 or INTA 3020 or INTA 3031 or INTA 3101 or INTA 3102 or INTA 3104 or INTA 3120 or INTA 3121 or INTA 3130 or INTA 3131 or INTA 3203 or INTA 3220 or INTA 3221 or INTA 3230 or INTA 3231 or INTA 3240 or INTA 3241 or INTA 3301 or INTA 3303 or INTA 3304 or INTA 3321 or INTA 3330 or INTA 3331 or INTA 4007 or INTA 4011 or INTA 4040 or INTA 4050 or INTA 4060 or INTA 4101 or INTA 4121 or INTA 4230 orINTA 4240 or INTA 4241 or INTA 4330 or INTA 4331 or INTA 4332 or INTA 4333 or INTA 4340

2. Any CoS or CS course.

3. Minimum grade of C required.

4. Any Modern Language 2000-level or higher.

5. Students must complete one 2000-level or higher Ethics course during their program.

6. Other Core D Math Options include: MATH 1551 and MATH 1554, MATH 1551 and MATH 1564, MATH 1550 and MATH 1553, MATH 1550 and MATH 1554, or MATH 1550 and MATH 1564.

**International Plan (All Thread Combinations)**

The LMC International Plan follows the Institute model to develop a global competence connected to the student's major program of study. It thus integrates international studies and experiences with work in a broad range of cultural and media studies, preparing graduates to critique and create cultural texts within an international professional environment. All students who successfully complete this option will receive the "International Plan" designation on their transcripts.
While following the basic LMC program of instruction, requiring a total of 122 credit hours of coursework, students following the International Plan will modify their program as follows. They will:

- take three Social Science courses, one each from the following categories: international relations, global economics, and a course on a specific country or region;
- spend two terms abroad engaged in any combination of study abroad, research, or internship;
- complete twelve credit hours of language instruction (by dedicating six credit hours of humanities electives, 3 credit hours of free electives, and 3 credit hours of the LMC language requirement to language study); and
- complete a LMC capstone course that links international studies with the major.

While all of the LMC degree combinations provide students with 14 credit hours of free electives, different options provide students with different numbers of free LMC elective hours. Students should contact the LMC advisor to learn about options for particular thread combinations.

LMC Information

Research Option (All Thread Combinations)

This degree option offers LMC students on all degree tracks the opportunity for a substantial, in-depth research experience. Students who pursue this degree option will learn how to design and complete advanced, multi-semester research projects through a combination of independent research, group writing instruction, and one-to-one work with a faculty mentor. Students are strongly encouraged at the end of their experience to work with their faculty mentor to develop a journal publication or conference presentation on the research in addition to the actual thesis. All students who successfully complete the research thesis option will receive the "research option" designation on their transcripts.

To fulfill the requirements of the LMC Research Option, students must:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>LMC 2699/4699</td>
<td>Undergraduate Research</td>
<td>6</td>
</tr>
<tr>
<td>LMC 4701</td>
<td>US Rsch Proposal Writing</td>
<td>1</td>
</tr>
<tr>
<td>LMC 4702</td>
<td>US Rsch Thesis Writing</td>
<td>1</td>
</tr>
<tr>
<td>LMC 4102</td>
<td>Senior Thesis</td>
<td>3</td>
</tr>
</tbody>
</table>

Students may substitute audit hours of LMC 2698/LMC 4698 for equivalent hours of LMC 2699/LMC 4699. If they elect this option, they must add corresponding credit hours of an elective, for-credit class.

While all of the LMC degree thread combinations provide students with 14 credit hours of free electives, different options provide students with different numbers of free LMC elective hours. Students should contact the LMC advisor to learn about options for particular thread combinations.

BS/MS Degree Program

Students who wish to pursue the BS/MS combination in LMC and DM must apply to the School after completing at least seventy-five credit hours of work toward an LMC degree that includes the Interaction Design thread. Applicants should have a 3.5 GPA.

Students admitted to the program will select the LMC 4400 seminar option and take a total of twelve credit hours of graduate coursework during their final undergraduate year. Six credit hours of that work, in DM media courses, will replace the STAC free electives and will count for both undergraduate and graduate credit. During the summer term after their fourth year, students will participate in an approved internship program. During the fifth year, students will take a total of twenty-four credit hours, including either LMC 6800 (Project) or LMC 7000 (Thesis), and with no more than three courses taken outside the DM program.

Bachelor of Science in Literature, Media, and Communication - Thread: Communication & Social Justice

The BS in Literature, Media, and Communication (formerly named Science, Technology, and Culture) is the oldest undergraduate degree program in the Ivan Allen College for the Liberal Arts at Georgia Tech. This program offers a thorough education in the different modes of representation that structure our increasingly technological and global world. Program graduates will have both significant theoretical and hands-on experience with novels, films, games, comic books, web pages, and scientific documents. By learning the modes of communication common to science, technology, and the humanities, LMC graduates are prepared to become leaders in education, business, and the arts.

LMC students take classes across six paths or “threads” of study, eventually choosing two threads as their major fields of study. These threads include Literature; Media; Communication; Social Justice Studies; Interaction Design; and Science, Technology, and Culture. This prepares them to intern in fields including journalism, marketing, graphic design, videography, and educational policy. Many LMC alumni go on to graduate school in literature, communication sciences, and interactive entertainment studies or professional school in law, health, and social work. Other graduates pursue careers in fields ranging from graphic art and photography to client advocacy and medical administration to library services and arts administration.

LMC Information (http://www.iac.gatech.edu/academics/schools/lmc)

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<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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<tbody>
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<td></td>
<td>Wellness</td>
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</tbody>
</table>
Select two Foundation courses:

- LMC 3302 Social Justice Concentration

Select one of the following:

- Major Requirements
  - LMC 2050
  - LMC 2000
- Ethics Requirement
- Modern Language Elective
- Science or Computing Electives
- Core F - Courses Related to Major
  - HIST 2111 United States to 1877
  - HIST 2112 United States since 1877
  - INTA 1200 American Government
  - POL 1101 Government of the U.S.
  - PUBP 3000 US Constitutional Issues
- International Requirement
- Any SS (p. 93)

Select three Specialty courses:

- LMC 3403 Tech Communication

Select two Foundation courses:

- LMC 3306 Science, Tech & Race
- LMC 3308 Environment Ecocritic
- LMC 3316 Postcolonialism

Select three Specialty courses:

- LMC 3112 Evolution & Industrial Age
- LMC 3118 Sci Tech & American Empire
- LMC 3225 Gender Study-Disciplines
- LMC 3257 Global Cinema
- LMC 3258 Documentary Film
- LMC 3314 Tech of Representation
- LMC 3318 Biomedicine & Culture
- LMC 3414 Intellectual Property

Communication

- LMC 3403 Tech Communication

Select two Foundation courses:

- LMC 2720 Prin of Visual Design
- LMC 3402 Graphic & Visual Design
- LMC 3406 Video Production
- LMC 3408 Rhetoric-Tech Narratives
- LMC 3410 Non-Linear Documents
- LMC 3412 Communicating Sci/Tech

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- LMC 3206 Communication & Culture
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LMC Electives

Free Electives

Free Electives

Total Credit Hours 122

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LMC Information (http://www.iac.gatech.edu/academics/schools/lcc)

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<td>LMC 4102</td>
<td>Senior Thesis</td>
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**Concentration**

**Design**

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<th>Credit Hours</th>
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<tr>
<td>LMC 2720</td>
<td>Prin of Visual Design ³</td>
<td>3</td>
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<tr>
<td>LMC 2410</td>
<td>Intro to Game Studies</td>
<td></td>
</tr>
<tr>
<td>LMC 2700</td>
<td>Intr-Computational Media ³</td>
<td></td>
</tr>
<tr>
<td>LMC 2730</td>
<td>Construct-Moving Image</td>
<td></td>
</tr>
<tr>
<td>LMC 3705</td>
<td>Prin Information Design</td>
<td></td>
</tr>
<tr>
<td>LMC 3710</td>
<td>Prin Interaction Design</td>
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</tbody>
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Select three Specialty courses: ³

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<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>LMC 3206</td>
<td>Communication &amp; Culture</td>
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</tr>
<tr>
<td>LMC 3259</td>
<td>Experimental Film</td>
<td></td>
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<tr>
<td>LMC 3314</td>
<td>Tech of Representation</td>
<td></td>
</tr>
<tr>
<td>LMC 3402</td>
<td>Graphic &amp; Visual Design</td>
<td></td>
</tr>
<tr>
<td>LMC 3406</td>
<td>Video Production</td>
<td></td>
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<td>LMC 3414</td>
<td>Intellectual Property</td>
<td></td>
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<tr>
<td>LMC 3853</td>
<td>Special Topics in Film</td>
<td></td>
</tr>
<tr>
<td>LMC 4720</td>
<td>Interactive Narrative</td>
<td></td>
</tr>
<tr>
<td>LMC 4725</td>
<td>Game Design</td>
<td></td>
</tr>
<tr>
<td>LMC 4730</td>
<td>Experimental Digital Art</td>
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**Science, Technology, and Culture**

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<tr>
<td>LMC 2100</td>
<td>Intro to STAC ³</td>
<td>3</td>
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Select two Foundations courses: ³

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>LMC 2300</td>
<td>Intro Biomedicine &amp; Cult</td>
<td></td>
</tr>
<tr>
<td>LMC 3102</td>
<td>The Classical Tradition</td>
<td></td>
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<tr>
<td>LMC 3104</td>
<td>Age Scientific Discovery</td>
<td></td>
</tr>
<tr>
<td>LMC 3106</td>
<td>Age Sci Revolution</td>
<td></td>
</tr>
<tr>
<td>LMC 3108</td>
<td>Sci Tech &amp; Enlightenment</td>
<td></td>
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<tr>
<td>LMC 3110</td>
<td>Sci, Tech &amp; Romanticism</td>
<td></td>
</tr>
<tr>
<td>LMC 3112</td>
<td>Evolution&amp;Industrial Age</td>
<td></td>
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<tr>
<td>LMC 3114</td>
<td>Sci, Tech &amp; Modernism</td>
<td></td>
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<tr>
<td>LMC 3116</td>
<td>Sci Tech &amp; Postmodernisms</td>
<td></td>
</tr>
<tr>
<td>LMC 3118</td>
<td>Sci Tech &amp;American Empire</td>
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</table>

Select three Specialty courses: ³

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<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>LMC 3214</td>
<td>Science Fiction</td>
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<td>LMC 3215</td>
<td>Science Fiction Film TV</td>
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<tr>
<td>LMC 3219</td>
<td>Literature &amp; Medicine</td>
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<tr>
<td>LMC 3225</td>
<td>Gender Study-Disciplines</td>
<td></td>
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<tr>
<td>LMC 3302</td>
<td>Sci, Tech &amp; Ideology</td>
<td></td>
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<tr>
<td>LMC 3304</td>
<td>Science, Tech &amp; Gender</td>
<td></td>
</tr>
<tr>
<td>LMC 3306</td>
<td>Science, Tech &amp; Race</td>
<td></td>
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<tr>
<td>LMC 3308</td>
<td>Environment Ecocritic</td>
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<tr>
<td>LMC 3310</td>
<td>Rhetoric Sci Inquiry</td>
<td></td>
</tr>
<tr>
<td>LMC 3314</td>
<td>Tech of Representation</td>
<td></td>
</tr>
<tr>
<td>LMC 3316</td>
<td>Postcolonialism</td>
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<tr>
<td>LMC 3318</td>
<td>Biomedicine &amp; Culture</td>
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<tr>
<td>LMC 3352</td>
<td>Film Technology</td>
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<tr>
<td>LMC 3362</td>
<td>Sci, Tech &amp; Performance</td>
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<tr>
<td>LMC 3833</td>
<td>Special Topics in STAC</td>
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<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>LMC Electives</td>
<td></td>
<td>6</td>
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</tbody>
</table>
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**Code** | **Title** | **Credit Hours**
--- | --- | ---
LMC 2699/4699 | Undergraduate Research | 6
LMC 4701 | US Rsch Proposal Writing | 1
LMC 4702 | US Rsch Thesis Writing | 1
LMC 4102 | Senior Thesis | 3

Students will meet these requirements without adding additional hours to their schedules by:

- Dedicating six credit hours of undefined LMC elective and/or free elective credit hours to undergraduate research
- Dedicating two more credit hours of free elective credit to LMC 4701 and LMC 4702
- Dedicating 3 hours of capstone coursework in the LMC major to LMC 4102: Senior Thesis.

Students may substitute audit hours of LMC 2698/LMC 4698 for equivalent hours of LMC 2699/LMC 4699. If they elect this option, they must add corresponding credit hours of an elective, for-credit class.

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**LMC Information**

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<tbody>
<tr>
<td>APPH 1040</td>
<td>Sci Foundation of Health</td>
<td>2</td>
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<tr>
<td>or APPH 10</td>
<td>Sci of Phys Act &amp; Health</td>
<td></td>
</tr>
<tr>
<td>ENGL 1101</td>
<td>English Composition I</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 1102</td>
<td>English Composition II</td>
<td>3</td>
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<tr>
<td>MATH 1712</td>
<td>Survey of Calculus</td>
<td>4</td>
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<tr>
<td>or MATH 15</td>
<td>Integral Calculus</td>
<td></td>
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<tr>
<td>CS 1301</td>
<td>Intro to Computing</td>
<td>3</td>
</tr>
<tr>
<td>or CS 1315</td>
<td>Intro Media Computation</td>
<td></td>
</tr>
<tr>
<td>Any HUM (p. 93)</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>LMC 3302</td>
<td>Sci, Tech &amp; Ideology</td>
<td>3</td>
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Select two Foundations courses: 6

Select three Specialty courses: 9

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<tr>
<td>LMC 2700</td>
<td>In-Computational Media</td>
<td>3</td>
</tr>
<tr>
<td>LMC 2730</td>
<td>Construct-Moving Image</td>
<td></td>
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<tr>
<td>LMC 3705</td>
<td>Prin Information Design</td>
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<td>LMC 3710</td>
<td>Prin Interaction Design</td>
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</tr>
<tr>
<td>LMC 3206</td>
<td>Communication &amp; Culture</td>
<td></td>
</tr>
<tr>
<td>LMC 3259</td>
<td>Experimental Film</td>
<td></td>
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<tr>
<td>LMC 3314</td>
<td>Tech of Representation</td>
<td></td>
</tr>
<tr>
<td>LMC 3402</td>
<td>Graphic &amp; Visual Design</td>
<td></td>
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<tr>
<td>LMC 3406</td>
<td>Video Production</td>
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<td>LMC 3414</td>
<td>Intellectual Property</td>
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<td>LMC 3853</td>
<td>Special Topics in Film</td>
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<tr>
<td>LMC 4720</td>
<td>Interactive Narrative</td>
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<tr>
<td>LMC 4725</td>
<td>Game Design</td>
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<tr>
<td>LMC 4730</td>
<td>Experimental Digital Art</td>
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<tr>
<td>LMC 4730</td>
<td>Social Justice</td>
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<tr>
<td>LMC 4100</td>
<td>Seminar in STAC</td>
<td>3</td>
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<tr>
<td>LMC 4200</td>
<td>Seminar Lit/Cult Theory</td>
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<tr>
<td>LMC 4300</td>
<td>Seminar Biomed &amp; Culture</td>
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<tr>
<td>LMC 4400</td>
<td>Seminar in Media Studies</td>
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<tr>
<td>LMC 4500</td>
<td>Seminar in Film Studies</td>
<td></td>
</tr>
<tr>
<td>LMC 4600</td>
<td>Seminar Perform Studies</td>
<td></td>
</tr>
<tr>
<td>LMC 4102</td>
<td>Senior Thesis</td>
<td></td>
</tr>
</tbody>
</table>

**Core C - Humanities**

Any HUM (p. 93) 6
critique and create cultural texts within an international professional environment. All students who successfully complete this option will receive the "International Plan" designation on their transcripts.

While following the basic LMC program of instruction, requiring a total of 122 credit hours of coursework, students following the International Plan will modify their program as follows. They will:

- take three Social Science courses, one each from the following categories: international relations, global economics, and a course on a specific country or region;
- spend two terms abroad engaged in any combination of study abroad, research, or internship;
- complete twelve credit hours of language instruction (by dedicating six credit hours of humanities electives, 3 credit hours of free electives, and 3 credit hours of the LMC language requirement to language study); and
- complete a LMC capstone course that links international studies with the major.

While all of the LMC degree combinations provide students with 14 credit hours of free electives, different options provide students with different numbers of free LMC elective hours. Students should contact the LMC advisor to learn about options for particular thread combinations.

**LMC Information**

**Research Option (All Thread Combinations)**

This degree option offers LMC students on all degree tracks the opportunity for a substantial, in-depth research experience. Students who pursue this degree option will learn how to design and complete advanced, multi-semester research projects through a combination of independent research, group writing instruction, and one-to-one work with a faculty mentor. Students are strongly encouraged at the end of their experience to work with their faculty mentor to develop a journal publication or conference presentation on the research in addition to the actual thesis. All students who successfully complete the research thesis option will receive the “research option” designation on their transcripts.

To fulfill the requirements of the LMC Research Option, students must:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
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<td>LMC 2699/4699</td>
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<td>LMC 4701</td>
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<td>LMC 4702</td>
<td>US Rsch Thesis Writing</td>
<td>1</td>
</tr>
<tr>
<td>LMC 4102</td>
<td>Senior Thesis</td>
<td>3</td>
</tr>
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</table>

Students will meet these requirements without adding additional hours to their schedules by:

- Dedicating six credit hours of undefined LMC elective and/or free elective credit hours to undergraduate research
- Dedicating two more credit hours of free elective credit to LMC 4701 and LMC 4702
- Dedicating 3 hours of capstone coursework in the LMC major to LMC 4102: Senior Thesis

### International Plan (All Thread Combinations)

The LMC International Plan follows the Institute model to develop a global competence connected to the student’s major program of study. It thus integrates international studies and experiences with work in a broad range of cultural and media studies, preparing graduates to
Students may substitute audit hours of LMC 2698/LMC 4698 for equivalent hours of LMC 2699/LMC 4699. If they elect this option, they must add corresponding credit hours of an elective, for-credit class. While all of the LMC degree thread combinations provide students with 14 credit hours of free electives, different options provide students with different numbers of free LMC elective hours. Students should contact the LMC advisor to learn about options for particular thread combinations.

LMC Information

BS/MS Degree Program

Students who wish to pursue the BS/MS combination in LMC and DM must apply to the School after completing at least seventy-five credit hours of work toward an LMC degree that includes the Interaction Design thread. Applicants should have a 3.5 GPA.

Students admitted to the program will select the LMC 4400 seminar option and take a total of twelve credit hours of graduate coursework during their final undergraduate year. Six credit hours of that work, in DM media courses, will replace the STAC free electives and will count for both undergraduate and graduate credit. During the summer term after their fourth year, students will participate in an approved internship program. During the fifth year, students will take a total of twenty-four credit hours, including either LMC 6800 (Project) or LMC 7000 (Thesis), and with no more than three courses taken outside the DM program.

Bachelor of Science in Literature, Media, and Communication - Thread: Literature & Communication

The BS in Literature, Media, and Communication (formerly named Science, Technology, and Culture) is the oldest undergraduate degree program in the Ivan Allen College for the Liberal Arts at Georgia Tech. This program offers a thorough education in the different modes of representation that structure our increasingly technological and global world. Program graduates will have both significant theoretical and hands-on experience with novels, films, games, comic books, web pages, and scientific documents. By learning the modes of communication common to science, technology, and the humanities, LMC graduates are prepared to become leaders in education, business, and the arts.

LMC students take classes across six paths or "threads" of study, eventually choosing two threads as their major fields of study. These threads include Literature; Media; Communication; Social Justice Studies; Interaction Design; and Science, Technology, and Culture. This prepares them to intern in fields including journalism, marketing, graphic design, videography, and educational policy. Many LMC alumni go on to graduate school in literature, communication sciences, and interactive entertainment studies or professional school in law, health, and social work. Other graduates pursue careers in fields ranging from graphic art and photography to client advocacy and medical administration to library services and arts administration.

LMC Information [http://www.iac.gatech.edu/academics/schools/lcc]

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<tr>
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<td>Studies in Fiction</td>
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<td>LMC 3208</td>
<td>African-American Literature &amp; Culture</td>
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<td>LMC 3210</td>
<td>Ethnicity &amp; American Cultures</td>
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<tr>
<td>LMC 3212</td>
<td>Women, Literature &amp; Culture</td>
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<tr>
<td>LMC 3502</td>
<td>Medieval Literature &amp; Culture</td>
<td>3</td>
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<td>LMC 3504</td>
<td>Renaissance Literature &amp; Culture</td>
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<td>Science or Computing Electives</td>
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<td>Modern Language Elective</td>
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<tr>
<td>LMC 2000</td>
<td>Intro-Lit, Media &amp; Comm</td>
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<td>LMC 2050</td>
<td>Lit, Media, Comm Seminar</td>
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<td>Lit, Media, Comm Seminar</td>
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<tr>
<td>LMC 2000</td>
<td>Intro-Lit, Media &amp; Comm</td>
</tr>
<tr>
<td>LMC 2050</td>
<td>Lit, Media, Comm Seminar</td>
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</table>
LMC 3506  Enlightenment Lit & Cult  
LMC 3508  American Culture I  
LMC 3510  American Culture II  
LMC 3512  Brit/Cont Romanticism  
LMC 3514  Victorian Lit & Culture  
LMC 3516  Lit & Cultural Modernism  
LMC 3518  Lit/Cult Postmodernism  
Select 3 of these Specialty courses:  
LMC 3102  The Classical Tradition  
LMC 3108  Sci Tech & Enlightenment  
LMC 3110  Sci, Tech & Romanticism  
LMC 3114  Sci, Tech & Modernism  
LMC 3116  Sci Tech & Postmodernisms  
LMC 3118  Sci Tech&American Empire  
LMC 3204  Poetry and Poetics  
LMC 3214  Science Fiction  
LMC 3216  Theatre I  
LMC 3218  Theatre II  
LMC 3219  Literature & Medicine  
LMC 3220  Theatre III  
LMC 3222  Regionalism American Lit  
LMC 3226  Major Authors  
LMC 3228  Shakespeare  
LMC 3234  Creative Writing  
LMC 3248  Poetry & Digital Culture  
LMC 3316  Postcolonialism  
LMC 3408  Rhetoric-Tech Narratives  
LMC 3823  Special Topics Lit/Cult  
LMC 4204  Poetry and Poetics II  
LMC 4720  Interactive Narrative  

**Free Electives**  

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<tr>
<th>Course</th>
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<tr>
<td>LMC 3403</td>
<td>Tech Communication</td>
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<tr>
<td>Select 2 of these Foundation courses:</td>
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<tr>
<td>LMC 2720</td>
<td>Prin of Visual Design</td>
</tr>
<tr>
<td>LMC 3402</td>
<td>Graphic &amp; Visual Design</td>
</tr>
<tr>
<td>LMC 3406</td>
<td>Video Production</td>
</tr>
<tr>
<td>LMC 3408</td>
<td>Rhetoric-Tech Narratives</td>
</tr>
<tr>
<td>LMC 3410</td>
<td>Non-Linear Documents</td>
</tr>
<tr>
<td>LMC 3412</td>
<td>Communicating Sci/Tech</td>
</tr>
<tr>
<td>Select 3 of these Specialty courses:</td>
<td></td>
</tr>
<tr>
<td>LMC 3206</td>
<td>Communication &amp; Culture</td>
</tr>
<tr>
<td>LMC 3234</td>
<td>Creative Writing</td>
</tr>
<tr>
<td>LMC 3258</td>
<td>Documentary Film</td>
</tr>
<tr>
<td>LMC 3314</td>
<td>Tech of Representation</td>
</tr>
<tr>
<td>LMC 3414</td>
<td>Intellectual Property</td>
</tr>
<tr>
<td>LMC 3705</td>
<td>Prin Information Design</td>
</tr>
<tr>
<td>LMC 3710</td>
<td>Prin Interaction Design</td>
</tr>
<tr>
<td>LMC 3843</td>
<td>Spec Topic-Communication</td>
</tr>
<tr>
<td>LMC 4602</td>
<td>Performance Practicum</td>
</tr>
</tbody>
</table>

**International Plan (All Thread Combinations)**

The LMC International Plan follows the Institute model to develop a global competence connected to the student’s major program of study. It thus integrates international studies and experiences with work in a broad range of cultural and media studies, preparing graduates to critique and create cultural texts within an international professional environment. All students who successfully complete this option will receive the “International Plan” designation on their transcripts.

While following the basic LMC program of instruction, requiring a total of 122 credit hours of coursework, students following the International Plan will modify their program as follows. They will:

- take three Social Science courses, one each from the following categories: international relations, global economics, and a course on a specific country or region;
- spend two terms abroad engaged in any combination of study abroad, research, or internship;
- complete twelve credit hours of language instruction (by dedicating six credit hours of humanities electives, 3 credit hours of free electives, and 3 credit hours of the LMC language requirement to language study); and
- complete a LMC capstone course that links international studies with the major.

While all of the LMC degree combinations provide students with 14 credit hours of free electives, different options provide students with different numbers of free LMC elective hours. Students should contact the LMC advisor to learn about options for particular thread combinations.
During the fifth year, students will take a total of twenty-four credit hours, divided as follows: four credits for LMC major coursework, four credits for grad courses, four credits for LMC electives, four credits for arts electives, and six credits for non-LMC electives.

To fulfill the requirements of the LMC Research Option, students must:

1. Dedicating six credit hours of undefined LMC elective and/or free elective credit hours to undergraduate research.
2. Dedicating two more credit hours of free elective credit to LMC 4701 and LMC 4702.
3. Dedicating 3 hours of capstone coursework in the LMC major to LMC 4102: Senior Thesis.

Students may substitute audit hours of LMC 2698/LMC 4698 for equivalent hours of LMC 2699/LMC 4699. If they elect this option, they must add corresponding credit hours of an elective, for-credit class.

While all of the LMC degree thread combinations provide students with 14 credit hours of free electives, different options provide students with different numbers of free LMC elective hours. Students should contact the LMC advisor to learn about options for particular thread combinations.

LMC Information

BS/MS Degree Program

Students who wish to pursue the BS/MS combination in LMC and DM must apply to the School after completing at least seventy-five credit hours of work toward an LMC degree that includes the Interaction Design thread. Applicants should have a 3.5 GPA.

Students admitted to the program will select the LMC 4400 seminar option and take a total of twelve credit hours of graduate coursework during their final undergraduate year. Six credit hours of that work, in DM media courses, will replace the STAC free electives and will count for both undergraduate and graduate credit. During the summer term after their fourth year, students will participate in an approved internship program. During the fifth year, students will take a total of twenty-four credit hours, including either LMC 6800 (Project) or LMC 7000 (Thesis), and with no more than three courses taken outside the DM program.

Bachelor of Science in Literature, Media, and Communication - Thread: Literature & Design

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LMC Information (http://www.iac.gatech.edu/academics/schools/lcc)
Select three Specialty courses:

- LMC 3202 Literature Concentration
- LMC 3220 Theatre III
- LMC 3222 Regionalism American Lit
- LMC 3266 Major Authors
- LMC 3228 Shakespeare

Select two Foundation courses:

- LMC 2000 Intro-Lit, Media, & Comm
- LMC 2050

Select one of the following:

- Major Requirements
- Science or Computing Electives
- Core F - Courses Related to Major

Major Requirements

Select three Specialty courses:

- LMC 3202 Senior Thesis
- LMC 4720 Interactive Narrative Design
- LMC 2720 Prin of Visual Design

Select two Foundation courses:

- LMC 4100 Seminar in STAC
- LMC 4200 Seminar Lit/Cult Theory
- LMC 4300 Seminar Biomed & Culture
- LMC 4400 Seminar in Media Studies
- LMC 4500 Seminar in Film Studies
- LMC 4600 Seminar Perform Studies

Concentration

Literature

- LMC 3202 Studies in Fiction

Select three Specialty courses:

- LMC 3208 African-Amer Lit/Cult
- LMC 3210 Ethnicity American Cult
- LMC 3212 Women, Lit & Culture
- LMC 3502 Medieval Lit & Culture
- LMC 3504 Renaissance Lit&Culture
- LMC 3506 Enlightenment Lit & Cult
- LMC 3508 American Culture I
- LMC 3510 American Culture II
- LMC 3512 Brit/Cont Romanticism
- LMC 3514 Victorian Lit & Culture
- LMC 3516 Lit & Cultural Modernism
- LMC 3518 Lit/Cult Postmodernism

Select three Specialty courses:

- LMC 3102 The Classical Tradition
- LMC 3108 Sci Tech & Enlightenment
- LMC 3110 Sci, Tech & Romanticism
- LMC 3114 Sci, Tech & Modernism
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- LMC 3214 Science Fiction
- LMC 3216 Theatre I
- LMC 3218 Theatre II
- LMC 3219 Literature & Medicine
- LMC 3220 Theatre III
- LMC 3222 Regionalism American Lit
- LMC 3226 Major Authors
- LMC 3228 Shakespeare

LMC Electives

Free Electives

Total Credit Hours

122

1. Must be selected from the following list: Allow ECON 2101 or ECON 3300 or ECON 4311 or ECON 4350 or ECON 4351 or ECON 4355 or ECON 4411 or ECON 4415 or ECON 4620 or HTS 1031 or HTS 2036 or HTS 2037 or HTS 2041 or HTS 2061 or HTS 2062 or HTS 2082 or HTS 3012 or HTS 3015 or HTS 3028 or HTS 3030 or HTS 3031 or HTS 3032 or HTS 3035 or HTS 3036 or HTS 3038 or HTS 3039 or HTS 3041 or HTS 3043 or HTS 3045 or HTS 3051 or HTS 3061 or HTS 3062 or HTS 3063 or HTS 3064 or HTS 3065 or HTS 3069 or HTS 3087 or INTA 2011 or INTA 2030 or INTA 2040 or INTA 2100 or INTA 2210 or INTA 2220 or INTA 2230 or INTA 3010 or INTA 3020 or INTA 3031 or INTA 3101 or INTA 3102 or INTA 3104 or INTA 3120 or INTA 3121 or INTA 3130 or INTA 3131 or INTA 3203 or INTA 3220 or INTA 3221 or INTA 3230 or INTA 3231 or INTA 3240 or INTA 3241 or INTA 3301 or INTA 3303 or INTA 3304 or INTA 3321 or INTA 3330 or INTA 3331 or INTA 4007 or INTA 4011 or INTA 4040 or INTA 4050 or INTA 4060 or INTA 4101 or INTA 4121 or INTA 4230 or INTA 4240 or INTA 4241 or INTA 4330 or INTA 4331 or INTA 4332 or INTA 4333 or INTA 4340

2. Any CoS or CS course.

3. Minimum grade of C required.

4. Any Modern Language 2000-level or higher.

5. Students must complete one 2000-level or higher Ethics course during their program.
To fulfill the requirements of the LMC Research Option, students must:

- receive the "research option" designation on their transcripts.
- complete an actual thesis. All students who successfully complete the research thesis will receive a broad range of cultural and media studies, preparing graduates to critique and create cultural texts within an international professional environment. All students who successfully complete the research thesis will receive the "research option" designation on their transcripts.
- While following the basic LMC program of instruction, requiring a total of 122 credit hours of coursework, students following the International Plan will modify their program as follows. They will:
  - take three Social Science courses, one each from the following categories: international relations, global economics, and a course on a specific country or region;
  - spend two terms abroad engaged in any combination of study abroad, research, or internship;
  - complete twelve credit hours of language instruction (by dedicating six credit hours of humanities electives, 3 credit hours of free electives, and 3 credit hours of the LMC language requirement to language study); and
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While all of the LMC degree combinations provide students with 14 credit hours of free electives, different options provide students with different numbers of free LMC elective hours. Students should contact the LMC advisor to learn about options for particular thread combinations.

LMC Information

BS/MS Degree Program

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Students admitted to the program will select the LMC 4400 seminar option and take a total of twelve credit hours of graduate coursework during their final undergraduate year. Six credit hours of that work, in DM media courses, will replace the STAC free electives and will count for both undergraduate and graduate credit. During the summer term after their fourth year, students will participate in an approved internship program. During the fifth year, students will take a total of twenty-four credit hours, including either LMC 6800 (Project) or LMC 7000 (Thesis), and with no more than three courses taken outside the DM program.

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<td>LMC 4702</td>
<td>US Rsch Thesis Writing</td>
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<td>LMC 4102</td>
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Students will meet these requirements without adding additional hours to their schedules by

- dedicating six credit hours of undefined LMC elective and/or free elective credit hours to undergraduate research.
- dedicating two more credit hours of free elective credit to LMC 4701 and LMC 4702.
- dedicating 3 hours of capstone coursework in the LMC major to LMC 4102: Senior Thesis.

1 Students may substitute audit hours of LMC 2698/LMC 4698 for equivalent hours of LMC 2699/LMC 4699. If they elect this option, they must add corresponding credit hours of an elective, for-credit class.

While all of the LMC degree thread combinations provide students with 14 credit hours of free electives, different options provide students with different numbers of free LMC elective hours. Students should contact the LMC advisor to learn about options for particular thread combinations.

6 Other Core D Math Options include MATH 1551 and MATH 1554, MATH 1551 and MATH 1564, MATH 1550 and MATH 1553, MATH 1550 and MATH 1554, or MATH 1550 and MATH 1564.
work. Other graduates pursue careers in fields ranging from graphic art and photography to client advocacy and medical administration to library services and arts administration.

LMC Information (http://www.iac.gatech.edu/academics/schools/lcc)

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<td>Wellness</td>
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<td></td>
</tr>
<tr>
<td>APPH 1040</td>
<td>Sci Foundation of Health</td>
<td>2</td>
</tr>
<tr>
<td>or APPH 10</td>
<td>Sci of Phys Act &amp; Health</td>
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</table>

**Core A - Essential Skills**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
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<tbody>
<tr>
<td>ENGL 1101</td>
<td>English Composition I</td>
<td>3</td>
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<tr>
<td>ENGL 1102</td>
<td>English Composition II</td>
<td>3</td>
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<tr>
<td>MATH 1712</td>
<td>Survey of Calculus</td>
<td>4</td>
</tr>
<tr>
<td>or MATH 151</td>
<td>Integral Calculus</td>
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</table>

**Core B - Institutional Options**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>CS 1301</td>
<td>Intro to Computing</td>
<td>3</td>
</tr>
<tr>
<td>or CS 1315</td>
<td>Intro Media Computation</td>
<td></td>
</tr>
</tbody>
</table>

**Core C - Humanities**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any HUM (p. 93)</td>
<td></td>
<td>6</td>
</tr>
</tbody>
</table>

**Core D - Science, Math, & Technology**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lab Science</td>
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<td>4</td>
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<tr>
<td>Lab Science</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>MATH 1711</td>
<td>Finite Mathematics ^5</td>
<td>4</td>
</tr>
<tr>
<td>or MATH 151</td>
<td>Differential Calculus</td>
<td></td>
</tr>
<tr>
<td>&amp; MATH 151</td>
<td>and Intro to Linear Algebra</td>
<td></td>
</tr>
</tbody>
</table>

**Core E - Social Sciences**

Select one of the following: 3

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIST 2111</td>
<td>United States to 1877</td>
<td>3</td>
</tr>
<tr>
<td>HIST 2112</td>
<td>United States since 1877</td>
<td></td>
</tr>
<tr>
<td>INTA 1200</td>
<td>American Government</td>
<td></td>
</tr>
<tr>
<td>POL 1101</td>
<td>Government of the U.S.</td>
<td></td>
</tr>
<tr>
<td>PUBP 3000</td>
<td>US Constitutional Issues</td>
<td></td>
</tr>
</tbody>
</table>

International Requirement ^1 3

Any SS (p. 97) 6

**Core F - Courses Related to Major**

Science or Computing Electives ^2 6

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>LMC 2400</td>
<td>Intro to Media Studies</td>
<td>3</td>
</tr>
<tr>
<td>LMC 2500</td>
<td>Intro to Film</td>
<td></td>
</tr>
<tr>
<td>LMC 2600</td>
<td>Intro to Perform Studies</td>
<td></td>
</tr>
<tr>
<td>LMC 2700</td>
<td>Intr-Computational Media</td>
<td></td>
</tr>
<tr>
<td>LMC 2720</td>
<td>Prin of Visual Design</td>
<td></td>
</tr>
<tr>
<td>LMC 2730</td>
<td>Construct-Moving Image</td>
<td></td>
</tr>
</tbody>
</table>

Select two Foundations courses: ^3 6

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>LMC 4100</td>
<td>Seminar in STAC</td>
<td>3</td>
</tr>
<tr>
<td>LMC 4200</td>
<td>Seminar Lit/Cult Theory</td>
<td></td>
</tr>
<tr>
<td>LMC 4300</td>
<td>Seminar Biomed &amp; Culture</td>
<td></td>
</tr>
<tr>
<td>LMC 4400</td>
<td>Seminar in Media Studies</td>
<td></td>
</tr>
<tr>
<td>LMC 4500</td>
<td>Seminar in Film Studies</td>
<td></td>
</tr>
<tr>
<td>LMC 4600</td>
<td>Seminar Perform Studies</td>
<td></td>
</tr>
<tr>
<td>LMC 4102</td>
<td>Senior Thesis</td>
<td></td>
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</tbody>
</table>

Select three Specialty courses: ^3 9

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>LMC 3206</td>
<td>Communication &amp; Culture</td>
<td></td>
</tr>
<tr>
<td>LMC 3234</td>
<td>Creative Writing</td>
<td></td>
</tr>
<tr>
<td>LMC 3252</td>
<td>Film and Television</td>
<td></td>
</tr>
<tr>
<td>LMC 3254</td>
<td>Film History</td>
<td></td>
</tr>
<tr>
<td>LMC 3255</td>
<td>Cinema &amp; Digital Culture</td>
<td></td>
</tr>
<tr>
<td>LMC 3256</td>
<td>Major Filmmakers</td>
<td></td>
</tr>
</tbody>
</table>
receive the "International Plan" designation on their transcripts. All students who successfully complete this option will be prepared for a broad range of cultural and media studies, preparing graduates to be globally competent connected to the student’s major program of study. It thus integrates international studies and experiences with work in global competence connected to the student’s major program of study.

The LMC International Plan follows the Institute model to develop a global competence connected to the student’s major program of study. It thus integrates international studies and experiences with work in a broad range of cultural and media studies, preparing graduates to critique and create cultural texts within an international professional environment. All students who successfully complete this option will receive the "International Plan" designation on their transcripts.

While following the basic LMC program of instruction, requiring a total of 122 credit hours of coursework, students following the International Plan will modify their program as follows. They will:

1. take three Social Science courses, one each from the following categories: international relations, global economics, and a course on a specific country or region;
2. spend two terms abroad engaged in any combination of study abroad, research, or internship;
3. complete twelve credit hours of language instruction (by dedicating six credit hours of humanities electives, 3 credit hours of free electives, and 3 credit hours of the LMC language requirement to language study); and
4. complete a LMC capstone course that links international studies with the major.

While all of the LMC degree combinations provide students with 14 credit hours of free electives, different options provide students with different numbers of free LMC elective hours. Students should contact the LMC advisor to learn about options for particular thread combinations.

**LMC Information**

**Research Option (All Thread Combinations)**

This degree option offers LMC students on all degree tracks the opportunity for a substantial, in-depth research experience. Students who pursue this degree option will learn how to design and complete advanced, multi-semester research projects through a combination of independent research, group writing instruction, and one-to-one work with a faculty mentor. Students are strongly encouraged at the end of their experience to work with their faculty mentor to develop a journal publication or conference presentation on the research in addition to the actual thesis. All students who successfully complete the research thesis option will receive the "research option" designation on their transcripts.

To fulfill the requirements of the LMC Research Option, students must:

1. **LMC 3257 Global Cinema**
2. **LMC 3258 Documentary Film**
3. **LMC 3259 Experimental Film**
4. **LMC 3262 Performance Studies**
5. **LMC 3314 Tech of Representation**
6. **LMC 3352 Film Technology**
7. **LMC 3362 Sci, Tech & Performance**
8. **LMC 3402 Graphic & Visual Design**
9. **LMC 3406 Video Production**
10. **LMC 3414 Intellectual Property**
11. **LMC 3853 Special Topics in Film**
12. **LMC 3863 Spec Topics-Performance**
13. **LMC 4406 Professional Comm**
14. **LMC 4730 Experimental Digital Art**
15. **LMC 4733 Mixed Reality Design**

**LMC Electives**

Free Electives 14

**Total Credit Hours** 122

1. Must be selected from the following list: Allow ECON 2101 or ECON 3300 or ECON 4111 or ECON 4310 or ECON 4351 or ECON 4355 or ECON 4411 or ECON 4415 or ECON 4620 or HTS 1031 or HTS 2036 or HTS 2037 or HTS 2041 or HTS 2061 or HTS 2062 or HTS 2082 or HTS 3012 or HTS 3015 or HTS 3028 or HTS 3030 or HTS 3031 or HTS 3032 or HTS 3035 or HTS 3036 or HTS 3038 or HTS 3039 or HTS 3041 or HTS 3043 or HTS 3045 or HTS 3051 or HTS 3061 or HTS 3062 or HTS 3063 or HTS 3064 or HTS 3065 or HTS 3069 or HTS 3087 or INTA 1110 or INTA 2030 or INTA 2040 or INTA 2100 or INTA 2210 or INTA 2220 or INTA 2230 or INTA 3010 or INTA 3020 or INTA 3031 or INTA 3101 or INTA 3102 or INTA 3104 or INTA 3120 or INTA 3121 or INTA 3130 or INTA 3131 or INTA 3203 or INTA 3220 or INTA 3221 or INTA 3230 or INTA 3231 or INTA 3240 or INTA 3241 or INTA 3301 or INTA 3303 or INTA 3304 or INTA 3321 or INTA 3330 or INTA 3331 or INTA 4007 or INTA 4011 or INTA 4040 or INTA 4050 or INTA 4060 or INTA 4101 or INTA 4104 or INTA 4230 or INTA 4240 or INTA 4241 or INTA 4330 or INTA 4331 or INTA 4332 or INTA 4333 or INTA 4340
2. Any CoS or CS course.
3. Minimum grade of C required.
4. Any Modern Language 2000-level or higher.
5. Students must complete one 2000-level or higher Ethics course during their program.
6. Other Core D Math Options include: MATH 1551 and MATH 1554, MATH 1551 and MATH 1564, MATH 1550 and MATH 1553, MATH 1550 and MATH 1554, or MATH 1550 and MATH 1564.

**International Plan (All Thread Combinations)**

The LMC International Plan follows the Institute model to develop a global competence connected to the student’s major program of study. It thus integrates international studies and experiences with work in a broad range of cultural and media studies, preparing graduates to critique and create cultural texts within an international professional environment. All students who successfully complete this option will receive the "International Plan" designation on their transcripts.
Students may substitute audit hours of LMC 2698/LMC 4698 for equivalent hours of LMC 2699/LMC 4699. If they elect this option, they must add corresponding credit hours of an elective, for-credit class.

While all of the LMC degree thread combinations provide students with 14 credit hours of free electives, different options provide students with different numbers of free LMC elective hours. Students should contact the LMC advisor to learn about options for particular thread combinations.

**LMC Information**

**BS/MS Degree Program**

Students who wish to pursue the BS/MS combination in LMC and DM must apply to the School after completing at least seventy-five credit hours of work toward an LMC degree that includes the Interaction Design thread. Applicants should have a 3.5 GPA.

Students admitted to the program will select the LMC 4400 seminar option and take a total of twelve credit hours of graduate coursework during their final undergraduate year. Six credit hours of that work, in DM media courses, will replace the STAC free electives and will count for both undergraduate and graduate credit. During the summer term after their fourth year, students will participate in an approved internship program. During the fifth year, students will take a total of twenty-four credit hours, including either LMC 6800 (Project) or LMC 7000 (Thesis), and with no more than three courses taken outside the DM program.

**Bachelor of Science in Literature, Media, and Communication - Thread: Literature & Science, Technology, and Culture**

The BS in Literature, Media, and Communication (formerly named Science, Technology, and Culture) is the oldest undergraduate degree program in the Ivan Allen College for the Liberal Arts at Georgia Tech. This program offers a thorough education in the different modes of representation that structure our increasingly technological and global world. Program graduates will have both significant theoretical and hands-on experience with novels, films, games, comic books, web pages, and scientific documents. By learning the modes of communication common to science, technology, and the humanities, LMC graduates are prepared to become leaders in education, business, and the arts.

LMC students take classes across six paths or “threads” of study, eventually choosing two threads as their major fields of study. These threads include Literature; Media; Communication; Social Justice Studies; Interaction Design; and Science, Technology, and Culture. This prepares them to intern in fields including journalism, marketing, graphic design, videography, and educational policy. Many LMC alumni go on to graduate school in literature, communication sciences, and interactive entertainment studies or professional school in law, health, and social work. Other graduates pursue careers in fields ranging from graphic art and photography to client advocacy and medical administration to library services and arts administration.

LMC Information (http://www.iac.gatech.edu/academics/schools/lcc)
Select three Specialty courses:  3  

LMC 3102 The Classical Tradition  
LMC 3108 Sci Tech & Enlightenment  
LMC 3110 Sci, Tech & Romanticism  
LMC 3114 Sci, Tech & Modernism  
LMC 3116 Sci Tech & Postmodernisms  
LMC 3204 Poetry and Poetics  
LMC 3214 Science Fiction  
LMC 3216 Theatre I  
LMC 3218 Theatre II  
LMC 3219 Literature & Medicine  
LMC 3220 Theatre III  
LMC 3222 Regionalism American Lit  
LMC 3226 Major Authors  
LMC 3228 Shakespeare  
LMC 3234 Creative Writing  
LMC 3248 Poetry & Digital Culture  
LMC 3316 Postcolonialism  
LMC 3308 Science Fiction Film TV  
LMC 3319 Literature & Medicine  
LMC 3325 Gender Study-Disciplines  
LMC 3326 Sci, Tech & Performance  
LMC 3833 Special Topics in STAC  
LMC Electives  3  

Free Electives  

Total Credit Hours  122  

1 Must be selected from the following list: Allow ECON 2101 or ECON 3300 or ECON 4311 or ECON 4350 or ECON 4351 or ECON 4355 or ECON 4411 or ECON 4415 or ECON 4620 or HTS 1031 or HTS 2036 or HTS 2037 or HTS 2041 or HTS 2061 or HTS 2062 or HTS 2082 or HTS 3012 or HTS 3015 or HTS 3028 or HTS 3030 or HTS 3031 or HTS 3032 or HTS 3035 or HTS 3036 or HTS 3038 or HTS 3039 or HTS 3041 or HTS 3043 or HTS 3045 or HTS 3051 or HTS 3061 or HTS 3062 or HTS 3063 or HTS 3064 or HTS 3065 or HTS 3069 or HTS 3087 or INTA 1110 or INTA 2030 or INTA 2040 or INTA 2100 or INTA 2210 or INTA 2220 or INTA 2230 or INTA 3010 or INTA 3020 or INTA 3031 or INTA 3010 or INTA 3032 or INTA 3033 or INTA 3034 or INTA 3120 or INTA 3121 or INTA 3130 or INTA 3131 or INTA 3203 or INTA 3220 or INTA 3221 or INTA 3230 or INTA 3231 or INTA 3240 or INTA 3241 or INTA 3301 or INTA 3303 or INTA 3304 or INTA 3321 or INTA 3330 or INTA 3331 or INTA 4007 or INTA 4011 or INTA 4040 or INTA 4050 or INTA 4060 or INTA 4101 or INTA 4121 or INTA 4230 or INTA 4240 or INTA 4241 or INTA 4330 or INTA 4331 or INTA 4332 or INTA 4333 or INTA 4340  

2 Any CoS or CS course.  

3 Minimum grade of C required.  

4 Any Modern Language 2000-level or higher.  

5 Students must complete one 2000-level or higher Ethics course during their program.  

6 Other Core D Math Options include: MATH 1551 and MATH 1554, MATH 1551 and MATH 1564, MATH 1550 and MATH 1553, MATH 1550 and MATH 1554, or MATH 1550 and MATH 1564.  

International Plan (All Thread Combinations)  

The LMC International Plan follows the Institute model to develop a global competence connected to the student’s major program of study. It thus integrates international studies and experiences with work in a broad range of cultural and media studies, preparing graduates to critique and create cultural texts within an international professional environment. All students who successfully complete this option will receive the "International Plan” designation on their transcripts.  

While following the basic LMC program of instruction, requiring a total of 122 credit hours of coursework, students following the International Plan will modify their program as follows. They will:  

- take three Social Science courses, one each from the following categories: international relations, global economics, and a course on a specific country or region;
• spend two terms abroad engaged in any combination of study abroad, research, or internship;
• complete twelve credit hours of language instruction (by dedicating six credit hours of humanities electives, 3 credit hours of free electives, and 3 credit hours of the LMC language requirement to language study); and
• complete a LMC capstone course that links international studies with the major.

While all of the LMC degree combinations provide students with 14 credit hours of free electives, different options provide students with different numbers of free LMC elective hours. Students should contact the LMC advisor to learn about options for particular thread combinations.

LMC Information

Research Option (All Thread Combinations)

This degree option offers LMC students on all degree tracks the opportunity for a substantial, in-depth research experience. Students who pursue this degree option will learn how to design and complete advanced, multi-semester research projects through a combination of independent research, group writing instruction, and one-to-one work with a faculty mentor. Students are strongly encouraged at the end of their experience to work with their faculty mentor to develop a journal publication or conference presentation on the research in addition to the actual thesis. All students who successfully complete the research thesis option will receive the “research option” designation on their transcripts.

To fulfill the requirements of the LMC Research Option, students must:

### Code Title Credit Hours
LMC 2699/4699 Undergraduate Research 1 6
LMC 4701 US Rsch Proposal Writing 1
LMC 4702 US Rsch Thesis Writing 1
LMC 4102 Senior Thesis 3

Students will meet these requirements without adding additional hours to their schedules by

• Dedicating six credit hours of undefined LMC elective and/or free elective credit hours to undergraduate research
• Dedicating two more credit hours of free elective credit to LMC 4701 and LMC 4702
• Dedicating 3 hours of capstone coursework in the LMC major to LMC 4102: Senior Thesis.

1 Students may substitute audit hours of LMC 2698/LMC 4698 for equivalent hours of LMC 2699/LMC 4699. If they elect this option, they must add corresponding credit hours of an elective, for-credit class.

While all of the LMC degree thread combinations provide students with 14 credit hours of free electives, different options provide students with different numbers of free LMC elective hours. Students should contact the LMC advisor to learn about options for particular thread combinations.

### Bachelor of Science in Literature, Media, and Communication - Thread: Literature & Social Justice

The BS in Literature, Media, and Communication (formerly named Science, Technology, and Culture) is the oldest undergraduate degree program in the Ivan Allen College for the Liberal Arts at Georgia Tech. This program offers a thorough education in the different modes of representation that structure our increasingly technological and global world. Program graduates will have both significant theoretical and hands-on experience with novels, films, games, comic books, web pages, and scientific documents. By learning the modes of communication common to science, technology, and the humanities, LMC graduates are prepared to become leaders in education, business, and the arts.

LMC students take classes across six paths or “threads” of study, eventually choosing two threads as their major fields of study. These threads include Literature; Media; Communication; Social Justice Studies; Interaction Design; and Science, Technology, and Culture. This prepares them to intern in fields including journalism, marketing, graphic design, videography, and educational policy. Many LMC alumni go on to graduate school in literature, communication sciences, and interactive entertainment studies or professional school in law, health, and social work. Other graduates pursue careers in fields ranging from graphic art and photography to client advocacy and medical administration to library services and arts administration.

LMC Information (http://www.iac.gatech.edu/academics/schools/lcc)
**Core C - Humanities**
- Any HUM (p. 93) 6

**Core D - Science, Math, & Technology**
- Lab Science 4

**Core E - Social Sciences**
- Select one of the following: 3
  - HIST 2111 United States to 1877
  - HIST 2112 United States since 1877
  - INTA 1200 American Government
  - POL 1101 Government of the U.S.
  - PUBP 3000 US Constitutional Issues
- International Requirement 1 3
- Any SS (p. 97) 6

**Core F - Courses Related to Major**
- Science or Computing Electives 2 6
- Modern Language Elective 4 3
- Ethics Requirement (p. 100) 5 3
- LMC 2000 Intro-Lit, Media, & Comm 3 3
- LMC 2050 Lit, Media, Comm Seminar 3 3

**Major Requirements**
- Select one of the following: 3 3
  - LMC 4100 Seminar in STAC
  - LMC 4200 Seminar Lit/Cult Theory
  - LMC 4300 Seminar Biomed & Culture
  - LMC 4400 Seminar in Media Studies
  - LMC 4500 Seminar in Film Studies
  - LMC 4600 Seminar Perform Studies
- LMC 4102 Senior Thesis

**Concentration**
- Literature
  - LMC 3202 Studies in Fiction 3 3
- Select two Foundations courses: 6
  - LMC 3208 African-Amer Lit/Cult
  - LMC 3210 Ethnicity American Cult
  - LMC 3212 Women, Lit & Culture
  - LMC 3502 Medieval Lit & Culture
  - LMC 3504 Renaissance Lit&Culture
  - LMC 3506 Enlightenment Lit & Cult
  - LMC 3508 American Culture I
  - LMC 3510 American Culture II
- LMC 3512 Brit/Cont Romanticism
- LMC 3514 Victorian Lit & Culture
- LMC 3516 Lit & Cultural Modernism
- LMC 3518 Lit/Cult Postmodernism
- Select three Specialty courses: 9
  - LMC 3102 The Classical Tradition
  - LMC 3108 Sci Tech & Enlightenment

**Free Electives**
- Free Electives 14

**Total Credit Hours**
- 122
Research Option (All Thread Combinations)

This degree option offers LMC students on all degree tracks the opportunity for a substantial, in-depth research experience. Students who pursue this degree option will learn how to design and complete advanced, multi-semester research projects through a combination of independent research, group writing instruction, and one-to-one work with a faculty mentor. Students are strongly encouraged at the end of their experience to work with their faculty mentor to develop a journal publication or conference presentation on the research in addition to the actual thesis. All students who successfully complete the research thesis option will receive the "research option" designation on their transcripts.

To fulfill the requirements of the LMC Research Option, students must:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>LMC 2699</td>
<td>Undergraduate Research</td>
<td>6</td>
</tr>
<tr>
<td>LMC 4701</td>
<td>US Rsch Proposal Writing</td>
<td>1</td>
</tr>
<tr>
<td>LMC 4702</td>
<td>US Rsch Thesis Writing</td>
<td>1</td>
</tr>
<tr>
<td>LMC 4102</td>
<td>Senior Thesis</td>
<td>3</td>
</tr>
</tbody>
</table>

Students will meet these requirements without adding additional hours to their schedules by:

- Dedicating six credit hours of undefined LMC elective and/or free elective credit hours to undergraduate research
- Dedicating two more credit hours of free elective credit to LMC 4701 and LMC 4702
- Dedicating 3 hours of capstone coursework in the LMC major to LMC 4102: Senior Thesis.

Students may substitute audit hours of LMC 2698/LMC 4698 for equivalent hours of LMC 2699/LMC 4699. If they elect this option, they must add corresponding credit hours of an elective, for-credit class.

While all of the LMC degree thread combinations provide students with 14 credit hours of free electives, different options provide students with different numbers of free LMC elective hours. Students should contact the LMC advisor to learn about options for particular thread combinations.

LMC Information

BS/MS Degree Program

Students who wish to pursue the BS/MS combination in LMC and DM must apply to the School after completing at least seventy-five credit hours of work toward an LMC degree that includes the Interaction Design thread. Applicants should have a 3.5 GPA.

Students admitted to the program will select the LMC 4400 seminar option and take a total of twelve credit hours of graduate coursework during their final undergraduate year. Six credit hours of that work, in DM media courses, will replace the STAC free electives and will count for both undergraduate and graduate credit. During the summer term after their fourth year, students will participate in an approved internship program. During the fifth year, students will take a total of twenty-four credit hours, including either LMC 6800 (Project) or LMC 7000 (Thesis), and with no more than three courses taken outside the DM program.

International Plan (All Thread Combinations)

The LMC International Plan follows the Institute model to develop a global competence connected to the student's major program of study. It thus integrates international studies and experiences with work in a broad range of cultural and media studies, preparing graduates to critique and create cultural texts within an international professional environment. All students who successfully complete this option will receive the "International Plan" designation on their transcripts.

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- take three Social Science courses, one each from the following categories: international relations, global economics, and a course on a specific country or region;
- spend two terms abroad engaged in any combination of study abroad, research, or internship;
- complete twelve credit hours of language instruction (by dedicating six credit hours of humanities electives, 3 credit hours of free electives, and 3 credit hours of the LMC language requirement to language study); and
- complete a LMC capstone course that links international studies with the major.

While all of the LMC degree combinations provide students with 14 credit hours of free electives, different options provide students with different numbers of free LMC elective hours. Students should contact the LMC advisor to learn about options for particular thread combinations.

LMC Information

1. Must be selected from the following list: Allow ECON 2101 or ECON 3300 or ECON 4311 or ECON 4350 or ECON 4351 or ECON 4355 or ECON 4411 or ECON 4415 or ECON 4620 or HTS 1031 or HTS 2036 or HTS 2037 or HTS 2041 or HTS 2061 or HTS 2062 or HTS 2082 or HTS 3012 or HTS 3015 or HTS 3028 or HTS 3030 or HTS 3031 or HTS 3032 or HTS 3035 or HTS 3036 or HTS 3038 or HTS 3039 or HTS 3041 or HTS 3043 or HTS 3045 or HTS 3051 or HTS 3061 or HTS 3062 or HTS 3063 or HTS 3064 or HTS 3065 or HTS 3069 or HTS 3087 or INTA 1110 or INTA 2030 or INTA 2040 or INTA 2100 or INTA 2210 or INTA 2220 or INTA 2230 or INTA 3010 or INTA 3020 or INTA 3031 or INTA 3101 or INTA 3102 or INTA 3104 or INTA 3120 or INTA 3121 or INTA 3130 or INTA 3131 or INTA 3203 or INTA 3220 or INTA 3221 or INTA 3230 or INTA 3231 or INTA 3240 or INTA 3241 or INTA 3301 or INTA 3303 or INTA 3304 or INTA 3321 or INTA 3330 or INTA 3331 or INTA 4007 or INTA 4011 or INTA 4040 or INTA 4050 or INTA 4060 or INTA 4101 or INTA 4121 or INTA 4230 or INTA 4240 or INTA 4241 or INTA 4330 or INTA 4331 or INTA 4332 or INTA 4333 or INTA 4340
2. Any CoS or CS course.
3. Minimum grade of C required.
4. Any Modern Language 2000-level or higher.
5. Students must complete one 2000-level or higher Ethics course during their program.
6. Other Core D Math Options include: MATH 1551 and MATH 1554, MATH 1551 and MATH 1564, MATH 1550 and MATH 1553, MATH 1550 and MATH 1554, or MATH 1550 and MATH 1564.
Bachelor of Science in Literature, Media, and Communication - Thread: Media & Communication

The BS in Literature, Media, and Communication (formerly named Science, Technology, and Culture) is the oldest undergraduate degree program in the Ivan Allen College for the Liberal Arts at Georgia Tech. This program offers a thorough education in the different modes of representation that structure our increasingly technological and global world. Program graduates will have both significant theoretical and hands-on experience with novels, films, games, comic books, web pages, and scientific documents. By learning the modes of communication common to science, technology, and the humanities, LMC graduates are prepared to become leaders in education, business, and the arts.

LMC students take classes across six paths or “threads” of study, eventually choosing two threads as their major fields of study. These threads include Literature; Media; Communication; Social Justice Studies; Interaction Design; and Science, Technology, and Culture. This prepares them to intern in fields including journalism, marketing, graphic design, videography, and educational policy. Many LMC alumni go on to graduate school in literature, communication sciences, and interactive entertainment studies or professional school in law, health, and social work. Other graduates pursue careers in fields ranging from graphic art and photography to client advocacy and medical administration to library services and arts administration.

LMC Information (http://www.iac.gatech.edu/academics/schools/lcc)

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<thead>
<tr>
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<tr>
<td>APPH 1040</td>
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<td>or APPH 1050</td>
<td>Sci of Phys Act &amp; Health</td>
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<td>ENGL 1102</td>
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<td>MATH 1712</td>
<td>Survey of Calculus</td>
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<td>or MATH 1552</td>
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<td>CS 1301</td>
<td>Intro to Computing</td>
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<td>or CS 1315</td>
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<td>Lab Science</td>
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<td>MATH 1711</td>
<td>Finite Mathematics</td>
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<td>or MATH 1552</td>
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<td>&amp; MATH 153</td>
<td>and Intro to Linear Algebra</td>
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<td>HIST 2111</td>
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<td>3</td>
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<td>HIST 2112</td>
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<td>INTA 1200</td>
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<td>POL 1101</td>
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International Requirement
Any SS (p. 97) 6

Core F - Courses Related to Major
Science or Computing Electives 6
Modern Language Elective 3
Ethics Requirement (p. 100) 3

LMC 2000 Intro-Lit, Media, & Comm 3
LMC 2050 Lit, Media, Comm Seminar 3

Major Requirements
Select one of the following: 3
LMC 4100 Seminar in STAC
LMC 4200 Seminar Lit/Cult Theory
LMC 4300 Seminar Biomed & Culture
LMC 4400 Seminar in Media Studies
LMC 4500 Seminar in Film Studies
LMC 4600 Seminar Perform Studies
LMC 4102 Senior Thesis

Concentration
Communication
LMC 3403 Tech Communication 3

Select two Foundation courses: 6
LMC 2720 Prin of Visual Design
LMC 3402 Graphic & Visual Design
LMC 3406 Video Production
LMC 3408 Rhetoric-Tech Narratives
LMC 3410 Non-Linear Documents
LMC 3412 Communicating Sci/Tech

Select three Specialty courses: 9
LMC 3206 Communication & Culture
LMC 3234 Creative Writing
LMC 3258 Documentary Film
LMC 3314 Tech of Representation
LMC 3414 Intellectual Property
LMC 3705 Prin Information Design
LMC 3710 Prin Interaction Design
LMC 3843 Spec Topic-Communication
LMC 4602 Performance Practicum

Media
LMC 2400 Intro to Media Studies 3

Select two Foundation courses: 6
LMC 2410 Intro to Game Studies
LMC 2500 Intro to Film
LMC 2600 Intro to Perform Studies
LMC 2700 Intr-Computational Media
LMC 2720 Prin of Visual Design
LMC 2730 Construct-Moving Image

Select three Specialty courses: 9
LMC 3206 Communication & Culture
LMC 3234 Creative Writing
LMC 3252 Film and Television
LMC 3254 Film History
The LMC International Plan follows the Institute model to develop a global competence connected to the student’s major program of study. It thus integrates international studies and experiences with work in a broad range of cultural and media studies, preparing graduates to critique and create cultural texts within an international professional environment. All students who successfully complete this option will receive the “International Plan” designation on their transcripts.

While following the basic LMC program of instruction, requiring a total of 122 credit hours of coursework, students following the International Plan will modify their program as follows. They will:

- take three Social Science courses, one each from the following categories: international relations, global economics, and a course on a specific country or region;
- spend two terms abroad engaged in any combination of study abroad, research, or internship;
- complete twelve credit hours of language instruction (by dedicating six credit hours of humanities electives, 3 credit hours of free electives, and 3 credit hours of the LMC language requirement to language study); and
- complete a LMC capstone course that links international studies with the major.

While all of the LMC degree combinations provide students with 14 credit hours of free electives, different options provide students with different numbers of free LMC elective hours. Students should contact the LMC advisor to learn about options for particular thread combinations.

**LMC Information**

**Research Option (All Thread Combinations)**

This degree option offers LMC students on all degree tracks the opportunity for a substantial, in-depth research experience. Students who pursue this degree option will learn how to design and complete advanced, multi-semester research projects through a combination of independent research, group writing instruction, and one-to-one work with a faculty mentor. Students are strongly encouraged at the end of their experience to work with their faculty mentor to develop a journal publication or conference presentation on the research in addition to the actual thesis. All students who successfully complete the research thesis option will receive the “research option” designation on their transcripts.

To fulfill the requirements of the LMC Research Option, students must:

**Code** | **Title** | **Credit Hours**
--- | --- | ---
LMC | Undergraduate Research | 6
2699/4699
LMC 4701 | US Rsch Proposal Writing | 1
LMC 4702 | US Rsch Thesis Writing | 1
LMC 4102 | Senior Thesis | 3

Students will meet these requirements without adding additional hours to their schedules by

- Dedicating six credit hours of undefined LMC elective and/or free elective credit hours to undergraduate research
- Dedicating two more credit hours of free elective credit to LMC 4701 and LMC 4702
- Dedicating 3 hours of capstone coursework in the LMC major to LMC 4102: Senior Thesis.

**International Plan (All Thread Combinations)**

The LMC International Plan follows the Institute model to develop a global range of cultural and media studies, preparing graduates to critique and create cultural texts within an international professional environment.
Students may substitute audit hours of LMC 2698/LMC 4698 for equivalent hours of LMC 2699/LMC 4699. If they elect this option, they must add corresponding credit hours of an elective, for-credit class. While all of the LMC degree thread combinations provide students with 14 credit hours of free electives, different options provide students with different numbers of free LMC elective hours. Students should contact the LMC advisor to learn about options for particular thread combinations.

LMC Information

BS/MS Degree Program

Students who wish to pursue the BS/MS combination in LMC and DM must apply to the School after completing at least seventy-five credit hours of work toward an LMC degree that includes the Interaction Design thread. Applicants should have a 3.5 GPA.

Students admitted to the program will select the LMC 4400 seminar option and take a total of twelve credit hours of graduate coursework during their final undergraduate year. Six credit hours of that work, in DM media courses, will replace the STAC free electives and will count for both undergraduate and graduate credit. During the summer term after their fourth year, students will participate in an approved internship program. During the fifth year, students will take a total of twenty-four credit hours, including either LMC 6800 (Project) or LMC 7000 (Thesis), and with no more than three courses taken outside the DM program.

Bachelor of Science in Literature, Media, and Communication - Thread: Media & Design

The BS in Literature, Media, and Communication (formerly named Science, Technology, and Culture) is the oldest undergraduate degree program in the Ivan Allen College for the Liberal Arts at Georgia Tech. This program offers a thorough education in the different modes of representation that structure our increasingly technological and global world. Program graduates will have significant theoretical and hands-on experience with novels, films, games, comic books, web pages, and scientific documents. By learning the modes of communication common to science, technology, and the humanities, LMC graduates are prepared to become leaders in education, business, and the arts.

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LMC Information (http://www.iac.gatech.edu/academics/schools/lcc)

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<th>Code</th>
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<td>Wellness</td>
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APPH 1040 Sci Foundation of Health or APPH 10 Sci of Phys Act & Health

Core A - Essential Skills

ENGL 1101 English Composition I
ENGL 1102 English Composition II
MATH 1712 Survey of Calculus or MATH 15Integral Calculus

Core B - Institutional Options

CS 1301 Intro to Computing or CS 1315 Intro Media Computation

Core C - Humanities

Any HUM (p. 93)

Core D - Science, Math, & Technology

Lab Science
Lab Science
MATH 1711 Finite Mathematics or MATH 15Differential Calculus & MATH 15:And Intro to Linear Algebra

Core E - Social Sciences

Select one of the following:
  - HIST 2111 United States to 1877
  - HIST 2112 United States since 1877
  - INTA 1200 American Government
  - POL 1101 Government of the U.S.
  - PUBP 3000 US Constitutional Issues

International Requirement

Any SS (p. 97)

Core F - Courses Related to Major

Science or Computing Electives
Modern Language Elective
Ethics Requirement (p. 100)
LMC 2000 Intro-Lit, Media, & Comm
LMC 2050 Lit, Media, Comm Seminar

Major Requirements

Select one of the following:

LMC 4100 Seminar in STAC
LMC 4200 Seminar Lit/Cult Theory
LMC 4300 Seminar Biomed & Culture
LMC 4400 Seminar in Media Studies
LMC 4500 Seminar in Film Studies
LMC 4600 Seminar Perform Studies
LMC 4102 Senior Thesis

Concentration

Media

LMC 2400 Intro to Media Studies
Select two Foundations courses:

LMC 2410 Intro to Game Studies
LMC 2500 Intro to Film
LMC 2600 Intro to Perform Studies
LMC 2700 Intr-Computational Media
LMC 2720 Prin of Visual Design
LMC 2730 Construct-Moving Image
Select three Specialty courses:  
LMC 3206 Communication & Culture  
LMC 3234 Creative Writing  
LMC 3252 Film and Television  
LMC 3254 Film History  
LMC 3255 Cinema & Digital Culture  
LMC 3256 Major Filmmakers  
LMC 3257 Global Cinema  
LMC 3258 Documentary Cinema  
LMC 3259 Experimental Film  
LMC 3314 Tech of Representation  
LMC 3352 Film Technology  
LMC 3362 Sci, Tech & Performance  
LMC 3402 Graphic & Visual Design  
LMC 3406 Video Production  
LMC 3414 Intellectual Property  
LMC 3853 Special Topics in Film  
LMC 3863 Spec Topics-Performance  
LMC 4406 Professional Comm  
LMC 4730 Experimental Digital Art  
LMC 4733 Mixed Reality Design  

Select two Foundations courses:  
LMC 2720 Prin of Visual Design  
LMC 2700 Intr-Computational Media  
LMC 2730 Construct-Moving Image  
LMC 2410 Intro to Game Studies  
LMC 3705 Prin Information Design  
LMC 3710 Prin Interaction Design  

Select three Specialty courses:  
LMC 3206 Communication & Culture  
LMC 3259 Experimental Film  
LMC 3314 Tech of Representation  
LMC 3402 Graphic & Visual Design  
LMC 3406 Video Production  
LMC 3414 Intellectual Property  
LMC 3853 Special Topics in Film  
LMC 4720 Interactive Narrative  
LMC 4725 Game Design  
LMC 4730 Experimental Digital Art  

Free Electives  
Free Electives  

Total Credit Hours 122

International Plan (All Thread Combinations)

The LMC International Plan follows the Institute model to develop a global competence connected to the student’s major program of study. It thus integrates international studies and experiences with work in a broad range of cultural and media studies, preparing graduates to critique and create cultural texts within an international professional environment. All students who successfully complete this option will receive the "International Plan" designation on their transcripts.

While following the basic LMC program of instruction, requiring a total of 122 credit hours of coursework, students following the International Plan will modify their program as follows. They will:

- take three Social Science courses, one each from the following categories: international relations, global economics, and a course on a specific country or region;
- spend two terms abroad engaged in any combination of study abroad, research, or internship;
- complete twelve credit hours of language instruction (by dedicating six credit hours of humanities electives, 3 credit hours of free electives, and 3 credit hours of the LMC language requirement to language study); and
- complete a LMC capstone course that links international studies with the major.

While all of the LMC degree combinations provide students with 14 credit hours of free electives, different options provide students with different numbers of free LMC elective hours. Students should contact the LMC advisor to learn about options for particular thread combinations.

LMC Information
Research Option (All Thread Combinations)

This degree option offers LMC students on all degree tracks the opportunity for a substantial, in-depth research experience. Students who pursue this degree option will learn how to design and complete advanced, multi-semester research projects through a combination of independent research, group writing instruction, and one-to-one work with a faculty mentor. Students are strongly encouraged at the end of their experience to work with their faculty mentor to develop a journal publication or conference presentation on the research in addition to the actual thesis. All students who successfully complete the research thesis option will receive the “research option” designation on their transcripts.

To fulfill the requirements of the LMC Research Option, students must:

<table>
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<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>LMC 2699/4699</td>
<td>Undergraduate Research ¹</td>
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<tr>
<td>LMC 4701</td>
<td>US Rsch Proposal Writing</td>
<td>1</td>
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<tr>
<td>LMC 4702</td>
<td>US Rsch Thesis Writing</td>
<td>1</td>
</tr>
<tr>
<td>LMC 4102</td>
<td>Senior Thesis</td>
<td>3</td>
</tr>
</tbody>
</table>

Students will meet these requirements without adding additional hours to their schedules by

- Dedicating six credit hours of undefined LMC elective and/or free elective credit hours to undergraduate research
- Dedicating two more credit hours of free elective credit to LMC 4701 and LMC 4702
- Dedicating 3 hours of capstone coursework in the LMC major to LMC 4102: Senior Thesis.

¹ Students may substitute audit hours of LMC 2698/LMC 4698 for equivalent hours of LMC 2699/LMC 4699. If they elect this option, they must add corresponding credit hours of an elective, for-credit class.

While all of the LMC degree thread combinations provide students with 14 credit hours of free electives, different options provide students with different numbers of free LMC elective hours. Students should contact the LMC advisor to learn about options for particular thread combinations.

LMC Information

BS/MS Degree Program

Students who wish to pursue the BS/MS combination in LMC and DM must apply to the School after completing at least seventy-five credit hours of work toward an LMC degree that includes the Interaction Design thread. Applicants should have a 3.5 GPA.

Students admitted to the program will select the LMC 4400 seminar option and take a total of twelve credit hours of graduate coursework during their final undergraduate year. Six credit hours of that work, in DM media courses, will replace the STAC free electives and will count for both undergraduate and graduate credit. During the summer term after their fourth year, students will participate in an approved internship program. During the fifth year, students will take a total of twenty-four credit hours, including either LMC 6800 (Project) or LMC 7000 (Thesis), and with no more than three courses taken outside the DM program.

Bachelor of Science in Literature, Media, and Communication - Thread: Media & Science, Technology and Culture

The BS in Literature, Media, and Communication (formerly named Science, Technology, and Culture) is the oldest undergraduate degree program in the Ivan Allen College for the Liberal Arts at Georgia Tech. This program offers a thorough education in the different modes of representation that structure our increasingly technological and global world. Program graduates will have both significant theoretical and hands-on experience with novels, films, games, comic books, web pages, and scientific documents. By learning the modes of communication common to science, technology, and the humanities, LMC graduates are prepared to become leaders in education, business, and the arts.

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LMC Information ([link](http://www.iac.gatech.edu/academics/schools/lcc))

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<tr>
<td>or APPH 10 Sci of Phys Act &amp; Health</td>
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<td>ENGL 1101</td>
<td>English Composition I</td>
<td>3</td>
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<td>ENGL 1102</td>
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<tr>
<td>MATH 1712</td>
<td>Survey of Calculus</td>
<td>4</td>
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<td>or MATH 15Integral Calculus</td>
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<td>CS 1301</td>
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<td>or CS 1315 Intro Media Computation</td>
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<td>Any HUM (p. 93)</td>
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<td>MATH 1711</td>
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<td>or MATH 15Differential Calculus &amp; MATH 15Intro to Linear Algebra</td>
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<td>LMC 2600</td>
<td>Intro to Perform Studies</td>
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<td>LMC 2700</td>
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<td>LMC 2720</td>
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<td>LMC 2730</td>
<td>Construct-Moving Image</td>
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Select three Specialty courses: 9

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<td>Major Filmmakers</td>
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<td>LMC 2758</td>
<td>Documentary Film</td>
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<td>LMC 3314</td>
<td>Tech of Representation</td>
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<td>LMC 3352</td>
<td>Film Technology</td>
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<td>LMC 3362</td>
<td>Sci, Tech &amp; Performance</td>
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<td>Special Topics in Film</td>
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<td>LMC 4406</td>
<td>Professional Comm</td>
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<td>LMC 4730</td>
<td>Experimental Digital Art</td>
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<td>LMC 4733</td>
<td>Mixed Reality Design</td>
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<td>LMC Electives</td>
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</table>

Free Electives 14

Total Credit Hours 122

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1. Must be selected from the following list: Allow ECON 2101 or ECON 3300 or ECON 4311 or ECON 4350 or ECON 4351 or ECON 4355 or ECON 4411 or ECON 4415 or ECON 4620 or HTS 1031 or HTS 2036 or HTS 2037 or HTS 2041 or HTS 2061 or HTS 2062 or HTS 2082 or HTS 3012 or HTS 3015 or HTS 3028 or HTS 3030 or HTS 3031 or HTS 3032 or HTS 3035 or HTS 3036 or HTS 3038 or HTS 3039 or HTS 3041 or HTS 3043 or HTS 3045 or HTS 3051 or HTS 3061 or HTS 3062 or HTS 3063 or HTS 3064 or HTS 3065 or HTS 3069 or HTS 3087 or INTA 1110 or INTA 2030 or INTA 2040 or INTA 2100 or INTA 2210 or INTA 2220 or INTA 2230 or INTA 3010 or INTA 3020 or INTA 3031 or INTA 3031 or INTA 3101 or INTA 3102 or INTA 3104 or INTA 3120 or INTA 3121 or INTA 3130 or INTA 3131 or INTA 3203 or INTA 3220 or INTA 3221 or INTA 3230 or INTA 3231 or INTA 3240 or INTA 3241 or INTA 3301 or INTA 3303 or INTA 3304 or INTA 3321 or INTA 3330 or INTA 3331 or INTA 4007 or INTA 4011 or INTA 4040 or INTA 4050 or INTA 4060 or INTA 4101 or INTA 4121 or INTA 4230 or INTA 4240 or INTA 4241 or INTA 4330 or INTA 4331 or INTA 4332 or INTA 4333 or INTA 4340

2. Any CoS or CS course.

3. Minimum grade of C required.

4. Any Modern Language 2000-level or higher.

5. Students must complete one 2000-level or higher Ethics course during their program.

6. Historical courses include any LMC 3100-level course.

7. Issues courses include any LMC 3300-level course.
To fulfill the requirements of the LMC Research Option, students must:

• take three Social Science courses, one each from the following categories: international relations, global economics, and a course on a specific country or region;
• spend two terms abroad engaged in any combination of study abroad, research, or internship;
• complete twelve credit hours of language instruction (by dedicating six credit hours of humanities electives, 3 credit hours of free electives, and 3 credit hours of the LMC language requirement to language study); and
• complete a LMC capstone course that links international studies with the major.

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LMC Information

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Bachelor of Science in Literature, Media, and Communication - Thread: Media & Social Justice

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graduate school in literature, communication sciences, and interactive
entertainment studies or professional school in law, health, and social
work. Other graduates pursue careers in fields ranging from graphic art
and photography to client advocacy and medical administration to library
services and arts administration.

LMC Information (http://www.iac.gatech.edu/academics/schools/lcc)

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<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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<tr>
<td></td>
<td>Wellness</td>
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<tr>
<td>APPH 1040</td>
<td>Sci Foundation of Health</td>
<td>2</td>
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<tr>
<td>or APPH 10</td>
<td>Sci of Phys Act &amp; Health</td>
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<table>
<thead>
<tr>
<th>Core A - Essential Skills</th>
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<tbody>
<tr>
<td>ENGL 1101</td>
</tr>
<tr>
<td>ENGL 1102</td>
</tr>
<tr>
<td>MATH 1712</td>
</tr>
<tr>
<td>or MATH 15 Integral</td>
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<table>
<thead>
<tr>
<th>Core B - Institutional Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 1301 Intro to Computing</td>
</tr>
<tr>
<td>or CS 1315 Intro Media Computation</td>
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</table>

<table>
<thead>
<tr>
<th>Core C - Humanities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any HUM (p. 93)</td>
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<table>
<thead>
<tr>
<th>Core D - Science, Math, &amp; Technology</th>
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</thead>
<tbody>
<tr>
<td>Lab Science</td>
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<thead>
<tr>
<th>Core E - Social Sciences</th>
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<tbody>
<tr>
<td>Select one of the following:</td>
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<tr>
<td>HIST 2111 United States to 1877</td>
</tr>
<tr>
<td>HIST 2112 United States since 1877</td>
</tr>
<tr>
<td>INTA 1200 American Government</td>
</tr>
<tr>
<td>POL 1101 Government of the U.S.</td>
</tr>
<tr>
<td>PUBP 3000 US Constitutional Issues</td>
</tr>
<tr>
<td>International Requirement¹</td>
</tr>
<tr>
<td>Any SS (p. 97)</td>
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<table>
<thead>
<tr>
<th>Core F - Courses Related to Major</th>
</tr>
</thead>
<tbody>
<tr>
<td>Science or Computing Electives²</td>
</tr>
<tr>
<td>Modern Language Elective⁴</td>
</tr>
<tr>
<td>Ethics Requirement (p. 100)¹</td>
</tr>
<tr>
<td>LMC 2000 Intro-Lit, Media, &amp; Comm³</td>
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<tr>
<td>LMC 2050 Lit, Media, Comm Seminar³</td>
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<tr>
<th>Major Requirements</th>
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<tbody>
<tr>
<td>Select one of the following:³</td>
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<tr>
<td>LMC 4100 Seminar in STAC</td>
</tr>
<tr>
<td>LMC 4200 Seminar Lit/Cult Theory</td>
</tr>
<tr>
<td>LMC 4300 Seminar Biomed &amp; Culture</td>
</tr>
<tr>
<td>LMC 4400 Seminar in Media Studies</td>
</tr>
<tr>
<td>LMC 4500 Seminar in Film Studies</td>
</tr>
<tr>
<td>LMC 4600 Seminar Perform Studies</td>
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<tr>
<td>LMC 4102 Senior Thesis</td>
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<table>
<thead>
<tr>
<th>Concentration</th>
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</thead>
<tbody>
<tr>
<td>Media</td>
</tr>
<tr>
<td>LMC 2400 Intro to Media Studies³</td>
</tr>
<tr>
<td>Select two Foundations courses:³</td>
</tr>
<tr>
<td>LMC 2410 Intro to Game Studies</td>
</tr>
<tr>
<td>LMC 2500 Intro to Film</td>
</tr>
<tr>
<td>LMC 2600 Intro to Perform Studies</td>
</tr>
<tr>
<td>LMC 2700 Intr-Computational Media</td>
</tr>
<tr>
<td>LMC 2720 Prin of Visual Design</td>
</tr>
<tr>
<td>LMC 2730 Construct-Moving Image</td>
</tr>
<tr>
<td>Select three Specialty courses:³</td>
</tr>
<tr>
<td>LMC 3206 Communication &amp; Culture</td>
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<tr>
<td>LMC 3234 Creative Writing</td>
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<tr>
<td>LMC 3252 Film and Television</td>
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<td>LMC 3254 Film History</td>
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<td>LMC 3256 Major Filmmakers</td>
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<tr>
<td>LMC 3257 Global Cinema</td>
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<td>LMC 3258 Documentary Film</td>
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<tr>
<td>LMC 3259 Experimental Film</td>
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<tr>
<td>LMC 3314 Tech of Representation</td>
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<tr>
<td>LMC 3352 Film Technology</td>
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<td>LMC 3362 Sci, Tech &amp; Performance</td>
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<tr>
<td>LMC 3406 Video Production</td>
</tr>
<tr>
<td>LMC 3414 Intellectual Property</td>
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<tr>
<td>LMC 3853 Special Topics in Film</td>
</tr>
<tr>
<td>LMC 3863 Spec Topics-Performance</td>
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<tr>
<td>LMC 4406 Professional Comm</td>
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<tr>
<td>LMC 4730 Experimental Digital Art</td>
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<tr>
<td>LMC 4733 Mixed Reality Design</td>
</tr>
<tr>
<td>Social Justice</td>
</tr>
<tr>
<td>LMC 3302 Sci, Tech &amp; Ideology³</td>
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<tr>
<td>Select two Foundations courses:³</td>
</tr>
<tr>
<td>LMC 2200 Intro to Gender Studies</td>
</tr>
<tr>
<td>LMC 2300 Intro Biomedicine &amp; Cult</td>
</tr>
<tr>
<td>LMC 3208 African-Amer Lit/Cult</td>
</tr>
<tr>
<td>LMC 3210 Ethnicity American Cult</td>
</tr>
<tr>
<td>LMC 3212 Women, Lit &amp; Culture</td>
</tr>
<tr>
<td>LMC 3304 Science, Tech &amp; Gender</td>
</tr>
<tr>
<td>LMC 3306 Science, Tech &amp; Race</td>
</tr>
<tr>
<td>LMC 3308 Environment Ecocritic</td>
</tr>
<tr>
<td>LMC 3316 Postcolonialism</td>
</tr>
<tr>
<td>Select three Specialty courses:³</td>
</tr>
<tr>
<td>LMC 3112 Evolution &amp; Industrial Age</td>
</tr>
<tr>
<td>LMC 3118 Sci Tech &amp; American Empire</td>
</tr>
<tr>
<td>LMC 3225 Gender Study-Disciplines</td>
</tr>
<tr>
<td>LMC 3257 Global Cinema</td>
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<tr>
<td>LMC 3258 Documentary Film</td>
</tr>
<tr>
<td>LMC 3314 Tech of Representation</td>
</tr>
<tr>
<td>LMC 3318 Biomedicine &amp; Culture</td>
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<tr>
<td>LMC 3414 Intellectual Property</td>
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<tr>
<td>LMC Electives³</td>
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<table>
<thead>
<tr>
<th>Free Electives</th>
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</table>

Bachelor of Science in Literature, Media, and Communication - Thread: Media & Social Justice
Research Option (All Thread Combinations)

This degree option offers LMC students on all degree tracks the opportunity for a substantial, in-depth research experience. Students who pursue this degree option will learn how to design and complete advanced, multi-semester research projects through a combination of independent research, group writing instruction, and one-to-one work with a faculty mentor. Students are strongly encouraged at the end of their experience to work with their faculty mentor to develop a journal publication or conference presentation on the research in addition to the actual thesis. All students who successfully complete the research thesis option will receive the "research option" designation on their transcripts.

To fulfill the requirements of the LMC Research Option, students must:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>LMC 2699</td>
<td>Undergraduate Research</td>
<td>6</td>
</tr>
<tr>
<td>LMC 4701</td>
<td>US Rsch Proposal Writing</td>
<td>1</td>
</tr>
<tr>
<td>LMC 4702</td>
<td>US Rsch Thesis Writing</td>
<td>1</td>
</tr>
<tr>
<td>LMC 4102</td>
<td>Senior Thesis</td>
<td>3</td>
</tr>
</tbody>
</table>

Students will meet these requirements without adding additional hours to their schedules by:

- Dedicating six credit hours of undefined LMC elective and/or free elective credit hours to undergraduate research
- Dedicating two more credit hours of free elective credit to LMC 4701 and LMC 4702
- Dedicating 3 hours of capstone coursework in the LMC major to LMC 4102: Senior Thesis.

Students may substitute audit hours of LMC 2698/LMC 4699 for equivalent hours of LMC 2699/LMC 4699. If they elect this option, they must add corresponding credit hours of an elective, for-credit class.

While all of the LMC degree thread combinations provide students with 14 credit hours of free electives, different options provide students with different numbers of free LMC elective hours. Students should contact the LMC advisor to learn about options for particular thread combinations.

LMC Information

BS/MS Degree Program

Students who wish to pursue the BS/MS combination in LMC and DM must apply to the School after completing at least seventy-five credit hours of work toward an LMC degree that includes the Interaction Design thread. Applicants should have a 3.5 GPA.

Students admitted to the program will select the LMC 4400 seminar option and take a total of twelve credit hours of graduate coursework during their final undergraduate year. Six credit hours of that work, in DM media courses, will replace the STAC free electives and will count for both undergraduate and graduate credit. During the summer term after their fourth year, students will participate in an approved internship program. During the fifth year, students will take a total of twenty-four credit hours,
including either LMC 6800 (Project) or LMC 7000 (Thesis), and with no more than three courses taken outside the DM program.

**Bachelor of Science in Literature, Media, and Communication - Thread: Social Justice and Science, Technology, and Culture**

The BS in Literature, Media, and Communication (formerly named Science, Technology, and Culture) is the oldest undergraduate degree program in the Ivan Allen College for the Liberal Arts at Georgia Tech. This program offers a thorough education in the different modes of representation that structure our increasingly technological and global world. Program graduates will have both significant theoretical and hands-on experience with novels, films, games, comic books, web pages, and scientific documents. By learning the modes of communication common to science, technology, and the humanities, LMC graduates are prepared to become leaders in education, business, and the arts.

LMC students take classes across six paths or “threads” of study, eventually choosing two threads as their major fields of study. These threads include Literature; Media; Communication; Social Justice Studies; Interaction Design; and Science, Technology, and Culture. This prepares them to intern in fields including journalism, marketing, graphic design, videography, and educational policy. Many LMC alumni go on to graduate school in literature, communication sciences, and interactive entertainment studies or professional school in law, health, and social work. Other graduates pursue careers in fields ranging from graphic art and photography to client advocacy and medical administration to library services and arts administration.

LMC Information (http://www.iac.gatech.edu/academics/schools/lcc)

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
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<td>APPH 1040</td>
<td>Sci Foundation of Health</td>
<td>2</td>
</tr>
<tr>
<td>or APPH 10</td>
<td>Sci of Phys Act &amp; Health</td>
<td></td>
</tr>
</tbody>
</table>

**Core A - Essential Skills**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGL 1101</td>
<td>English Composition I</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 1102</td>
<td>English Composition II</td>
<td>3</td>
</tr>
<tr>
<td>MATH 1712</td>
<td>Survey of Calculus</td>
<td>3</td>
</tr>
<tr>
<td>or MATH 15</td>
<td>Integral Calculus</td>
<td></td>
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**Core B - Institutional Options**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 1301</td>
<td>Intro to Computing</td>
<td>3</td>
</tr>
<tr>
<td>or CS 1315</td>
<td>Intro Media Computation</td>
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**Core C - Humanities**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any HUM  (p. 93)</td>
<td></td>
<td>6</td>
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</table>

**Core D - Science, Math, & Technology**

| Lab Science     | 4                                    |
| Lab Science     | 4                                    |
| MATH 1711 Finite Mathematics | 4                                    |
| or MATH 15 Differential Calculus & MATH 15:and Intro to Linear Algebra |              |

**Core E - Social Sciences**

Select one of the following: 3

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
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<tbody>
<tr>
<td>LMC 2100</td>
<td>Intro to STAC</td>
<td>3</td>
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Select two Foundations courses: 6

| LMC 2300   | Intro Biomedicine & Cult                  | 6            |
| LMC 3102   | The Classical Tradition                   | 3            |
| LMC 3104   | Age Scientific Discovery                  | 3            |
| LMC 3106   | Age Sci Revolution                        | 3            |
| LMC 3108   | Sci Tech & Enlightenment                  | 3            |
| LMC 3110   | Sci, Tech & Romanticism                   | 3            |
| LMC 3112   | Evolution & Industrial Age                | 3            |
| LMC 3114   | Sci, Tech & Modernism                     | 3            |
| LMC 3116   | Sci Tech & Postmodernisms                 | 3            |
| LMC 3118   | Sci Tech & American Empire                |              |

Select three Specialty courses: 9

| LMC 3214   | Science Fiction                           |              |
| LMC 3215   | Science Fiction Film TV                   |              |
| LMC 3219   | Literature & Medicine                     |              |
| LMC 3225   | Gender Study-Disciplines                  |              |
| LMC 3302   | Sci, Tech & Ideology                      |              |
| LMC 3304   | Science, Tech & Gender                    |              |
| LMC 3306   | Science, Tech & Race                      |              |
| LMC 3308   | Environment Ecocritic                     |              |
| LMC 3310   | Rhetoric Sci Inquiry                      |              |
| LMC 3314   | Tech of Representation                    |              |
| LMC 3316   | Postcolonial                              |              |
| LMC 3318   | Biomedicine & Culture                     |              |
| LMC 3352   | Film Technology                           |              |
| LMC 3362   | Sci, Tech & Performance                   |              |
| LMC 3833   | Special Topics in STAC                    |              |
Social Justice
LMC 3302 Sci, Tech & Ideology 3
Select two Foundations courses: 3
LMC 2200 Intro to Gender Studies
LMC 2300 Intro Biomedicine & Cult
LMC 3208 African-Amer Lit/Cult
LMC 3210 Ethnicity American Cult
LMC 3212 Women, Lit & Culture
LMC 3304 Science, Tech & Gender
LMC 3306 Science, Tech & Race
LMC 3308 Environment Ecocritic
LMC 3316 Postcolonialism
Select three Specialty courses: 3
LMC 3112 Evolution & Industrial Age
LMC 3118 Sci Tech & American Empire
LMC 3225 Gender Study-Disciplines
LMC 3257 Global Cinema
LMC 3258 Documentary Film
LMC 3314 Tech of Representation
LMC 3318 Biomedicine & Culture
LMC 3414 Intellectual Property
LMC 3514 Victorian Lit & Culture
LMC Electives 3
Free Electives
Free Electives 14
Total Credit Hours 122

1 Must be selected from the following list: Allow ECON 2101 or ECON 3300 or ECON 4311 or ECON 4350 or ECON 4351 or ECON 4355 or ECON 4411 or ECON 4415 or ECON 4620 or HTS 1031 or HTS 2036 or HTS 2037 or HTS 2041 or HTS 2061 or HTS 2062 or HTS 2082 or HTS 3012 or HTS 3015 or HTS 3028 or HTS 3030 or HTS 3031 or HTS 3032 or HTS 3035 or HTS 3036 or HTS 3038 or HTS 3039 or HTS 3041 or HTS 3043 or HTS 3045 or HTS 3051 or HTS 3061 or HTS 3062 or HTS 3063 or HTS 3064 or HTS 3065 or HTS 3069 or HTS 3087 or INTA 1110 or INTA 2030 or INTA 2040 or INTA 2100 or INTA 2210 or INTA 2220 or INTA 2300 or INTA 3010 or INTA 3020 or INTA 3031 or INTA 3102 or INTA 3104 or INTA 3120 or INTA 3121 or INTA 3130 or INTA 3131 or INTA 3203 or INTA 3220 or INTA 3221 or INTA 3230 or INTA 3231 or INTA 3240 or INTA 3241 or INTA 3301 or INTA 3330 or INTA 3304 or INTA 3321 or INTA 3330 or INTA 3331 or INTA 4007 or INTA 4011 or INTA 4040 or INTA 4050 or INTA 4060 or INTA 4101 or INTA 4121 or INTA 4230 or INTA 4240 or INTA 4241 or INTA 4330 or INTA 4331 or INTA 4332 or INTA 4333 or INTA 4340
2 Any CoS or CS course.
3 Minimum grade of C required.
4 Any Modern Language 2000-level or higher.
5 Students must complete one 2000-level or higher Ethics course during their program. For a complete list of Ethics courses, please see: /academics/undergraduate/core-curriculum/ethics/ (p. 100)
6 Historical courses include any LMC 3100-level course
7 Literary/Film/Cultural courses include any LMC 2200-level, LMC 3200-level, LMC 3500-level, LMC 4300-level course
8 Issues courses include any LMC 3300-level course
9 Media courses include any LMC 2700-level, LMC 3400-level, LMC 4400-level course (Excluding LMC 2700 and LMC 3403)
10 Other Core D Math Options include: MATH 1551 and MATH 1554, MATH 1551 and MATH 1564, MATH 1550 and MATH 1553, MATH 1550 and MATH 1554, or MATH 1550 and MATH 1564.

International Plan (All Thread Combinations)
The LMC International Plan follows the Institute model to develop a global competence connected to the student’s major program of study. It thus integrates international studies and experiences with work in a broad range of cultural and media studies, preparing graduates to critique and create cultural texts within an international professional environment. All students who successfully complete this option will receive the "International Plan" designation on their transcripts.

While following the basic LMC program of instruction, requiring a total of 122 credit hours of coursework, students following the International Plan will modify their program as follows. They will:

• take three Social Science courses, one each from the following categories: international relations, global economics, and a course on a specific country or region;
• spend two terms abroad engaged in any combination of study abroad, research, or internship;
• complete twelve credit hours of language instruction (by dedicating six credit hours of humanities electives, 3 credit hours of free electives, and 3 credit hours of the LMC language requirement to language study); and
• complete a LMC capstone course that links international studies with the major.

While all of the LMC degree combinations provide students with 14 credit hours of free electives, different options provide students with different numbers of free LMC elective hours. Students should contact the LMC advisor to learn about options for particular thread combinations.

LMC Information

Research Option (All Thread Combinations)
This degree option offers LMC students on all degree tracks the opportunity for a substantial, in-depth research experience. Students who pursue this degree option will learn how to design and complete advanced, multi-semester research projects through a combination of independent research, group writing instruction, and one-to-one work with a faculty mentor. Students are strongly encouraged at the end of their experience to work with their faculty mentor to develop a journal publication or conference presentation on the research in addition to the actual thesis. All students who successfully complete the research thesis option will receive the "research option" designation on their transcripts.

To fulfill the requirements of the LMC Research Option, students must:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>LMC 2699/4699</td>
<td>Undergraduate Research 1</td>
<td>6</td>
</tr>
<tr>
<td>LMC 4701</td>
<td>US Rsch Proposal Writing</td>
<td>1</td>
</tr>
<tr>
<td>LMC 4702</td>
<td>US Rsch Thesis Writing</td>
<td>1</td>
</tr>
</tbody>
</table>
Students will meet these requirements without adding additional hours to their schedules by

- Dedicating six credit hours of undefined LMC elective and/or free elective credit hours to undergraduate research
- Dedicating two more credit hours of free elective credit to LMC 4701 and LMC 4702
- Dedicating 3 hours of capstone coursework in the LMC major to LMC 4102: Senior Thesis.

Students may substitute audit hours of LMC 2698/LMC 4698 for equivalent hours of LMC 2699/LMC 4699. If they elect this option, they must add corresponding credit hours of an elective, for-credit class.

While all of the LMC degree thread combinations provide students with 14 credit hours of free electives, different options provide students with different numbers of free LMC elective hours. Students should contact the LMC advisor to learn about options for particular thread combinations.

LMC Information

BS/MS Degree Program

Students who wish to pursue the BS/MS combination in LMC and DM must apply to the School after completing at least seventy-five credit hours of work toward an LMC degree that includes the Interaction Design thread. Applicants should have a 3.5 GPA.

Students admitted to the program will select the LMC 4400 seminar option and take a total of twelve credit hours of graduate coursework during their final undergraduate year. Six credit hours of that work, in DM media courses, will replace the STAC free electives and will count for both undergraduate and graduate credit. During the summer term after their fourth year, students will participate in an approved internship program. During the fifth year, students will take a total of twenty-four credit hours, including either LMC 6800 (Project) or LMC 7000 (Thesis), and with no more than three courses taken outside the DM program.

Bachelor of Science in Materials Science and Engineering

The materials science and engineering undergraduate program offers a BS degree in Materials Science and Engineering with concentrations in Polymer and Fiber materials, Structural and Functional materials and Biomaterials. This versatile degree combines traditional instruction in ceramic, metallurgy, and polymer and fiber science and engineering with modern materials, including nano-, bio-, composite, electronic, and optical and magnetic materials. Freshmen and sophomores study basic chemistry, physics, mathematics, and engineering science and are introduced to the fundamental aspects of both hard and soft materials. Two English courses taken in the freshman year provide the foundation for further instruction in communications that is integrated throughout the curriculum. Juniors and seniors take courses in the engineering and science of materials including the details of materials processing, structure, and properties. The curriculum culminates in a two-course senior design sequence in which students work in teams to design a material, component, or process using previously learned skills and knowledge.

Five concentration related courses provide flexibility that allow students in their junior-senior years to focus in a particular area of materials. Five hours of free electives allows students to further specialize or to pursue other interests. Courses in the humanities/fine arts and social sciences ensure that graduates appreciate the role of engineering in today's global society.

Mission Statement

The mission of the Bachelor of Science in Materials Science and Engineering program is to produce graduates well-rounded in the fundamentals of materials science and engineering who are prepared to meet the related needs of industry and government, and prepared for advanced academic study in materials related disciplines. This will be accomplished by providing students with up-to-date knowledge and skills through coursework, modern laboratories, opportunities to conduct cutting edge research with distinguished faculty mentors, and opportunities to participate in leadership and service activities.

Program Educational Objectives

The general educational objective of the Materials Science and Engineering undergraduate program is to provide its graduates with the fundamental knowledge to function effectively in materials science and engineering related positions in industry and government, and academics. The following specific Program Educational Objectives were established to ensure the attainment of this general objective consistent with the visions and missions of Georgia Tech and the College of Engineering, and ABET Criteria for Evaluating Engineering Programs:

1. To produce graduates with the fundamental knowledge and skills to function effectively in materials science and engineering related positions in industry and government, or to successfully pursue advanced study.
2. To produce graduates who advance in their chosen fields.
3. To produce graduates who function effectively in the global arena.

Grade Requirements

In order to encourage students to explore subjects of personal or professional interest without jeopardizing their GPA, the Institute has a limited pass/fail option. The policy of the School of Materials Science and Engineering regarding the use of pass/fail hours for credit is as follows: no course specifically required by name and number by the materials science and engineering curriculum may be taken on a pass/fail basis and used toward graduation, unless the course is offered only on that basis.

In cases of deficiencies obtained for the intended graduation term, refer to Section VII (on Deficiencies) of the Rules and Regulations published in the on-line General Catalog. Note that a deficiency (e.g., a single D deficiency) obtained the intended graduation term will delay graduation by at least one term.

Transfer Students

Students transferring into Materials Science and Engineering from another university or major should meet with the Associate Chair for Undergraduate Programs to discuss possible course substitutions and plan their remaining coursework.

- Bachelor of Science in Materials Science and Engineering - Biomaterials (p. 425)
• Bachelor of Science in Materials Science and Engineering - Polymer and Fiber Materials (p. 427)
• Bachelor of Science in Materials Science and Engineering - Structural and Functional Materials (p. 429)

Bachelor of Science in Materials Science and Engineering - Biomaterials

The materials science and engineering undergraduate program offers a BS degree in Materials Science and Engineering with concentrations in Polymer and Fiber materials, Structural and Functional materials and Biomaterials. This versatile degree combines traditional instruction in ceramic, metallurgy, and polymer and fiber science and engineering with modern materials, including nano-, bio-, composite, electronic, and optical and magnetic materials. Freshmen and sophomores study basic chemistry, physics, mathematics, and engineering science and are introduced to the fundamental aspects of both hard and soft materials. Two English courses taken in the freshman year provide the foundation for further instruction in communications that is integrated throughout the curriculum. Juniors and seniors take courses in the engineering and science of materials including the details of materials processing, structure, and properties. The curriculum culminates in a two-course senior design sequence in which students work in teams to design a material, component, or process using previously learned skills and knowledge.

Five concentration related courses provide flexibility that allow students in their junior-senior years to focus in a particular area of materials. Five hours of free electives allows students to further specialize or to pursue other interests. Courses in the humanities/fine arts and social sciences ensure that graduates appreciate the role of engineering in today's global society.

Mission Statement

The mission of the Bachelor of Science in Materials Science and Engineering program is to produce graduates well-rounded in the fundamentals of materials science and engineering who are prepared to meet the related needs of industry and government, and prepared for advanced academic study in materials related disciplines. This will be accomplished by providing students with up-to-date knowledge and skills through coursework, modern laboratories, opportunities to conduct cutting edge research with distinguished faculty mentors, and opportunities to participate in leadership and service activities.

Program Educational Objectives

The general educational objective of the Materials Science and Engineering undergraduate program is to provide its graduates with the fundamental knowledge to function effectively in materials-related positions in industry and government. The following specific Program Educational Objectives were established to ensure the attainment of this general objective consistent with the visions and missions of Georgia Tech and the College of Engineering, and ABET Criteria for Evaluating Engineering Programs:

1. To produce graduates with the fundamental knowledge and skills to function effectively in materials science and engineering related positions in industry and government, or to successfully pursue advanced study.
2. To produce graduates who advance in their chosen fields.
3. To produce graduates who function effectively in the global arena.

Grade Requirements

In order to encourage students to explore subjects of personal or professional interest without jeopardizing their GPA, the Institute has a limited pass/fail option. The policy of the School of Materials Science and Engineering regarding the use of pass/fail hours for credit is as follows: no course specifically required by name and number by the materials science and engineering curriculum may be taken on a pass/ fail basis and used toward graduation, unless the course is offered only on that basis.

In cases of deficiencies obtained for the intended graduation term, refer to Section VII (on Deficiencies) of the Rules and Regulations published in the on-line General Catalog. Note that a deficiency (e.g., a single D deficiency) obtained the intended graduation term will delay graduation by at least one term.

Transfer Students

Students transferring into Materials Science and Engineering from another university or major should meet with the Associate Chair for Undergraduate Programs to discuss possible course substitutions and plan their remaining coursework.

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<th>Credit Hours</th>
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<td>or APPH 10</td>
<td>Sci of Phys Act &amp; Health</td>
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<td>ENGL 1101</td>
<td>English Composition I</td>
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<td>ENGL 1102</td>
<td>English Composition II</td>
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<td>MATH 1552</td>
<td>Integral Calculus</td>
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<td>Computing for Engineers</td>
<td>3</td>
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<tr>
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<td>PHYS 2212</td>
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<td>MATH 1553</td>
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<td>HIST 2112</td>
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<td>POL 1101</td>
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<td>PUBP 3000</td>
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<td>ECON 2100</td>
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<td>ECON 2105</td>
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<td>ECON 2106</td>
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<td>Any SS (p. 97)</td>
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Core F - Courses Related to Major
Bachelor of Science in Materials Science and Engineering - Biomaterials

Select one of the following:

- MSE 4751
- MSE 4006
- MSE 4002
- BIOL 1510
- Biomaterials Concentration
- ISYE 3025
- ECE 3741
- ECE 3710
- COE 3001
- Non-Major Requirements
- MSE 4775
- MSE 4420
- MSE 4410
- MSE 4022
- MSE 3210
- MSE 3025
- MSE 3022
- MSE 3005
- MSE 3015
- MSE 3021
- Major Requirements
- MSE 1111
- MSE 2001
- MSE 2021
- MSE 3001
- MSE 3002
- MSE 3005
- MSE 3015
- MSE 3021
- MSE 3025
- MSE 3210
- MSE 4022
- MSE 4410
- MSE 4420
- MSE 4775
- Non-Major Requirements
- COE 2001
- COE 3001
- ECE 3710
- ECE 3741
- ISYE 3025
- BIOMaterials Concentration
- BIOL 1510
- MSE 4002
- MSE 4006
- MSE 4751
Select one of the following:
- ME 1770
- ME 3012
- ME 3220
- ME 4751

Free Electives

- Free Electives

Total Credit Hours

Pass-fail only allowed for Free Electives, Humanities, and Social Sciences.

1. If PHYS 2231 is taken, extra hour goes to Free Electives.
2. If PHYS 2232 is taken, extra hour goes to Free Electives.
3. MATH 1113 and PHYS 2XXX (AP credit) are not allowed.
4. Allow CS 4001 or CS 4002 or HTS 2084 or HTS 3021 or INTA 2030 or LMC 3318 or PHIL 3105 or PHIL 3109 or PHIL 3127 or PHIL 4176 or PUBP 3600
5. ME 1770 is recommended as a Free Elective, depending upon whether the student wishes to enter the work force directly after graduation or intends to pursue a graduate degree. Consultation with the academic advisor is highly recommended.

Cooperative Plan

Since 1912, Georgia Tech has offered a five-year Undergraduate Cooperative Program to those students who wish to combine career-related work experience with classroom studies. The program is the fourth oldest of its kind in the world.

Students typically alternate between industrial assignments and classroom studies until they complete at least three terms of work (two of which must be fall or spring). Co-op students complete the same coursework on campus that is completed by non-co-op students. Most co-op students begin the program as freshman or sophomores and are classified as full-time students regardless whether they are attending classes on campus or are full-time at an employer’s location.

Participants have the opportunity to develop career interests, gain hands-on work experience, develop human relations skills and earn a paycheck. Graduates of the program receive a bachelor’s degree with the Cooperative Plan designation.

Students can also complete work assignments in a foreign country as part of the International Cooperative Program. This program is a great opportunity to utilize foreign language skills, gain a global perspective, and experience a diverse culture. Proficiency in a foreign language is necessary to earn the International Cooperative Plan degree designation. For more information on the Cooperative Program, visit: www.coop.gatech.edu.

Internships

The Undergraduate Professional Internship Program is for students who do not participate in the Cooperative Program, but want some career-related work experience before graduation. Students generally work for one semester, usually in the summer, with an option for more work. Students must have completed at least thirty hours of coursework at Georgia Tech before they can participate in the program. For more details, visit: www.upti.gatech.edu (http://www.upti.gatech.edu).

In addition, there is a Work Abroad Program (www.workabroad.gatech.edu), which complements a student’s formal education with paid international work experience directly related to Materials Science and Engineering. Participating students typically include juniors and seniors. The international work assignments are designed to include practical training, cross-cultural exposure and learning, and the acquisition of professional skills.
Research Option
The Materials Science and Engineering undergraduate program offers a Research Option that allows students to participate in undergraduate research in faculty laboratories. The words "Research Option in Materials Science and Engineering" will appear on the transcript of each student completing the requirements to indicate that the student has had a substantial, in-depth, research experience.

The requirements for the "Research Option" in Materials Science and Engineering are:

1. Selection of a faculty advisor and research topic in conjunction with the faculty advisor. The topic and expected scope of the project must be approved in advance by the MSE Undergraduate Curriculum Committee. A key criterion will be whether the research may lead to a publishable paper.
2. Completion of nine units (see item 3 below) of supervised research, over a period of at least two, but preferably three, terms. Research may be either for pay or credit. At least six credit hours must involve work on a single research project.
3. Registration in nine hours of undergraduate research courses MSE 2698 and MSE 4698 (for pay), or MSE 2699 and MSE 4699 (for credit). MSE 2699 or MSE 4699 can be used to satisfy the free elective requirements of the BS degree in MSE.
4. Completion of LMC 4701 Undergraduate Research Proposal Writing (one hr. credit typically taken during the first or second semester of research). The student should write a Research Proposal while taking this class.
5. Obtain approval of the Research Proposal from the MSE Undergraduate Curriculum Committee. This is required before taking LMC 4702.
6. Completion of LMC 4702 (one hr. credit). This course is taken during the term in which the thesis is written.
7. Have research thesis approved by the faculty advisor and one other MSE faculty member approved by the MSE Undergraduate Curriculum Committee. The thesis will be evaluated on the basis of publishability, originality, creativity, and clarity. The MSE Undergraduate Curriculum Committee must approve each "Research Option" awarded under the BS MSE program.

BS/MS Option
The School of Materials Science and Engineering (MSE) offers a BS/MS program for outstanding students who want to obtain a graduate degree in addition to their BS degree. The advanced degree provides the additional knowledge and specialization needed to further facilitate a technical career. As a participant in this program, students have an opportunity to work with individual faculty members on projects in one of the traditional or innovative research areas in MSE. See www.mse.gatech.edu (http://www.mse.gatech.edu) for more details.

Bachelor of Science in Materials Science and Engineering - Polymer and Fiber Materials
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Criteria for Evaluating Engineering Programs:

1. To produce graduates with the fundamental knowledge and skills to function effectively in materials science and engineering related positions in industry and government, or to successfully pursue advanced study.
2. To produce graduates who advance in their chosen fields.
3. To produce graduates who function effectively in the global arena.

For more information about all of the programs in the Center for Career Discovery and Development, visit www.careerdiscovery.gatech.edu (http://careerdiscovery.gatech.edu).
Grade Requirements

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<tr>
<td>or APPH 1050</td>
<td>Sci of Phys Act &amp; Health</td>
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<tr>
<td>MATH 1552</td>
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<td>Core C - Humanities</td>
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<td>HIST 2112</td>
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<td>POL 1101</td>
<td>Government of the U.S.</td>
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<td>US Constitutional Issues</td>
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<td>ECON 2100</td>
<td>Economics and Policy</td>
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<td>ECON 2105</td>
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<td>ECON 2106</td>
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<td>Core F - Courses Related to Major</td>
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<td>CHEM 1211K</td>
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<tr>
<td>CHEM 1212K</td>
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<td>CHEM 1315</td>
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<td>MSE 2021</td>
<td>Maths Characterization</td>
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<td>MSE 3001</td>
<td>Chemical Thermo-Material</td>
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<td>MSE 3002</td>
<td>Struct Trans-Met,Cer&amp;Poly</td>
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<td>MSE 3005</td>
<td>Mech Behavior-Materials</td>
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<td>MSE 3015</td>
<td>Elec,Optical&amp;Magnet Prop</td>
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<td>MSE 3021</td>
<td>Materials Laboratory I</td>
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<td>MSE 3025</td>
<td>Stats&amp;Numerical Methods</td>
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<td>MSE 3210</td>
<td>Transport Phenomena</td>
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<td>MSE 4022</td>
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<td>MSE 4410</td>
<td>Capstone Engr Design I</td>
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<td>Fiber Product Mfg</td>
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<td>MSE 4230</td>
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<td>MSE 4335</td>
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<td>MSE 4791</td>
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Pass-fail only allowed for Free Electives, Humanities, and Social Sciences.

1 If PHYS 2231 is taken, extra hour goes to Free Electives.
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3 MATH 1113 and PHYS 2XXX (AP credit) are not allowed.
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Bachelor of Science in Materials Science and Engineering - Polymer and Fiber Materials
The requirements for the "Research Option" in Materials Science and Engineering are:

1. Selection of a faculty advisor and research topic in conjunction with the faculty advisor. The topic and expected scope of the project must be approved in advance by the MSE Undergraduate Curriculum Committee. A key criterion will be whether the research may lead to a publishable paper.

2. Completion of nine units (see item 3 below) of supervised research, over a period of at least two, but preferably three, terms. Research may be either for pay or credit. At least six credit hours must involve work on a single research project.

3. Registration in nine hours of undergraduate research courses MSE 2698 and MSE 4698 (for pay), or MSE 2699 and MSE 4699 (for credit). MSE 2699 or MSE 4699 can be used to satisfy the free elective requirements of the BS degree in MSE.

4. Completion of LMC 4701 Undergraduate Research Proposal Writing (one hr. credit typically taken during the first or second semester of research). The student should write a Research Proposal while taking this class.

5. Obtain approval of the Research Proposal from the MSE Undergraduate Curriculum Committee. This is required before taking LMC 4702.

6. Completion of LMC 4702 (one hr. credit). This course is taken during the term in which the thesis is written.

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3. To produce graduates who function effectively in the global arena.

Grade Requirements
In order to encourage students to explore subjects of personal or professional interest without jeopardizing their GPA, the Institute has a limited pass/fail option. The policy of the School of Materials Science and Engineering regarding the use of pass/fail hours for credit is as follows: no course specifically required by name and number by the materials science and engineering curriculum may be taken on a pass/fail basis and used toward graduation, unless the course is offered only on that basis.

In cases of deficiencies obtained for the intended graduation term, refer to Section VII (on Deficiencies) of the Rules and Regulations published in the on-line General Catalog. Note that a deficiency (e.g., a single D deficiency) obtained the intended graduation term will delay graduation by at least one term.

Transfer Students
Students transferring into Materials Science and Engineering from another university or major should meet with the Associate Chair for Undergraduate Programs to discuss possible course substitutions and plan their remaining coursework.

<table>
<thead>
<tr>
<th>Code</th>
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<tr>
<td>or APPH 10</td>
<td>Sci of Phys Act &amp; Health</td>
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<td>MATH 1552</td>
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<td>Core B - Institutional Options</td>
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<td>Core C - Humanities</td>
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<td>Core D - Science, Math, &amp; Technology</td>
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<td>PHYS 2212</td>
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<td>MATH 1553</td>
<td>Intro to Linear Algebra</td>
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<td>HIST 2112</td>
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<td>POL 1101</td>
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<td>MSE 3005</td>
<td>Mech Behavior-Materials</td>
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<td>MSE 3015</td>
<td>Elec,Optical&amp;Magnet Prop</td>
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<td>MSE 3021</td>
<td>Materials Laboratory I</td>
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<td>MSE 3025</td>
<td>Stats&amp;Numerical Methods</td>
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<td>MSE 4410</td>
<td>Capstone Engr Design I</td>
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</table>
Materials Science and Engineering undergraduate program offers a Research Option that allows students to participate in undergraduate research in faculty laboratories. The words "Research Option in Materials Science and Engineering" will appear on the transcript of each student completing the requirements to indicate that the student has had a substantial, in-depth, research experience.

The requirements for the "Research Option" in Materials Science and Engineering are:

1. Selection of a faculty advisor and research topic in conjunction with the faculty advisor. The topic and expected scope of the project must be approved in advance by the MSE Undergraduate Curriculum Committee. A key criterion will be whether the research may lead to a publishable paper.
2. Completion of nine units (see item 3 below) of supervised research, over a period of at least two, but preferably three, terms. Research may be either for pay or credit. At least six credit hours must involve work on a single research project.
3. Registration in nine hours of undergraduate research courses MSE 2698 and MSE 4698 (for pay), or MSE 2699 and MSE 4699 of which must be fall or spring). Co-op students complete the same coursework on campus that is completed by non-co-op students. Most co-op students begin the program as freshman or sophomores and are classified as full-time students regardless of whether they are attending classes on campus or are full-time at an employer's location. Participants have the opportunity to develop career interests, gain hands-on work experience, develop human relation skills and earn a paycheck. Graduates of the program receive a bachelor's degree with the Cooperative Plan designation.

Students can also complete work assignments in a foreign country as part of the International Cooperative Program. This program is a great opportunity to utilize foreign language skills, gain a global perspective, and experience a diverse culture. Proficiency in a foreign language is necessary to earn the International Cooperative Plan degree designation. For more information on the Cooperative Program, visit: www.coop.gatech.edu.

Internships
The Undergraduate Professional Internship Program is for students who do not participate in the Cooperative Program, but want some career-related work experience before graduation. Students generally work for one semester, usually in the summer, with an option for more work. Students must have completed at least thirty hours of coursework at Georgia Tech before they can participate in the program. For more details, visit: www.upi.gatech.edu (http://www.upi.gatech.edu).

In addition, there is a Work Abroad Program (www.workabroad.gatech.edu), which complements a student's formal education with paid international work experience directly related to Materials Science and Engineering. Participating students typically include juniors and seniors. The international work assignments are designed to include practical training, cross-cultural exposure and learning, and the acquisition of professional skills.

For more information about all of the programs in the Center for Career Discovery and Development, visit www.careerdiscovery.gatech.edu (http://careerdiscovery.gatech.edu).

Cooperative Plan
Since 1912, Georgia Tech has offered a five-year Undergraduate Cooperative Program to those students who wish to combine career-related work experience with classroom studies. The program is the fourth oldest of its kind in the world.

Students typically alternate between industrial assignments and classroom studies until they complete at least three terms of work (two
Bachelor of Science in Mathematics (for credit). MSE 2699 or MSE 4699 can be used to satisfy the free elective requirements of the BS degree in MSE.

4. Completion of LMC 4701 Undergraduate Research Proposal Writing (one hr. credit typically taken during the first or second semester of research). The student should write a Research Proposal while taking this class.

5. Obtain approval of the Research Proposal from the MSE Undergraduate Curriculum Committee. This is required before taking LMC 4702.

6. Completion of LMC 4702 (one hr. credit). This course is taken during the term in which the thesis is written.

7. Have research thesis approved by the faculty advisor and one other MSE faculty member approved by the MSE Undergraduate Curriculum Committee. The thesis will be evaluated on the basis of publishability, originality, creativity, and clarity. The MSE Undergraduate Curriculum Committee must approve each "Research Option" awarded under the BS MSE program.

**BS/MS Option**

The School of Materials Science and Engineering (MSE) offers a BS/MS program for outstanding students who want to obtain a graduate degree in addition to their BS degree. The advanced degree provides the additional knowledge and specialization needed to further facilitate a technical career. As a participant in this program, students have an opportunity to work with individual faculty members on projects in one of the traditional or innovative research areas in MSE. See www.mse.gatech.edu (http://www.mse.gatech.edu) for more details.

**Bachelor of Science in Mathematics**

The School of Mathematics at Georgia Tech offers a Bachelor of Science degree in Mathematics. The B.S. in Mathematics degree provides a certification of extensive training in mathematics at one of the nation’s leading scientific and technological universities. Holders of this degree are well qualified for a variety of careers in academia, business and industry, computer programming, data science, and education. The program provides excellent preparation for graduate studies in mathematics and related fields.

Students have the option of completing the B.S. in Mathematics or completing the B.S. in Mathematics with one of the areas of concentration.

**Optional concentrations**

- Applied Mathematics
- Discrete Mathematics
- Probability and Statistics
- Pure Mathematics

Bachelor of Science in Mathematics with a concentration in Applied Mathematics (p. 432)

Bachelor of Science in Mathematics with a concentration is Discrete Mathematics (p. 435)

Bachelor of Science in Mathematics with a concentration in Pure Mathematics (p. 438)

Bachelor of Science in Mathematics with a concentration in Probability and Statistics (p. 437)

Bachelor of Science in Mathematics - Business Option (p. 433)

Bachelor of Science in Mathematics - General (p. 436)

**Business and Research Options**

A student may elect to complete both the Business Option and the Research Option.

Completion of the Business and Research Options is noted by the designations "Business Option" and "Research Option" on the student’s transcript.

See Concentrations for the for the Business Option requirements. See below for the Research Option requirements.

Math Undergraduate Website (http://www.math.gatech.edu/academics/undergraduate/undergraduate-programs)

**Research Option**

Select one of the following Research Options: 1

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
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<tr>
<td>MATH 2698</td>
<td>Research Assistantship</td>
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<tr>
<td>&amp; MATH 4699</td>
<td>Research Assistantship (for credit)</td>
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<td>MATH 2699</td>
<td>Undergraduate Research</td>
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<tr>
<td>&amp; MATH 4699</td>
<td>Undergraduate Research (for credit)</td>
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</tr>
<tr>
<td>LMC 4701</td>
<td>US Rsch Proposal Writing (complete during the first or second semester of research)</td>
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<tr>
<td>LMC 4702</td>
<td>US Rsch Thesis Writing (take during the thesis-writing semester)</td>
<td>1</td>
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</tbody>
</table>

**Total Credit Hours** 11

1. supervised research with a faculty advisor over two or three semesters
2. Six credit hours of MATH 4699 may be used as mathematics electives for the BS in Mathematics.
3. a short proposal on the research project is developed
4. prepare a research report (research paper, project report/thesis), and make an oral presentation of the project

Completion of this Research Option is noted by the designation "Research Option in Mathematics" on the student’s transcript.

For more information, visit: http://www.undergradresearch.gatech.edu/research-option/.

Math Undergraduate Website (http://www.math.gatech.edu/academics/undergraduate/undergraduate-programs)

**Bachelor of Science in Mathematics - Applied Mathematics**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
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<td>APPH 1040</td>
<td>Sci Foundation of Health</td>
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<tr>
<td>ENGL 1101</td>
<td>English Composition I</td>
<td>3</td>
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<td>ENGL 1102</td>
<td>English Composition II</td>
<td>3</td>
</tr>
<tr>
<td>MATH 1552</td>
<td>Integral Calculus</td>
<td>4</td>
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</tbody>
</table>

For more information, visit: http://www.undergradresearch.gatech.edu/research-option/.

Math Undergraduate Website (http://www.math.gatech.edu/academics/undergraduate/undergraduate-programs)
Core B - Institutional Options
CS 1301 Intro to Computing 3

Core C - Humanities
Any HUM (p. 93) 6

Core D - Science, Math, & Technology
PHYS 2211 Intro Physics I 1 4
PHYS 2212 Intro Physics II 4
MATH 1551 Differential Calculus 2
or MATH 151Intro to Diff Calculus 2
MATH 1553 Intro to Linear Algebra 2
or MATH 155Linear Algebra 2
or MATH 156Honors Linear Algebra 2
Lab Science

Core E - Social Sciences
Select one of the following: 3
HIST 2111 United States to 1877
HIST 2112 United States since 1877
INTA 1200 American Government
POL 1101 Government of the U.S.
PUBP 3000 US Constitutional Issues
Any SS (p. 97) 9

Core F - Courses Related to Major
CS 1331 Intro-Object Orient Prog 3
Lab Science

Upper Level Foundation Courses
MATH 4107 Abstract Algebra I 3
MATH 4317 Analysis I 2 3
MATH 4320 Complex Analysis 2 3
Applied Mathematics Concentration
MATH 4640 Numerical Analysis I 3
MATH 4347 Partial Diff Eqns I 3
MATH 4541 Dynamics&Bifurcations I 3
Select nine credits:
MATH 4348Partial Diff Eqns II 3
MATH 4542Dynamics&Bifurcations II 3
MATH 4580Linear Programming 3
MATH 4581Math Methods in Engr 3
MATH 4641Numerical Analysis II 3
MATH 4699Undergraduate Research 3
MATH 4755Mathematical Biology 3
MATH 4777Vector&Parallel Sci Comp 3
MATH 4782Quantum Info&Quant Comp 3
CX 4140 Comp Model Algorithms 3
CX 4240 Computing for Data Analy 3

Mathematics Elective 3
Engineering or Science Electives
BIOI, CHEM, EAS, PHYS, PSYC, ECON, CS, AE, BMED, CEE, CHBE, ECE, ISYE, MSE, ME 3000-level or higher courses 4,5 9
Free Electives
Free Electives 6 11
Total Credit Hours 122
Pass-fail only allowed for Free Electives.
Four courses from Group A list must be completed. Student may select MATH elective from Group B if four courses from Group A are complete, otherwise, the Math elective must come from Group A. If student does not complete four courses from Group A list from concentration requirements and MATH elective, then the course(s) must be completed for free electives.

Group A list: MATH 3236, MATH 4022, MATH 4032, MATH 4108, MATH 4150, MATH 4221, MATH 4261, MATH 4318, MATH 4347, MATH 4431, MATH 4432, MATH 4441, MATH 4541, MATH 4542, MATH 4640.

Group B list: MATH 4080/MATH 4090, MATH 4222, MATH 4255, MATH 4262, MATH 4280, MATH 4348, MATH 4542, MATH 4580, MATH 4581, MATH 4641, MATH 4699, MATH 4755, MATH 4777, MATH 4782, MATH 4801, MATH 4802, CS 3510/CS 3511, CS 4510, CS 4540, CS 4641, CX 4140 CX 4240, ISYE 3133, ISYE 4133.

1 If PHYS 2231 is taken, extra hour goes toward Free Electives
2 C-minimum required
3 MATH 4699 must be an approved topic and can be used up to 6 hours.
4 CEE 3770 and ISYE 3770 are not allowed to be used here.
5 Two courses must be from the same school.
6 MATH 1113, MATH 3670 CEE 3770, and ISYE 3770 are restricted from free electives.

Bachelor of Science in Mathematics - Business Option

Code Title Credit Hours
Wellness
APPH 1040 Sci Foundation of Health 2
or APPH 10 Sci of Phys Act & Health
Core A - Essential Skills
ENGL 1101 English Composition I 3
ENGL 1102 English Composition II 3
MATH 1552 Integral Calculus 4
Core B - Institutional Options
CS 1301 Intro to Computing 3
Core C - Humanities
Any HUM (p. 93) 6
Core D - Science, Math, & Technology
PHYS 2211 Intro Physics I 1 4
PHYS 2212 Intro Physics II 4
MATH 1551 Differential Calculus 2
or MATH 151Intro to Diff Calculus

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Bachelor of Science in Mathematics - Business Option

MATH 1553 Intro to Linear Algebra 2
or MATH 1554 Linear Algebra
or MATH 1564 LinAlg w Abstract Vec Sp

Core E - Social Sciences
Select one of the following: 3
HIST 2111 United States to 1877
HIST 2112 United States since 1877
INTA 1200 American Government
POL 1101 Government of the U.S.
PUBP 3000 US Constitutional Issues
ECON 2106 Prin of Microeconomics 3
Any SS (p. 97) 6

Core F - Courses Related to Major
CS 1331 Intro-Object Orient Prog 3
Lab Science 4
MATH 2551 Multivariable Calculus 4
or MATH 2561 Honors Multivar Calculus
MATH 2552 Differential Equations 4
or MATH 2562 Honors Diff Equations
MATH 2106 Foundations Math Proof 3

Bridging Courses
MATH 3012 Applied Combinatorics 3
MATH 3235 Probability Theory 3
MATH 3406 Second Course Linear Alg 3

Upper Level Foundation Courses
MATH 4107 Abstract Algebra I 3
MATH 4317 Analysis I 3
MATH 4320 Complex Analysis 3

General Mathematics 21
Select twelve credits:
MATH 3236 Statistical Theory
MATH 4022 Intro to Graph Theory
MATH 4032 Combinatorial Analysis
MATH 4108 Abstract Algebra II
MATH 4150 Intro To Number Theory
MATH 4221 Stochastic Processes I
MATH 4261 Math Statistics I
MATH 4318 Analysis II
MATH 4347 Partial Diff Eqns I
MATH 4431 Introduction to Topology
MATH 4432 Algebraic Topology
MATH 4441 Differential Geometry
MATH 4541 Dynamics & Bifurcations I
MATH 4640 Numerical Analysis I

Select nine credits (or, select nine credits from previous list):
MATH 4080 Senior Project I
& MATH 4090 Senior Project II
MATH 4222 Stochastic Processes II
MATH 4255 Monte Carlo Methods
MATH 4262 Math Statistics II
MATH 4280 Information Theory
MATH 4348 Partial Diff Eqns II

MATH 4524 Dynamics & Bifurcations II
MATH 4580 Linear Programming
MATH 4581 Math Methods in Engr
MATH 4641 Numerical Analysis II
MATH 4699 Undergraduate Research
MATH 4755 Mathematical Biology
MATH 4777 Vector & Parallel Sci Comp
MATH 4782 Quantum Info & Quant Comp
MATH 4801 Special Topics
MATH 4802 Special Topics
CS 3510 Design & Analysis Algorithms
or CS 35 Algorithms Honors
CS 4510 Automata & Complexity
CS 4540 Advanced Algs
CS 4641 Machine Learning
CX 4140 Comp Model Algorithms
CS 4240 Compilers & Interpreters
ISYE 3133 Engineering Optimization
ISYE 4133 Advanced Optimization

Engineering or Science Electives
BIOL, CHEM, EAS, PHYS, PSYC, ECON, CS, AE, BMED, CEE, CHBE, ECE, ISYE, MSE, ME 3000-level or higher courses 3

Business Option
ACCT 2101 Accounting I 3
or MGT 3000 Financial & Managerial Acct
PSYC 2220 Industrial/Organizational Psychology 3
or MGT 310 Organizational Behavior
or MGT 315 Prin of Management

Select 6 credit hours: 6
MGT 3062 Financial Management
MGT 3078 Finance & Investments
MGT 3300 Marketing Management I
MGT 3660 International Business
MGT 4015 Adv Managerial Acct
MGT 4026 Fin Report & Analysis I
MGT 4028 Fin Analy & Rpt - Tech Firms
MGT 4030 International Accounting
MGT 4190 Strategic Quality Mgt
MGT 4191 Entrepreneurship Forum
MGT 4192 IMPACT Forum
MGT 4193 Serv Lead Values Systems
MGT 4194 Social Entrepreneurship
MGT 4303 Personal Sell & Sales Mgt
MGT 4304 Strategic Brand Mgt
MGT 4307 Strategic Marketing
MGT 4335 International Marketing
MGT 4610 Law, Mgt, & Economics
MGT 4670 Entrepreneurship

Free Electives
Free Electives 5

Total Credit Hours 122
Pass-fail only allowed for Free Electives.

Four courses from Group A list must be completed. Student may select MATH elective from Group B if four courses from Group A are complete, otherwise, the Math elective must come from Group A. If student does not complete four courses from Group A list from concentration requirements and MATH elective, then the course(s) must be completed for free electives.

Group A list: MATH 3236, MATH 4022, MATH 4032, MATH 4108, MATH 4150, MATH 4221, MATH 4261, MATH 4318, MATH 4347, MATH 4431, MATH 4442, MATH 4443, MATH 4541, MATH 4641, MATH 4640.

Group B list: MATH 4080/MATH 4090, MATH 4222, MATH 4255, MATH 4262, MATH 4280, MATH 4348, MATH 4542, MATH 4580, MATH 4581, MATH 4641, MATH 4699, MATH 4755, MATH 4777, MATH 4782, MATH 4801, MATH 4802, CS 3510/CS 3511, CS 4510, CS 4540, CS 4641, CX 4140 CX 4240, ISYE 3133, ISYE 4133.

1. If PHYS 2231 is taken, extra hours go toward Free Electives.
2. C-minimum required.
3. MATH 4699 must be an approved topic and can be used up to 6 hours.
4. CEE 3770 and ISYE 3770 are not allowed to be used here.
5. MATH 1113, MATH 3670, CEE 3770, and ISYE 3770 are restricted from free electives.
6. Two courses must be from the same school.

Bachelor of Science in Mathematics - Discrete Mathematics

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<td>MATH 1553</td>
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<td>2</td>
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<td>or MATH 155</td>
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<td>or MATH 156</td>
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<td>United States to 1877</td>
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<td>or CS 351</td>
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<td>Automata and Complexity</td>
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<td>CS 4540</td>
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<td>ISYE 4133</td>
<td>Advanced Optimization</td>
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Pass-fail only allowed for Free Electives.

Four courses from Group A list must be completed. Student may select MATH elective from Group B if four courses from Group A are complete, otherwise, the Math elective must come from Group A. If student does not complete four courses from Group A list from concentration requirements and MATH elective, then the course(s) must be completed for free electives.

Group A list: MATH 3236, MATH 4022, MATH 4032, MATH 4108, MATH 4150, MATH 4221, MATH 4261, MATH 4318, MATH 4347, MATH 4431, MATH 4442, MATH 4443, MATH 4541, MATH 4641, MATH 4640.

Group B list: MATH 4080/MATH 4090, MATH 4222, MATH 4255, MATH 4262, MATH 4280, MATH 4348, MATH 4542, MATH 4580,
Bachelor of Science in Mathematics - General

Code | Title                        | Credit Hours
--- | ----------------------------- | ---------------

**Wellness**

APPH 1040  Sci Foundation of Health  2
or APPH 10 Sci of Phys Act & Health

**Core A - Essential Skills**

ENGL 1101  English Composition I  3
ENGL 1102  English Composition II  3
MATH 1552  Integral Calculus  4

**Core B - Institutional Options**

CS 1301  Intro to Computing  3

**Core C - Humanities**

Any HUM (p. 93)  6

**Core D - Science, Math, & Technology**

PHYS 2211  Intro Physics I  4
PHYS 2212  Intro Physics II  4
MATH 1551  Differential Calculus  2
or MATH 15Intro to Diff Calculus
MATH 1553  Intro to Linear Algebra  2
or MATH 15Linear Algebra
or MATH 15inAlg w Abstract Vec Sp

**Core E - Social Sciences**

Select one of the following:  3
HIST 2111  United States to 1877
HIST 2112  United States since 1877
INTA 1200  American Government
POL 1101  Government of the U.S.
PUBP 3000  US Constitutional Issues
Any SS (p. 97)  9

**Core F - Courses Related to Major**

CS 1331  Intro-Object Orient Prog  3
Lab Science  4
MATH 2551  Multivariable Calculus  4
or MATH 25Honors Multivar Calculus
MATH 2552  Differential Equations  4
or MATH 25Honors Diff Equations
MATH 2106  Foundations Math Proof  3

**Bridging Courses**

MATH 3012  Applied Combinatorics  3
MATH 3235  Probability Theory  3
MATH 3406  Second Course Linear Alg  3

**Upper Level Foundation Courses**

MATH 4107  Abstract Algebra I  3
MATH 4317  Analysis I  3
MATH 4320  Complex Analysis  3

**General Mathematics**

Select twelve credits:
MATH 3236  Statistical Theory  3
MATH 4022  Intro to Graph Theory  3
MATH 4032  Combinatorial Analysis  3
MATH 4108  Abstract Algebra II  3
MATH 4150  Intro To Number Theory  3
MATH 4221  Stochastic Processes I  3
MATH 4261  Math Statistics I  3
MATH 4318  Analysis II  3
MATH 4347  Partial Diff Eqns I  3
MATH 4431  Introduction to Topology  3
MATH 4432  Algebraic Topology  3
MATH 4441  Differential Geometry  3
MATH 4541  Dynamics&Bifurcations I  3
MATH 4640  Numerical Analysis I  3

Select nine credits (or, select nine credits from previous list):
MATH 4080  Senior Project I
& MATH 4090  Senior Project II  3
MATH 4222  Stochastic Processes II  3
MATH 4255  Monte Carlo Methods  3
MATH 4262  Math Statistics II  3
MATH 4280  Information Theory  3
MATH 4348  Partial Diff Eqns II  3
MATH 4542  Dynamics&Bifurcations II  3
MATH 4581  Math Methods in Engr  3
MATH 4641  Numerical Analysis II  3
MATH 4699  Undergraduate Research  3
MATH 4755  Mathematical Biology  3
MATH 4777  Vector&Parallel Sci Comp  3
MATH 4782  Quantum Info&Quant Comp  3
MATH 4801  Special Topics  3
MATH 4802  Special Topics  3
CS 3510  Dsgn&Analysis-Algorithms  3
or CS 3511  Algorithms Honors  3
CS 4510  Automata and Complexity  3
CS 4540  Advanced Algs  3
CS 4641  Machine Learning  3
CX 4140  Comp Model Algorithms  3
CX 4240  Computing for Data Analy  3
ISYE 3133  Engineering Optimization  3
ISYE 4133  Advanced Optimization  3

**Engineering or Science Electives**
Probability and Statistics

Bachelor of Science in Mathematics - Probability and Statistics

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<tr>
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<td><strong>Core B - Institutional Options</strong></td>
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<td><strong>Core C - Humanities</strong></td>
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<td>Any HUM (p. 93)</td>
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<td>PHYS 2211</td>
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<td>MATH 1553</td>
<td>Intro to Linear Algebra</td>
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or MATH 1554 or MATH 1550

Probability and Statistics Concentration

Select twelve credits:
- MATH 4222 Stochastic Processes I
- MATH 4222 Stochastic Processes II
- MATH 4255 Monte Carlo Methods
- MATH 4262 Math Statistics II
- MATH 4280 Information Theory
- MATH 4580 Linear Programming
- MATH 4699 Undergraduate Research
- ISYE 4133 Advanced Optimization
- CX 4240 Computing for Data Analy

Mathematics Elective

Select one of the following:
- HIST 2111 United States to 1877
- HIST 2112 United States since 1877
- INTA 1200 American Government
- POL 1101 Government of the U.S.
- PUBP 3000 US Constitutional Issues

Any SS (p. 97) 9

**Core F - Courses Related to Major**

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<tr>
<th>Course Code</th>
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<tr>
<td>CS 1331</td>
<td>Intro-Object Orient Prog</td>
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<td>Lab Science</td>
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<td>MATH 3012</td>
<td>Applied Combinatorics</td>
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<td>MATH 3406</td>
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**Upper Level Foundation Courses**

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<tbody>
<tr>
<td>MATH 4107</td>
<td>Abstract Algebra I</td>
</tr>
<tr>
<td>MATH 4317</td>
<td>Analysis I</td>
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<tr>
<td>MATH 4320</td>
<td>Complex Analysis</td>
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**Probability and Statistics Concentration**

Select twelve credits:
- MATH 4222 Stochastic Processes I
- MATH 4222 Stochastic Processes II
- MATH 4255 Monte Carlo Methods
- MATH 4262 Math Statistics II
- MATH 4280 Information Theory
- MATH 4580 Linear Programming
- MATH 4699 Undergraduate Research
- ISYE 4133 Advanced Optimization
- CX 4240 Computing for Data Analy

**Free Electives**

Select twelve credits:
- BIOL, CHEM, EAS, PHYS, PSYC, ECON, CS, AE, BMED, CEE, CHBE, ECE, ISYE, MSE, ME 3000-level or higher courses

Four courses from Group A list must be completed. Student may select MATH elective from Group B if four courses from Group A are complete, otherwise, the Math elective must come from Group A. If student does not complete four courses from Group A list from concentration requirements and MATH elective, then the course(s) must be completed for free electives.

Four courses from Group A list must be completed. Student may select MATH elective from Group B if four courses from Group A are complete, otherwise, the Math elective must come from Group A. If student does not complete four courses from Group A list from concentration requirements and MATH elective, then the course(s) must be completed for free electives.

Pass-fail only allowed for Free Electives.

Pass-fail only allowed for Free Electives.

Four courses from Group A list must be completed. Student may select MATH elective from Group B if four courses from Group A are complete, otherwise, the Math elective must come from Group A. If student does not complete four courses from Group A list from concentration requirements and MATH elective, then the course(s) must be completed for free electives.

Pass-fail only allowed for Free Electives.

Four courses from Group A list must be completed. Student may select MATH elective from Group B if four courses from Group A are complete, otherwise, the Math elective must come from Group A. If student does not complete four courses from Group A list from concentration requirements and MATH elective, then the course(s) must be completed for free electives.

Pass-fail only allowed for Free Electives.
Bachelor of Science in Mathematics - Pure Mathematics

requirements and MATH elective, then the course(s) must be completed for free electives.

**Group A** list: MATH 3236, MATH 4022, MATH 4032, MATH 4108, MATH 4150, MATH 4221, MATH 4261, MATH 4318, MATH 4347, MATH 4432, MATH 4431, MATH 4541, MATH 4542.

**Group B** list: MATH 4080/MATH 4090, MATH 4222, MATH 4255, MATH 4262, MATH 4280, MATH 4348, MATH 4542, MATH 4580, MATH 4581, MATH 4641, MATH 4699, MATH 4755, MATH 4777, MATH 4782, MATH 4801, MATH 4802, CS 3510/CS 3511, CS 4510, CS 4540, CS 4641, CX 4140 CX 4240, ISYE 3133, ISYE 4133.

1. If PHYS 2231 is taken, extra hour goes toward Free Electives
2. C-minimum required
3. MATH 4699 must be an approved topic related to concentration and can only be used once.
4. CEE 3770 and ISYE 3770 are not allowed to be used here.
5. Two courses must be from the same school.
6. MATH 1113, MATH 3670, CEE 3770, and ISYE 3770 are restricted from free electives.

**Bachelor of Science in Mathematics - Pure Mathematics**

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<th>Code</th>
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<td><strong>Wellness</strong></td>
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<tr>
<td>APPH 1040</td>
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<td>POL 1101</td>
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<td>US Constitutional Issues</td>
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<td>US Constitutional Issues</td>
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<td>Any SS (p. 97)</td>
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**CS 1331** Intro-Object Orient Prog 3
Lab Science 4
MATH 2551 | Multivariable Calculus                             |              |
| or MATH 2561 | Honors Multivar Calculus                      | 4            |
| MATH 2552 | Differential Equations                           | 4            |
| or MATH 2562 | Honors Diff Equations                          |              |
| MATH 2106 | Foundations Math Proof                           | 3            |

**Bridging Courses**

<table>
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<th>Title</th>
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<tr>
<td>MATH 3012</td>
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**Upper Level Foundation Courses**

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<td>MATH 4107</td>
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**Pure Mathematics Concentration**

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<tr>
<td>MATH 4431</td>
<td>Introduction to Topology</td>
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<tr>
<td>or MATH 4432</td>
<td>Algebraic Topology</td>
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<td>or MATH 4433</td>
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Select nine credits:

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<td>Combinatorial Analysis</td>
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<td>MATH 4221</td>
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<td>MATH 4542</td>
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Mathematics Elective 3

**Engineering or Science Electives**

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**Free Electives**

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Total Credit Hours 122

Pass-fail only allowed for Free Electives.

Four courses from Group A list must be completed. Student may select MATH elective from Group B if four courses from Group A are complete, otherwise, the Math elective must come from Group A. If student does not complete four courses from Group A list from concentration requirements and MATH elective, then the course(s) must be completed for free electives.
Concentrations are each fifteen hours of classes, and will satisfy the concentration areas in sub-fields of Mechanical Engineering. The Woodruff School of Mechanical Engineering has established objectives reflect the needs, and have been reviewed by, among others, undergraduate programs in mechanical engineering. The educational faculty of the Woodruff School strives to continuously improve our undergraduate research. of special programs including co-op, internships, study abroad, and courses in electronics, materials science, computer programming, and wide range of career choices open to MEs, the program incorporates the ME program on design, creativity, and hands-on learning. Due to the on for further study in graduate school. There is a strong emphasis in and to contribute to a wide range of industries and businesses, or to go or by earning post-graduate degrees.

Our graduates will be recognized leaders in ME-related fields or other career paths, including industry, academe, government, and non-governmental organizations.

Our graduates will be global collaborators, leading and participating in culturally diverse teams, who fearlessly discover and apply new knowledge and engineering practices that have a world-wide impact.

Our graduates will be adaptive learners who continue to grow knowledge and engineering practices that have a world-wide impact.

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Our graduates will be adaptive learners who continue to grow knowledge and engineering practices that have a world-wide impact.

Our graduates will be entrepreneurial innovators who have a positive economic and social impact on their communities, the nation, and society as a whole.

The Woodruff School of Mechanical Engineering has established concentration areas in sub-fields of Mechanical Engineering. Concentrations are optional for the students; they are not required. The Concentrations are each fifteen hours of classes, and will satisfy the

**Group A** list: MATH 3236, MATH 4022, MATH 4032, MATH 4108, MATH 4150, MATH 4221, MATH 4261, MATH 4318, MATH 4347, MATH 4431, MATH 4432, MATH 4441, MATH 4541, MATH 4640.

**Group B** list: MATH 4080/MATH 4090, MATH 4222, MATH 4255, MATH 4262, MATH 4280, MATH 4348, MATH 4542, MATH 4580, MATH 4581, MATH 4641, MATH 4699, MATH 4755, MATH 4777, MATH 4782, MATH 4801, MATH 4802, CS 3510/CS 3511, CS 4510, CS 4540, CS 4641, CX 4140 CX 4240, ISYE 3133, ISYE 4133.

1. If PHYS 2231 is taken, extra hour goes toward Free Electives
2. C-minimum required
3. MATH 4699 must be an approved topic related to concentration and can only be used once.
4. CEE 3770 and ISYE 3770 are not allowed to be used here.
5. Two courses must be from the same school.
6. MATH 1113, MATH 3670, CEE 3770, and ISYE 3770 are restricted from free electives.

**Bachelor of Science in Mechanical Engineering**

The undergraduate curriculum in mechanical engineering (ME) is very broad and flexible. The curriculum comprises a ME core of fundamental concepts, plus a design/professional-practice stem, plus 15 credit hours of free electives. The program prepares students to be problem solvers and to contribute to a wide range of industries and businesses, or to go on for further study in graduate school. There is a strong emphasis in the ME program on design, creativity, and hands-on learning. Due to the wide range of career choices open to MEs, the program incorporates courses in electronics, materials science, computer programming, and manufacturing. The large number of free elective hours allows students to pursue minors and certificates throughout the Institute, or to specialize in areas within ME. The flexibility also helps students to pursue a variety of special programs including co-op, internships, study abroad, and undergraduate research.

**Program Educational Objectives**

The faculty of the Woodruff School strives to continuously improve our undergraduate programs in mechanical engineering. The educational objectives reflect the needs, and have been reviewed by, among others, the Advisory Board of the Woodruff School, the faculty, and the students.

- Our graduates will be recognized leaders in ME-related fields or other career paths, including industry, academe, government, and non-governmental organizations.
- Our graduates will be global collaborators, leading and participating in culturally diverse teams, who fearlessly discover and apply new knowledge and engineering practices that have a world-wide impact.
- Our graduates will be adaptive learners who continue to grow professionally by obtaining professional registration or certification, or by earning post-graduate degrees.
- Our graduates will be entrepreneurial innovators who have a positive economic and social impact on their communities, the nation, and society as a whole.

International Plan

Mechanical Engineering majors may choose to participate in the Georgia Tech International Plan. Students who complete the requirements of the International Plan have the degree designation noted on their transcripts and on their diploma. The International Plan has specific requirements which must be completed including:

1. a minimum of 26 weeks abroad in educational, research, or work internships,
2. a language requirement,
3. courses specifically designated for global economics, international affairs, and global competency, and
4. a capstone project, typically one which is based on the student's ME capstone design experience.

Complete requirements may be found at http://oie.gatech.edu/content/international-plan.

Cooperative Plan

Since 1912, Georgia Tech has offered an Undergraduate Cooperative Program to those students who wish to combine career-related experience with classroom studies. Students alternate between industrial assignments and classroom studies until they complete three semesters of work. Co-op students with mechanical engineering majors complete the same coursework on campus that is completed by non-co-op students. Most co-op students begin the program as sophomores or juniors and are classified as full-time students regardless of whether they are attending classes on campus or are full-time at an employer's location. Co-op employment opportunities exist across the USA, and even in foreign countries. Depending on the chosen country, proficiency in a foreign language is usually necessary. Mechanical engineering students have worked in countries such as Germany, China, and Japan.

Students who participate in the co-op program have the opportunity to develop career interests, become more confident in their career choices, and develop human relation skills through their work experience. Graduates of the program receive a bachelor's degree with a Cooperative Plan Designation. For more information about the Cooperative Program, go to www.coop.gatech.edu (http://www.coop.gatech.edu).

For more information about all of the programs in the Center for Career Discovery and Development, visit www.careerdisccovery.gatech.edu (http://careerdisccovery.gatech.edu).
Research Option

The School of Mechanical Engineering offers the ‘Research Option’ (RO) under the BSME degree program. In order to graduate with a BSME (RO) degree, students must:

• Complete at least nine units of supervised research over at least two (preferably three) terms. The research must either be for pay (ME 4698) or credit (ME 4699). Up to six hours of research for credit may be used towards the BSME free elective requirements.
• Write an undergraduate thesis or other substantial, written report showing results of the research. This is usually done during the graduating term.
• Take both LMC 4701 (typically during the first or second semester of research) and LMC 4702 (during the thesis-writing semester).

At least six of the nine required credit hours of research should be on the same topic. A research proposal must be approved by a faculty advisor and one other faculty member. This proposal will be written in LMC 4701 which serves as a pre-requisite for LMC 4702. Completion of the Research Option is noted on students’ transcripts.

The BS/MS Program

The Woodruff School offers a BS/MS program for those students who demonstrate an interest in and ability for additional education beyond the BS degree. Woodruff School students with a GPA of 3.5 or higher are eligible to apply for the program after completion of 30 semester credit hours at Georgia Tech, but before the completion of seventy-five semester credit hours, including transfer and advanced placement credits. Students who have more than 75 credit hours will be considered for the program on a case-by-case basis.

Participants in the BS/MS Program in the Woodruff School can obtain a master’s degree in mechanical engineering, nuclear engineering, medical physics, or in Georgia Tech’s interdisciplinary bioengineering graduate program. There are two options to consider.

Non-Thesis Option

The Non-Thesis Option is completed by taking 10 classes according to the MS degree requirements. In many cases, two courses can be counted towards both a student’s BS and MS degrees, thereby streamlining the process. With proper planning, most MS non-thesis degrees could be completed in one year.

Thesis Option

The Thesis Option involves working with a faculty member on a project in a wide range of research topics being investigated by Woodruff School faculty members. This will give the student hands-on experience in working with a faculty mentor; the opportunity to work in a laboratory or a research environment; and the chance to perform theoretical and experimental work. These efforts will foster the student’s career interests and expand their job prospects with certain employers. In some cases, a student will receive a graduate research assistantship, which includes a stipend and a tuition waiver. The time to graduation depends on the thesis project, the advisor, and the student’s work ethic.

During the first year of graduate studies, students may be encouraged to continue for the PhD. In many cases, students may be working on an interesting topic of study as part of master’s degree research that could provide the basis for doctoral research.

Bachelor of Science in Mechanical Engineering - Automation and Robotic Systems

The undergraduate curriculum in mechanical engineering (ME) is very broad and flexible. The curriculum comprises a ME core of fundamental concepts, plus a design/professional-practice stem, plus 15 credit hours of free electives. The program prepares students to be problem solvers and to contribute to a wide range of industries and businesses, or to go on for further study in graduate school. There is a strong emphasis in the ME program on design, creativity, and hands-on learning. Due to the wide range of career choices open to MEs, the program incorporates courses in electronics, materials science, computer programming, and manufacturing. The large number of free elective hours allows students to pursue minors and certificates throughout the Institute, or to specialize in areas within ME. The flexibility also helps students to pursue a variety of special programs including co-op, internships, study abroad, and undergraduate research.

Program Educational Objectives

The faculty of the Woodruff School strives to continuously improve our undergraduate programs in mechanical engineering. The educational objectives reflect the needs, and have been reviewed by, among others, the Advisory Board of the Woodruff School, the faculty, and the students.

• Our graduates will be recognized leaders in ME-related fields or other career paths, including industry, academe, government, and non-governmental organizations.
• Our graduates will be global collaborators, leading and participating in culturally diverse teams, who fearlessly discover and apply new knowledge and engineering practices that have a world-wide impact.
• Our graduates will be adaptive learners who continue to grow professionally by obtaining professional registration or certification, or by earning post-graduate degrees.
• Our graduates will be entrepreneurially minded innovators who have a positive economic and social impact on their communities, the nation, and society as a whole.

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<td></td>
<td>APPH 1040 Sci Foundation of Health</td>
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<td>or APPH 10 Sci of Phys Act &amp; Health</td>
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<td>ENGL 1102</td>
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<td>MATH 1552</td>
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<td>CS 1371</td>
<td>Computing for Engineers</td>
<td>3</td>
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<tr>
<td>Any HUM (p. 93)</td>
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<td>6</td>
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<td>PHYS 2211</td>
<td>Intro Physics I ^2</td>
<td>4</td>
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<tr>
<td>PHYS 2212</td>
<td>Intro Physics II</td>
<td>4</td>
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<tr>
<td>MATH 1551</td>
<td>Differential Calculus ^2</td>
<td>2</td>
</tr>
</tbody>
</table>
Select one of the following:

ME 4452  
ME 3180  
Automation and Robotic Systems Concentration  
MATH 3670  
ISYE 3025  
ECE 3741  
ECE 3710  
Other Engineering Requirements  
ME 4182  
ME 4056  
ME 3210  
COE 3001  
ME 3345  
ME 3322  
ME 3057  
ME 2202  
COE 2001  
ME 2110  
COE 2001

**Core E - Social Sciences**

Select one of the following:

HIST 2111 United States to 1877  
HIST 2112 United States since 1877  
INTA 1200 American Government  
POL 1101 Government of the U.S.  
PUBP 3000 US Constitutional Issues  

Select one of the following:

ECON 2100 Economics and Policy  
ECON 2101 The Global Economy  
ECON 2105 Prin of Macroeconomics  
ECON 2106 Prin of Microeconomics

Any SS (p. 97)  

**Core F - Courses Related to Major**

CHEM 1310 General Chemistry  
ME 1770 Intro to Engr Graphics  
MATH 2551 Multivariable Calculus  
MATH 2552 Differential Equations  
MSE 2001 Prin&Appl-Engr Materials  

Ethics Requirement (p. 100)  

**Major Requirements**

COE 2001 Statics  
ME 2016 Computing Techniques  
ME 2110 Creative Decisions&Dsgn  
ME 2202 Dynamics of Rigid Bodies  
ME 3017 System Dynamics  
ME 3057 Experimental Methodology  
ME 3322 Thermodynamics  
ME 3340 Fluid Mechanics  
ME 3345 Heat Transfer  
COE 3001 Deformable Bodies  
ME 3210 Design and Manufacture  
ME 4056 ME Systems Laboratory  
ME 4182 Capstone Design

**Other Engineering Requirements**

ECE 3710 Circuits & Electronics  
ECE 3741 Instrum & Electronic Lab  
ISYE 3025 Engineering Economy  
MATH 3670 Statistics and Applns

**Automation and Robotic Systems Concentration**

ME 3180 Machine Design  
ME 4452 Control Dynamic Systems  

Select one of the following:  

CS 3600 Intro-Artificial Intell  
CS 4641 Machine Learning  
ME 4012 Motion Systems  
ME 4013 Hybrid Vehicle Powertrains  
ME 4189 Structural Vibrations  
ME 4405 Fund of Mechatronics

**Free Electives**

Free Electives  

Total Credit Hours 129  

No pass-fail courses allowed.  

Student must earn a 2.0 GPA within Major Requirements and the following:

<table>
<thead>
<tr>
<th>Code</th>
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<tr>
<td>MSE 2001</td>
<td>Prin&amp;Appl-Engr Materials</td>
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<tr>
<td>ECE 3710</td>
<td>Circuits &amp; Electronics</td>
<td>2</td>
</tr>
<tr>
<td>ECE 3741</td>
<td>Instrum &amp; Electronic Lab</td>
<td>1</td>
</tr>
<tr>
<td>ISYE 3025</td>
<td>Engineering Economy</td>
<td>1</td>
</tr>
</tbody>
</table>

If a course is repeated, only the latest grade is included in the calculation of the Major Requirements GPA.

1. Students must complete one Ethics course during their program.  
2. Minimum grade of C required.  
3. At least 3 credit hours in either the Concentration Electives or Free Electives must be a 3000-level or higher ME course. ME 3141, ME 3700, ME 3720, ME 3743, ME 3744, ME 4699, ME 4741, ME 4742, ME 4753, and ME 4903 are not allowed.  
4. Excludes CEE 2040, PHYS 2802, PHYS 2XXX (AP credit) and MGT 2250.  
5. Students can use a maximum of 6 credit hours of VIP courses (ECE 2811, ECE 38X1, ECE 48X1) or a maximum of 6 credit hours of undergraduate research and special problems courses (2699, 4699, 4903 from any department) not to exceed 9 credit hours from both course groups towards the degree requirements for the BSME degree.  
6. CHEM 1211K can substitute for CHEM 1310. CHEM 1211K and CHEM 1212K are recommended for pre-health students.

**International Plan**

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Thesis Option

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BS/MS Information (https://www.me.gatech.edu/undergraduate/bsms)

Bachelor of Science in Mechanical Engineering - Automotive

The undergraduate curriculum in mechanical engineering (ME) is very broad and flexible. The curriculum comprises a ME core of fundamental concepts, plus a design/professional-practice stem, plus 15 credit hours of free electives. The program prepares students to be problem solvers and to contribute to a wide range of industries and businesses, or to go on for further study in graduate school. There is a strong emphasis in the ME program on design, creativity, and hands-on learning. Due to the wide range of career choices open to MEs, the program incorporates courses in electronics, materials science, computer programming, and manufacturing. The large number of free elective hours allows students to pursue minors and certificates throughout the Institute, or to specialize in areas within ME. The flexibility also helps students to pursue a variety of special programs including co-op, internships, study abroad, and undergraduate research.

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<td>Sci of Phys Act &amp; Health</td>
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<td>or MATH 1561 Linear Algebra</td>
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<td>or MATH 1564 LinAlg w Abstract Vec Sp</td>
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<tr>
<td>ME 3180</td>
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<td>or ME 4315 Energy Systems Analy&amp;Dgn</td>
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<td>ME 4823</td>
<td>Introduction to Automotive Engineering</td>
<td>3</td>
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<td>Select three of the following:</td>
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<td></td>
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<td><strong>Free Electives</strong></td>
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No pass-fail courses allowed.

Student must earn a 2.0 GPA within Major Requirements and the following:

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<td>ISYE 3025</td>
<td>Engineering Economy</td>
<td>1</td>
</tr>
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</table>

If a course is repeated, only the latest grade is included in the calculation of the Major Requirements GPA.

1. Students must complete one Ethics course during their program.
2. Minimum grade of C required.
3. At least 3 credit hours in either the Concentration Electives or Free Electives must be a 3000-level or higher ME course. ME 3141, ME 3700, ME 3720, ME 3743, ME 3744, ME 4699, ME 4741, ME 4742, ME 4753, and ME 4903 are not allowed.
4. Excludes CEE 2040, PHYS 2802, PHYS 2XXX (AP credit) and MGT 2250.
Students can use a maximum of 6 credit hours of VIP courses (ECE 2811, ECE 381X, ECE 481X) or a maximum of 6 credit hours of undergraduate research and special problems courses (2699, 4699, 4903 from any department) not to exceed 9 credit hours from both course groups towards the degree requirements for the BSME degree.

CHEM 1211K can substitute for CHEM 1310. CHEM 1211K and CHEM 1212K are recommended for pre-health students.

**International Plan**
Mechanical Engineering majors may choose to participate in the Georgia Tech International Plan. Students who complete the requirements of the International Plan have the degree designation noted on their transcripts and on their diploma. The International Plan has specific requirements which must be completed including:

1. a minimum of 26 weeks abroad in educational, research, or work internships,
2. a language requirement,
3. courses specifically designated for global economics, international affairs, and global competency, and
4. a capstone project, typically one which is based on the student’s ME capstone design experience.

Complete requirements may be found at http://oie.gatech.edu/content/international-plan.

**Cooperative Plan**
Since 1912, Georgia Tech has offered an Undergraduate Cooperative Program to those students who wish to combine career-related experience with classroom studies. Students alternate between industrial assignments and classroom studies until they complete three semesters of work. Co-op students with mechanical engineering majors complete the same coursework on campus that is completed by non-co-op students. Most co-op students begin the program as sophomores or juniors and are classified as full-time students regardless of whether they are attending classes on campus or are full-time at an employer’s location. Co-op employment opportunities exist across the USA, and even in foreign countries. Depending on the chosen country, proficiency in a foreign language is usually necessary. Mechanical engineering students have worked in countries such as Germany, China, and Japan.

Students who participate in the co-op program have the opportunity to develop career interests, become more confident in their career choices, and develop human relation skills through their work experience. Graduates of the program receive a bachelor’s degree with a Cooperative Plan Designation. For more information about the Cooperative Program, go to www.coop.gatech.edu (http://www.coop.gatech.edu).

For more information about all of the programs in the Center for Career Discovery and Development, visit www.careerdiscovery.gatech.edu (http://careerdiscussion.gatech.edu).

**The BS/MS Program**
The Woodruff School offers a BS/MS program for those students who demonstrate an interest in and ability for additional education beyond the BS degree. Woodruff School students with a GPA of 3.5 or higher are eligible to apply for the program after completion of 30 semester credit hours at Georgia Tech, but before the completion of seventy-five semester credit hours, including transfer and advanced placement credits. Students who have more than 75 credit hours will be considered for the program on a case-by-case basis.

Participants in the BS/MS Program in the Woodruff School can obtain a master’s degree in mechanical engineering, nuclear engineering, medical physics, or in Georgia Tech’s interdisciplinary bioengineering graduate program. There are two options to consider:

**Non-Thesis Option**
The Non-Thesis Option is completed by taking 10 classes according to the MS degree requirements. In many cases, two courses can be counted towards both a student’s BS and MS degrees, thereby streamlining the process. With proper planning, most MS non-thesis degrees could be completed in one year.

**Thesis Option**
The Thesis Option involves working with a faculty member on a project in a wide range of research topics being investigated by Woodruff School faculty members. This will give you hands-on experience in working with a faculty mentor; the opportunity to work in a laboratory or a research environment; and the chance to perform theoretical and experimental work. These events will foster your career interests and expand your selection of possible employers. In some cases, a student will receive a graduate research assistantship, which includes a stipend and a tuition waiver. The time to graduation depends on your thesis project, your advisor, and your work ethic.

During the first year of your graduate studies, you will be encouraged to continue for the PhD In many cases, you might be working on an interesting topic of study as part of your master’s degree research that could provide the basis for doctoral research.

**BS/MS Information** (https://www.me.gatech.edu/undergraduate/bsms)

**Bachelor of Science in Mechanical Engineering - Design**
The undergraduate curriculum in mechanical engineering (ME) is very broad and flexible. The curriculum comprises a ME core of fundamental concepts, plus a design/professional-practice stem, plus 15 credit hours of free electives. The program prepares students to be problem solvers and to contribute to a wide range of industries and businesses, or to go on for further study in graduate school. There is a strong emphasis in the ME program on design, creativity, and hands-on learning. Due to the wide range of career choices open to MEs, the program incorporates courses in electronics, materials science, computer programming, and manufacturing. The large number of free elective hours allows students to pursue minors and certificates throughout the Institute, or to specialize in areas within ME. The flexibility also helps students to pursue a variety of special programs including co-op, internships, study abroad, and undergraduate research.

**Program Educational Objectives**
The faculty of the Woodruff School strives to continuously improve our undergraduate programs in mechanical engineering. The educational objectives reflect the needs, and have been reviewed by, among others, the Advisory Board of the Woodruff School, the faculty, and the students.

- Our graduates will be recognized leaders in ME-related fields or other career paths, including industry, academe, government, and non-governmental organizations.
• Our graduates will be global collaborators, leading and participating in culturally diverse teams, who fearlessly discover and apply new knowledge and engineering practices that have a world-wide impact.
• Our graduates will be adaptive learners who continue to grow professionally by obtaining professional registration or certification, or by earning post-graduate degrees.
• Our graduates will be entrepreneurially minded innovators who have a positive economic and social impact on their communities, the nation, and society as a whole.

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<td>ME 4823</td>
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Bachelor of Science in Mechanical Engineering - General

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<tr>
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<tr>
<td>ECON 2105 Prin of Macroeconomics</td>
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<tr>
<td>ECON 2106 Prin of Microeconomics</td>
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</table>

Any SS (p. 97) 6

Core F - Courses Related to Major

<table>
<thead>
<tr>
<th>Course</th>
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<tbody>
<tr>
<td>CHEM 1310 General Chemistry</td>
<td>4</td>
</tr>
<tr>
<td>ME 1770 Intro to Engr Graphics</td>
<td>3</td>
</tr>
<tr>
<td>MATH 2551 Multivariable Calculus</td>
<td>4</td>
</tr>
<tr>
<td>MATH 2552 Differential Equations</td>
<td>4</td>
</tr>
<tr>
<td>MSE 2001 Prin&amp;Appl-Engr Materials</td>
<td>3</td>
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</tbody>
</table>

Ethics Requirement (p. 100) 1

Major Requirements

<table>
<thead>
<tr>
<th>Course</th>
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<tbody>
<tr>
<td>ME 3180 Machine Design</td>
<td>3</td>
</tr>
<tr>
<td>or ME 4315 Energy Systems Analy&amp;Dgn</td>
<td></td>
</tr>
<tr>
<td>COE 2001 Statics 2</td>
<td>2</td>
</tr>
<tr>
<td>ME 2016 Computing Techniques</td>
<td>3</td>
</tr>
<tr>
<td>ME 2110 Creative Decisions &amp; Dsgn</td>
<td>3</td>
</tr>
<tr>
<td>ME 2202 Dynamics of Rigid Bodies</td>
<td>3</td>
</tr>
<tr>
<td>ME 3017 System Dynamics</td>
<td>3</td>
</tr>
<tr>
<td>ME 3057 Experimental Methodology</td>
<td>3</td>
</tr>
<tr>
<td>ME 3322 Thermodynamics</td>
<td>3</td>
</tr>
<tr>
<td>ME 3340 Fluid Mechanics</td>
<td>3</td>
</tr>
<tr>
<td>ME 3345 Heat Transfer</td>
<td>3</td>
</tr>
<tr>
<td>COE 3001 Deformable Bodies</td>
<td>3</td>
</tr>
<tr>
<td>ME 3210 Design and Manufacture</td>
<td>3</td>
</tr>
<tr>
<td>ME 4056 ME Systems Laboratory</td>
<td>3</td>
</tr>
<tr>
<td>ME 4182 Capstone Design</td>
<td>3</td>
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ME Electives

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ME 3000-level Electives 3</td>
<td>3</td>
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</tbody>
</table>

Other Engineering Requirements

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<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECE 3710 Circuits &amp; Electronics</td>
<td>2</td>
</tr>
<tr>
<td>ECE 3741 Instrum &amp; Electronic Lab</td>
<td>1</td>
</tr>
<tr>
<td>ISYE 3025 Engineering Economy</td>
<td>1</td>
</tr>
<tr>
<td>MATH 3670 Statistics and Applns</td>
<td>3</td>
</tr>
</tbody>
</table>

Free Electives

<table>
<thead>
<tr>
<th>Course</th>
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<tr>
<td>2000-Level Electives 4,5</td>
<td>9</td>
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<tr>
<td>Free Electives 4,6</td>
<td>6</td>
</tr>
</tbody>
</table>

Total Credit Hours 129

No pass-fail courses allowed.

Students must complete one Ethics course during their program.

Minimum grade of C required.

ME Electives must be 3000-level electives. ME 3141, ME 3700, ME 3720, ME 3743, ME 3744, ME 4699, ME 4741, ME 4742, ME 4753, and ME 4903 are not allowed. ME Elective must not duplicate any other material used for BSME degree.

Cannot include CEE 2040, PHYS 2802, PHYS 2XXX(AP Credit), MGT 2250.

5 Must be at 2000-Level or above; four of these 9 credit hours may be satisfied with one of the following: BIOL 1510, BIOL 1520, or CHEM 1212K.

6 Students can use a maximum of 6 credit hours of VIP courses (ECE 2811, 381X, 481X) or a maximum of 6 credit hours of undergraduate research and special problems courses (2699, 4699, 4903 from any department) not to exceed 9 credit hours from both course groups towards the degree requirements for the BSME degree.

7 CHEM 1211K can substitute for CHEM 1310. CHEM 1211K and CHEM 1212K are recommended for pre-health students.

International Plan

Mechanical Engineering majors may choose to participate in the Georgia Tech International Plan. Students who complete the requirements of the International Plan have the degree designation noted on their transcripts and on their diploma. The International Plan has specific requirements which must be completed including:

1. a minimum of 26 weeks abroad in educational, research, or work internships,
2. a language requirement,
3. courses specifically designated for global economics, international affairs, and global competency, and
4. a capstone project, typically one which is based on the student’s ME capstone design experience.

Complete requirements may be found at http://oie.gatech.edu/content/international-plan.

Cooperative Plan

Since 1912, Georgia Tech has offered an Undergraduate Cooperative Program to those students who wish to combine career-related experience with classroom studies. Students alternate between industrial assignments and classroom studies until they complete three semesters of work. Co-op students with mechanical engineering majors complete the same coursework on campus that is completed by non-co-op students. Most co-op students begin the program as sophomores or juniors and are classified as full-time students regardless of whether they are attending classes on campus or are full-time at an employer’s location. Co-op employment opportunities exist across the USA, and even in foreign countries. Depending on the chosen country, proficiency in a foreign language is usually necessary. Mechanical engineering students have worked in countries such as Germany, China, and Japan.

Students who participate in the co-op program have the opportunity to develop career interests, become more confident in their career choices, and develop human relation skills through their work experience. Graduates of the program receive a bachelor’s degree with a Cooperative Plan Designation. For more information about the Cooperative Program, go to www.coop.gatech.edu (http://www.coop.gatech.edu).

For more information about all of the programs in the Center for Career Discovery and Development, visit www.careerdiscovery.gatech.edu (http://careerdiscovery.gatech.edu).
Research Option

The School of Mechanical Engineering offers the ‘Research Option’ (RO) under the BSME degree program. In order to graduate with a BSME (RO) degree, students must:

• Complete at least nine units of supervised research over at least two (preferably three) terms. The research must either be for pay (ME 4698) or credit (ME 4699). Up to six hours of research for credit may be used towards the BSME free elective requirements.
• Write an undergraduate thesis or other substantial, written report showing results of the research. This is usually done during the graduating term.
• Take both LMC 4701 (typically during the first or second semester of research) and LMC 4702 (during the thesis-writing semester).

At least six of the nine required credit hours of research should be on the same topic. A research proposal must be approved by a faculty advisor and one other faculty member. This proposal will be written in LMC 4701 which serves as a pre-requisite for LMC 4702. Completion of the Research Option is noted on students’ transcripts.

The BS/MS Program

The Woodruff School offers a BS/MS program for those students who demonstrate an interest in and ability for additional education beyond the BS degree. Woodruff School students with a GPA of 3.5 or higher are eligible to apply for the program after completion of 30 semester credit hours at Georgia Tech, but before the completion of seventy-five semester credit hours, including transfer and advanced placement credits. Students who have more than 75 credit hours will be considered for the program on a case-by-case basis.

Participating in the BS/MS Program in the Woodruff School can obtain a master’s degree in mechanical engineering, nuclear engineering, medical physics, or in Georgia Tech’s interdisciplinary bioengineering graduate program. There are two options to consider:

Non-Thesis Option

The Non-Thesis Option is completed by taking 10 classes according to the MS degree requirements. In many cases, two courses can be counted towards both a student’s BS and MS degrees, thereby streamlining the process. With proper planning, most MS non-thesis degrees could be completed in one year.

Thesis Option

The Thesis Option involves working with a faculty member on a project in a wide range of research topics being investigated by Woodruff School faculty members. This will give the student hands-on experience in working with a faculty mentor; the opportunity to work in a laboratory or a research environment; and the chance to perform theoretical and experimental work. These efforts will foster the student’s career interests and expand their job prospects with certain employers. In some cases, a student will receive a graduate research assistantship, which includes a stipend and a tuition waiver. The time to graduation depends on the thesis project, the advisor, and the student’s work ethic.

During the first year of graduate studies, students may be encouraged to continue for the PhD. In many cases, students may be working on an interesting topic of study as part of master’s degree research that could provide the basis for doctoral research.

Program Educational Objectives

The faculty of the Woodruff School strives to continuously improve our undergraduate programs in mechanical engineering. The educational objectives reflect the needs, and have been reviewed by, among others, the Advisory Board of the Woodruff School, the faculty, and the students.

• Our graduates will be recognized leaders in ME-related fields or other career paths, including industry, academe, government, and non-governmental organizations.
• Our graduates will be global collaborators, leading and participating in culturally diverse teams, who fearlessly discover and apply new knowledge and engineering practices that have a world-wide impact.
• Our graduates will be adaptive learners who continue to grow professionally by obtaining professional registration or certification, or by earning post-graduate degrees.
• Our graduates will be entrepreneurial innovators who have a positive economic and social impact on their communities, the nation, and society as a whole.

BS/MS Information (https://www.me.gatech.edu/undergraduate/bsms)

Bachelor of Science in Mechanical Engineering - Manufacturing

The undergraduate curriculum in mechanical engineering (ME) is very broad and flexible. The curriculum comprises a ME core of fundamental concepts, plus a design/professional-practice stem, plus 15 credit hours of free electives. The program prepares students to be problem solvers and to contribute to a wide range of industries and businesses, or to go on for further study in graduate school. There is a strong emphasis in the ME program on design, creativity, and hands-on learning. Due to the wide range of career choices open to MEs, the program incorporates courses in electronics, materials science, computer programming, and manufacturing. The large number of free elective hours allows students to pursue minors and certificates throughout the Institute, or to specialize in areas within ME. The flexibility also helps students to pursue a variety of special programs including co-op, internships, study abroad, and undergraduate research.

<table>
<thead>
<tr>
<th>Code</th>
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<th>Credit Hours</th>
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<tbody>
<tr>
<td>APPH 1040</td>
<td>Sci Foundation of Health</td>
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<tr>
<td>or APPH 10</td>
<td>Sci of Phys Act &amp; Health</td>
<td></td>
</tr>
<tr>
<td>ENGL 1101</td>
<td>English Composition I</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 1102</td>
<td>English Composition II</td>
<td>3</td>
</tr>
<tr>
<td>MATH 1552</td>
<td>Integral Calculus</td>
<td>4</td>
</tr>
<tr>
<td>CS 1371</td>
<td>Computing for Engineers</td>
<td>3</td>
</tr>
<tr>
<td>Any HUM (p. 93)</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>PHYS 2211</td>
<td>Intro Physics I</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 2212</td>
<td>Intro Physics II</td>
<td>4</td>
</tr>
<tr>
<td>MATH 1551</td>
<td>Differential Calculus</td>
<td>2</td>
</tr>
<tr>
<td>MATH 1553</td>
<td>Intro to Linear Algebra</td>
<td>2</td>
</tr>
</tbody>
</table>
Free Electives

Core E - Social Sciences
Select one of the following:

- HIST 2111 United States to 1877
- HIST 2112 United States since 1877
- INTA 1200 American Government
- POL 1101 Government of the U.S.
- PUBP 3000 US Constitutional Issues

Select one of the following:

- ECON 2101 The Global Economy
- ECON 2105 Prin of Macroeconomics
- ECON 2106 Prin of Microeconomics

Any SS (p. 97)

Core F - Courses Related to Major

CHEM 1310 General Chemistry 6
ME 1770 Intro to Engr Graphics
MATH 2551 Multivariable Calculus 2
MATH 2552 Differential Equations 2
MSE 2001 Prin&Appl-Engr Materials

Ethics Requirement (p. 100) 1

Major Requirements

COE 2001 Statics 2
ME 2016 Computing Techniques
ME 2110 Creative Decisions & Dsgn
ME 2202 Dynamics of Rigid Bodies
ME 3017 System Dynamics
ME 3057 Experimental Methodology
ME 3322 Thermodynamics
ME 3340 Fluid Mechanics
ME 3345 Heat Transfer
COE 3001 Deformable Bodies
ME 3210 Design and Manufacture
ME 4056 ME Systems Laboratory
ME 4182 Capstone Design

Other Engineering Requirements

ECE 3710 Circuits & Electronics
ECE 3741 Instrum & Electronics Lab
ISYE 3025 Engineering Economy
MATH 3670 Statistics and Applns

Manufacturing Concentration

ME 3180 Machine Design
ME 4215 Mfg Process Analysis

Select one of the following:

- ME 4214 Mech Behavior-Materials
- ME 4405 Fund of Mechatronics
- ME 4452 Control Dynamic Systems
- ME 4699 Undergraduate Research
- ME 4766 Nanoscale Devices
- ME 4793 Composite Mater& Process

Free Electives

No pass-fail courses allowed.

Student must earn a 2.0 GPA within Major Requirements and the following:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSE 2001</td>
<td>Prin&amp;Appl-Engr Materials</td>
<td>3</td>
</tr>
<tr>
<td>ECE 3710</td>
<td>Circuits &amp; Electronics</td>
<td>2</td>
</tr>
<tr>
<td>ECE 3741</td>
<td>Instrum &amp; Electronics Lab</td>
<td>1</td>
</tr>
<tr>
<td>ISYE 3025</td>
<td>Engineering Economy</td>
<td>1</td>
</tr>
</tbody>
</table>

If a course is repeated, only the latest grade is included in the calculation of the Major Requirements GPA.

1. Students must complete one Ethics course during their program.
2. Minimum grade of C required.
3. At least 3 credit hours in either the Concentration Electives or Free Electives must be a 3000-level or higher ME course. ME 3141, ME 3700, ME 3720, ME 3743, ME 3744, ME 4699, ME 4741, ME 4742, ME 4753, and ME 4903 are not allowed.
4. Excludes CEE 2040, PHYS 2802, PHYS 2XXX (AP Credit) and MGT 2250.
5. Students can use a maximum of 6 credit hours of VIP courses (ECE 2811, ECE 38X1, ECE 48X1) or a maximum of 6 credit hours of undergraduate research and special problems courses (2699, 4699, 4903 from any department) not to exceed 9 credit hours from both course groups towards the degree requirements for the BSME degree.
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At least six of the nine required credit hours of research should be on the same topic. A research proposal must be approved by the faculty advisor and one other faculty member. This proposal will be written in LMC 4701 which serves as a pre-requisite for LMC 4702. Completion of the Research Option is noted on students' transcripts.

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Bachelor of Science in Mechanical Engineering - Mechanics of Materials

The undergraduate curriculum in mechanical engineering (ME) is very broad and flexible. The curriculum comprises a ME core of fundamental concepts, plus a design/professional-practice stem, plus 15 credit hours of free electives. The program prepares students to be problem solvers and to contribute to a wide range of industries and businesses, or to go on for further study in graduate school. There is a strong emphasis in the ME program on design, creativity, and hands-on learning. Due to the wide range of career choices open to MEs, the program incorporates courses in electronics, materials science, computer programming, and manufacturing. The large number of free elective hours allows students to pursue minors and certificates throughout the Institute, or to specialize in areas within ME. The flexibility also helps students to pursue a variety of special programs including co-op, internships, study abroad, and undergraduate research.

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- Our graduates will be global collaborators, leading and participating in culturally diverse teams, who fearlessly discover and apply new knowledge and engineering practices that have a world-wide impact.
- Our graduates will be adaptive learners who continue to grow professionally by obtaining professional registration or certification, or by earning post-graduate degrees.
- Our graduates will be entrepreneurially minded innovators who have a positive economic and social impact on their communities, the nation, and society as a whole.
Major Requirements

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>ME 4056</td>
<td>ME Systems Laboratory</td>
<td>3</td>
</tr>
<tr>
<td>ME 4182</td>
<td>Capstone Design</td>
<td>3</td>
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</table>

Other Engineering Requirements

<table>
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<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECE 3710</td>
<td>Circuits &amp; Electronics</td>
<td>2</td>
</tr>
<tr>
<td>ECE 3741</td>
<td>Instrum &amp; Electronic Lab</td>
<td>1</td>
</tr>
<tr>
<td>ISYE 3025</td>
<td>Engineering Economy</td>
<td>1</td>
</tr>
<tr>
<td>MATH 3670</td>
<td>Statistics and Applns</td>
<td>3</td>
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Mechanics of Materials Concentration

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ME 3180</td>
<td>Machine Design</td>
<td>3</td>
</tr>
<tr>
<td>ME 4214</td>
<td>Mech Behavior-Materials</td>
<td>3</td>
</tr>
</tbody>
</table>

Select one of the following:

<table>
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<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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</thead>
<tbody>
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</tr>
<tr>
<td>CEE 3055</td>
<td>Structural Analysis</td>
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<tr>
<td>CEE 4550</td>
<td>Structural Analysis II</td>
<td></td>
</tr>
<tr>
<td>ME 4041</td>
<td>Computer Graphics &amp; Cad</td>
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<tr>
<td>MSE 4010</td>
<td>Environ Degradation</td>
<td></td>
</tr>
<tr>
<td>MSE 4325</td>
<td>Thin Film Materials Sci</td>
<td></td>
</tr>
</tbody>
</table>

Free Electives

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Free Electives</td>
<td></td>
<td>6</td>
</tr>
</tbody>
</table>

Total Credit Hours 129

No pass-fail courses allowed.

Student must earn a 2.0 GPA within Major Requirements and the following:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSE 2001</td>
<td>Prin&amp;Appl-Engr Materials</td>
<td>3</td>
</tr>
<tr>
<td>ECE 3710</td>
<td>Circuits &amp; Electronics</td>
<td>2</td>
</tr>
<tr>
<td>ECE 3741</td>
<td>Instrum &amp; Electronic Lab</td>
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<tr>
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<td>Engineering Economy</td>
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</table>

If a course is repeated, only the latest grade is included in the calculation of the Major Requirements GPA.

1. Students must complete one Ethics course during their program.
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5. Students can use a maximum of 6 credit hours of VIP courses (ECE 2811, ECE 38X1, ECE 48X1) or a maximum of 6 credit hours of undergraduate research and special problems courses (2699, 4699, 4903 from any department) not to exceed 9 credit hours from both course groups towards the degree requirements for the BSME degree.
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Complete requirements may be found at http://oie.gatech.edu/content/international-plan.

Cooperative Plan

Since 1912, Georgia Tech has offered an Undergraduate Cooperative Program to those students who wish to combine career-related experience with classroom studies. Students alternate between industrial assignments and classroom studies until they complete three semesters of work. Co-op students with mechanical engineering majors complete the same coursework on campus that is completed by non-co-op students. Most co-op students begin the program as sophomores or juniors and are classified as full-time students regardless of whether they are attending classes on campus or are full-time at an employer’s location. Co-op employment opportunities exist across the USA, and even in foreign countries. Depending on the chosen country, proficiency in a foreign language is usually necessary. Mechanical engineering students have worked in countries such as Germany, China, and Japan.

Students who participate in the co-op program have the opportunity to develop career interests, become more confident in their career choices, and develop human relation skills through their work experience. Graduates of the program receive a bachelor’s degree with a Cooperative Plan Designation. For more information about the Cooperative Program, go to www.coop.gatech.edu (http://www.coop.gatech.edu).

For more information about all of the programs in the Center for Career Discovery and Development, visit www.careerdiscovery.gatech.edu (http://careerdiscovery.gatech.edu).

Research Option

The School of Mechanical Engineering offers the ‘Research Option’ (RO) under the BSME degree program. In order to graduate with a BSME (RO) degree, students must:

- Complete at least nine units of supervised research over at least two (preferably three) terms. The research must either be for pay (ME 4698) or credit (ME 4699). Up to six hours of research for credit may be used towards the BSME free elective requirements.
- Write an undergraduate thesis or other substantial, written report showing results of the research. This is usually done during the graduating term.
- Take both LMC 4701 (typically during the first or second semester of research) and LMC 4702 (during the thesis-writing semester).

At least six of the nine required credit hours of research should be on the same topic. A research proposal must be approved by a faculty advisor and one other faculty member. This proposal will be written in LMC 4701 which serves as a prerequisite for LMC 4702. Completion of the Research Option is noted on students’ transcripts.

The BS/MS Program

The Woodruff School offers a BS/MS program for those students who demonstrate an interest in and ability for additional education beyond the BS degree. Woodruff School students with a GPA of 3.5 or higher are eligible to apply for the program after completion of 30 semester credit hours at Georgia Tech, but before the completion of seventy-five semester credit hours, including transfer and advanced placement credits. Students who have more than 75 credit hours will be considered for the program on a case-by-case basis.

Participants in the BS/MS Program in the Woodruff School can obtain a master’s degree in mechanical engineering, nuclear engineering, medical physics, or in Georgia Tech’s interdisciplinary bioengineering graduate program. There are two options to consider:

Non-Thesis Option

The Non-Thesis Option is completed by taking 10 classes according to the MS degree requirements. In many cases, two courses can be counted towards both a student’s BS and MS degrees, thereby streamlining the process. With proper planning, most MS non-thesis degrees could be completed in one year.

Thesis Option

The Thesis Option involves working with a faculty member on a project in a wide range of research topics being investigated by Woodruff School faculty members. This will give the student hands-on experience in working with a faculty mentor; the opportunity to work in a laboratory or a research environment; and the chance to perform theoretical and experimental work. These efforts will foster the student’s career interests and expand their job prospects with certain employers. In some cases, a student will receive a graduate research assistantship, which includes a stipend and a tuition waiver. The time to graduation depends on the thesis project, the advisor, and the student’s work ethic.

During the first year of graduate studies, students may be encouraged to continue for the PhD. In many cases, students may be working on an interesting topic of study as part of master’s degree research that could provide the basis for doctoral research.

BS/MS Information (https://www.me.gatech.edu/undergraduate/bsms)
Program Educational Objectives

The faculty of the Woodruff School strives to continuously improve our undergraduate programs in mechanical engineering. The educational objectives reflect the needs, and have been reviewed by, among others, the Advisory Board of the Woodruff School, the faculty, and the students.

- Our graduates will be recognized leaders in ME-related fields or other career paths, including industry, academe, government, and non-governmental organizations.
- Our graduates will be global collaborators, leading and participating in culturally diverse teams, who fearlessly discover and apply new knowledge and engineering practices that have a world-wide impact.
- Our graduates will be adaptive learners who continue to grow professionally by obtaining professional registration or certification, or by earning post-graduate degrees.
- Our graduates will be entrepreneurially minded innovators who have a positive economic and social impact on their communities, the nation, and society as a whole.

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<td>or APPH 1050</td>
<td>Sci of Phys Act &amp; Health</td>
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Ethics Requirement (p. 100)  

Major Requirements

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<td>ME 2016</td>
<td>Computing Techniques</td>
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<td>ME 2110</td>
<td>Creative Decisions&amp;Dsgn</td>
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<td>ME 2202</td>
<td>Dynamics of Rigid Bodies</td>
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<td>Design and Manufacture</td>
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Other Engineering Requirements

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<td>ECE 3741</td>
<td>Instrum &amp; Electronic Lab</td>
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<td>Engineering Economy</td>
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<tr>
<td>MATH 3670</td>
<td>Statistics and Applns</td>
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Micro- and Nanoengineering Concentration

ME 4315 | Energy Systems Analy&Dgn                            | 3            |

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<td>ME 4766</td>
<td>Nanoscale Devices</td>
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Free Electives

Free Electives  

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Total Credit Hours 129

No pass-fail courses allowed.

Student must earn a 2.0 GPA within Major Requirements and the following:

<table>
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<tr>
<th>Code</th>
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<tr>
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<td>ECE 3741</td>
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</tr>
<tr>
<td>ISYE 3025</td>
<td>Engineering Economy</td>
<td>1</td>
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</table>
If a course is repeated, only the latest grade is included in the calculation of the Major Requirements GPA.

1. Students must complete one Ethics course during their program.
2. Minimum grade of C is required.
3. At least 3 credit hours in either the Concentration Electives or Free Electives must be a 3000-level or higher ME course. ME 3141, ME 3700, ME 3720, ME 3743, ME 3744, ME 4699, ME 4741, ME 4742, ME 4753, and ME 4903 are not allowed.
4. Excludes CEE 2040, PHYS 2802, PHYS 2XXX (AP Credit) and MGT 2250
5. Students can use a maximum of 6 credit hours of VIP courses (EC 2811, ECE 38X1, ECE 48X1) or a maximum of 6 credit hours of undergraduate research and special problems courses (2699, 4699, 4903 from any department) not to exceed 9 credit hours from both course groups towards the degree requirements for the BSME degree.
6. CHEM 1211K can substitute for CHEM 1310. CHEM 1211K and CHEM 1212K are recommended for pre-health students.

Cooperative Plan

Since 1912, Georgia Tech has offered a five-year Undergraduate Cooperative Program to those students who wish to combine career-related work experience with classroom studies. The program is the fourth oldest of its kind in the world.

Students typically alternate between industrial assignments and classroom studies until they complete at least three terms of work (two of which must be fall or spring). Co-op students complete the same coursework on campus that is completed by non-co-op students. Most co-op students begin the program as freshman or sophomores and can be classified as full-time students regardless whether they are attending classes on campus or are full-time at an employer's location.

Participants have the opportunity to develop career interests, gain hands-on work experience, develop human relation skills and earn a paycheck. Graduates of the program receive a bachelor's degree with the Cooperative Plan Designation.

Students can also complete work assignments in a foreign country as part of the International Cooperative Program. This program is a great opportunity to utilize foreign language skills, gain a global perspective, and experience a diverse culture. Proficiency in a foreign language is necessary to earn the International Cooperative Plan degree designation. For more information on the Cooperative Program, visit: www.coop.gatech.edu.

Internships

The Undergraduate Professional Internship Program is for students who do not participate in the Cooperative Program, but want some career-related work experience before graduation. Students generally work for one semester, usually in the summer, with an option for more work. Students must have completed at least thirty hours of coursework at Georgia Tech before they can participate in the program. For more details, visit: www.upi.gatech.edu (http://www.upi.gatech.edu).

In addition, there is a Work Abroad Program (www.workabroad.gatech.edu), which complements a student's formal education with paid international work experience directly related to Materials Science and Engineering. Participating students typically include juniors and seniors. The international work assignments are designed to include practical training, cross-cultural exposure and learning, and the acquisition of professional skills.

For more information about all of the programs in the Center for Career Discovery and Development, visit www.careerdiscovery.gatech.edu (http://careerdiscovery.gatech.edu).

Research Option

The Materials Science and Engineering undergraduate program offers a Research Option that allows students to participate in undergraduate research in faculty laboratories. The words "Research Option in Materials Science and Engineering" will appear on the transcript of each student completing the requirements to indicate that the student has had a substantial, in-depth, research experience.

The requirements for the "Research Option" in Materials Science and Engineering are:

1. Selection of a faculty advisor and research topic in conjunction with the faculty advisor. The topic and expected scope of the project must be approved in advance by the MSE Undergraduate Curriculum Committee. A key criterion will be whether the research may lead to a publishable paper.
2. Completion of nine units (see item 3 below) of supervised research, over a period of at least two, but preferably three, terms. Research may be either for pay or credit. At least six credit hours must involve work on a single research project.
3. Registration in nine hours of undergraduate research courses MSE 2698 and MSE 4698 (for pay), or MSE 2699 and MSE 4699 (for credit). MSE 2699 or MSE 4699 can be used to satisfy the free elective requirements of the BS degree in MSE.
4. Completion of LMC 4701 Undergraduate Research Proposal Writing (one hr. credit typically taken during the first or second semester of research). The student should write a Research Proposal while taking this class.
5. Obtain approval of the Research Proposal from the MSE Undergraduate Curriculum Committee. This is required before taking LMC 4702.
6. Completion of LMC 4702 (one hr. credit). This course is taken during the term in which the thesis is written.
7. Have research thesis approved by the faculty advisor and one other MSE faculty member approved by the MSE Undergraduate Curriculum Committee. The thesis will be evaluated on the basis of publishability, originality, creativity, and clarity. The MSE Undergraduate Curriculum Committee must approve each "Research Option" awarded under the BS MSE program.

BS/MS Option

The School of Materials Science and Engineering (MSE) offers a BS/MS program for outstanding students who want to obtain a graduate degree in addition to their BS degree. The advanced degree provides the additional knowledge and specialization needed to further facilitate a technical career. As a participant in this program, students have an opportunity to work with individual faculty members on projects in one of the traditional or innovative research areas in MSE. See www.mse.gatech.edu (http://www.mse.gatech.edu) for more details.
Bachelor of Science in Mechanical Engineering - Nuclear Engineering

The undergraduate curriculum in mechanical engineering (ME) is very broad and flexible. The curriculum comprises a ME core of fundamental concepts, plus a design/professional-practice stem, plus 15 credit hours of free electives. The program prepares students to be problem solvers and to contribute to a wide range of industries and businesses, or to go on for further study in graduate school. There is a strong emphasis in the ME program on design, creativity, and hands-on learning. Due to the wide range of career choices open to MEs, the program incorporates courses in electronics, materials science, computer programming, and manufacturing. The large number of free elective hours allows students to pursue minors and certificates throughout the Institute, or to specialize in areas within ME. The flexibility also helps students to pursue a variety of special programs including co-op, internships, study abroad, and undergraduate research.

Program Educational Objectives

The faculty of the Woodruff School strives to continuously improve our undergraduate programs in mechanical engineering. The educational objectives reflect the needs, and have been reviewed by, among others, the Advisory Board of the Woodruff School, the faculty, and the students.

- Our graduates will be recognized leaders in ME-related fields or other career paths, including industry, academe, government, and non-governmental organizations.
- Our graduates will be global collaborators, leading and participating in culturally diverse teams, who fearlessly discover and apply new knowledge and engineering practices that have a world-wide impact.
- Our graduates will be adaptive learners who continue to grow professionally by obtaining professional registration or certification, or by earning post-graduate degrees.
- Our graduates will be entrepreneurially minded innovators who have a positive economic and social impact on their communities, the nation, and society as a whole.

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<td>or MATH 1553 Intro to Linear Algebra</td>
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<td>HIST 2112 United States since 1877</td>
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<td>PUBP 3000 US Constitutional Issues</td>
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| Ethics Requirement (p. 100) | |
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<td>ME 3310 Deformable Bodies</td>
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<td>ME 4056 ME Systems Laboratory</td>
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</tr>
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<td>MATH 3670 Statistics and Applns</td>
<td>3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Nuclear Energy Concentration</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>NRE 3301 Radiation Physics</td>
<td>3</td>
</tr>
<tr>
<td>NRE 3208 Nuclear Reactor Phys I</td>
<td>3</td>
</tr>
<tr>
<td>ME 3180 Machine Design</td>
<td>3</td>
</tr>
<tr>
<td>or ME 4315 Energy Systems Analy&amp;Dgn</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Select two of the following:</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECE 3025 Electromagnetics</td>
<td></td>
</tr>
<tr>
<td>ECE 3072 Elec Energy Systems</td>
<td></td>
</tr>
<tr>
<td>ME 4214 Mech Behavior-Materials</td>
<td></td>
</tr>
<tr>
<td>ME 4340 Applied Fluid Mechanics</td>
<td></td>
</tr>
<tr>
<td>MSE 4010 Environ Degradation</td>
<td></td>
</tr>
<tr>
<td>NRE 4214 Reactor Engineering</td>
<td></td>
</tr>
<tr>
<td>NRE 4610 Plasma Phys&amp; Fusion Engr</td>
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</tbody>
</table>
Free Electives

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
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<tbody>
<tr>
<td>MSE 2001</td>
<td>Prin&amp;Appl-Engr Materials</td>
<td>3</td>
</tr>
<tr>
<td>ECE 3710</td>
<td>Circuits &amp; Electronics</td>
<td>2</td>
</tr>
<tr>
<td>ECE 3741</td>
<td>Instrum &amp; Electronic Lab</td>
<td>1</td>
</tr>
<tr>
<td>ISYE 3025</td>
<td>Engineering Economy</td>
<td>1</td>
</tr>
</tbody>
</table>

If a course is repeated, only the latest grade is included in the calculation of the Major Requirements GPA.

1. Students must complete one Ethics course during their program.
2. Minimum grade of C required.
3. At least 3 credit hours in either the Concentration Electives or Free Electives must be a 3000-level or higher ME course. ME 3141, ME 3700, ME 3720, ME 3743, ME 3744, ME 4699, ME 4741, ME 4742, ME 4753, and ME 4903 are not allowed.
4. Excludes CEE 2040, PHYS 2802, PHYS 2XXX (AP Credit) and MGT 2250.
5. ME 4803/NRE 4803 must have the title ‘Nuclear Reactor Materials’
6. Students can use a maximum of 6 credit hours of VIP courses (ECE 2811, ECE 38X1, ECE 48X1) or a maximum of 6 credit hours of undergraduate research and special problems courses (2699, 4699, 4903 from any department) not to exceed 9 credit hours from both course groups towards the degree requirements for the BSME degree.
7. CHEM 1211K can substitute for CHEM 1310. CHEM 1211K and CHEM 1212K are recommended for pre-health students.

International Plan

Mechanical Engineering majors may choose to participate in the Georgia Tech International Plan. Students who complete the requirements of the International Plan have the degree designation noted on their transcripts and on their diploma. The International Plan has specific requirements which must be completed including:

1. a minimum of 26 weeks abroad in educational, research, or work internships,
2. a language requirement,
3. courses specifically designated for global economics, international affairs, and global competency, and
4. a capstone project, typically one which is based on the student's ME capstone design experience.

Complete requirements may be found at http://oie.gatech.edu/content/international-plan.

Cooperative Plan

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Students who participate in the co-op program have the opportunity to develop career interests, become more confident in their career choices, and develop human relation skills through their work experience. Graduates of the program receive a bachelor's degree with a Cooperative Plan Designation. For more information about the Cooperative Program, go to www.coop.gatech.edu (http://www.coop.gatech.edu).

For more information about all of the programs in the Center for Career Discovery and Development, visit www.careerdiscovery.gatech.edu (http://careerdiscovery.gatech.edu).

Research Option

The School of Mechanical Engineering offers the 'Research Option' (RO) under the BSME degree program. In order to graduate with a BSME (RO) degree, students must:

- Complete at least nine units of supervised research over at least two (preferably three) terms. The research must either be for pay (ME 4698) or credit (ME 4699). Up to six hours of research for credit may be used towards the BSME free elective requirements.
- Write an undergraduate thesis or other substantial, written report showing results of the research. This is usually done during the graduating term.
- Take both LMC 4701 (typically during the first or second semester of research) and LMC 4702 (during the thesis-writing semester).

At least six of the nine required credit hours of research should be on the same topic. A research proposal must be approved by a faculty advisor and one other faculty member. This proposal will be written in LMC 4701 which serves as a pre-requisite for LMC 4702. Completion of the Research Option is noted on students’ transcripts.

The BS/MS Program

The Woodruff School offers a BS/MS program for those students who demonstrate an interest in and ability for additional education beyond the BS degree. Woodruff School students with a GPA of 3.5 or higher are eligible to apply for the program after completion of 30 semester credit hours at Georgia Tech, but before the completion of seventy-five semester credit hours, including transfer and advanced placement credits. Students who have more than 75 credit hours will be considered for the program on a case-by-case basis.

Participants in the BS/MS Program in the Woodruff School can obtain a master's degree in mechanical engineering, nuclear engineering, medical physics, or in Georgia Tech's interdisciplinary bioengineering graduate program. There are two options to consider.

Non-Thesis Option

The Non-Thesis Option is completed by taking 10 classes according to the MS degree requirements. In many cases, two courses can be counted
towards both a student's BS and MS degrees, thereby streamlining the process. With proper planning, most MS non-thesis degrees could be completed in one year.

**Thesis Option**

The Thesis Option involves working with a faculty member on a project in a wide range of research topics being investigated by Woodruff School faculty members. This will give the student hands-on experience in working with a faculty mentor; the opportunity to work in a laboratory or a research environment; and the chance to perform theoretical and experimental work. These efforts will foster the student's career interests and expand their job prospects with certain employers. In some cases, a student will receive a graduate research assistantship, which includes a stipend and a tuition waiver. The time to graduation depends on the thesis project, the advisor, and the student's work ethic.

During the first year of graduate studies, students may be encouraged to continue for the PhD. In many cases, students may be working on an interesting topic of study as part of master’s degree research that could provide the basis for doctoral research.

### Bachelor of Science in Mechanical Engineering - Thermal, Fluid, & Energy Systems

The undergraduate curriculum in mechanical engineering (ME) is very broad and flexible. The curriculum comprises a ME core of fundamental concepts, plus a design/professional-practice stem, plus 15 credit hours of free electives. The program prepares students to be problem solvers and to contribute to a wide range of industries and businesses, or to go on for further study in graduate school. There is a strong emphasis in the ME program on design, creativity, and hands-on learning. Due to the wide range of career choices open to MEs, the program incorporates courses in electronics, materials science, computer programming, and manufacturing. The large number of free elective hours allows students to pursue minors and certificates throughout the Institute, or to specialize in areas within ME. The flexibility also helps students to pursue a variety of special programs including co-op, internships, study abroad, and undergraduate research.

**Program Educational Objectives**

The faculty of the Woodruff School strives to continuously improve our undergraduate programs in mechanical engineering. The educational objectives reflect the needs, and have been reviewed by, among others, the Advisory Board of the Woodruff School, the faculty, and the students.

- Our graduates will be recognized leaders in ME-related fields or other career paths, including industry, academe, government, and non-governmental organizations.
- Our graduates will be global collaborators, leading and participating in culturally diverse teams, who fearlessly discover and apply new knowledge and engineering practices that have a world-wide impact.
- Our graduates will be adaptive learners who continue to grow professionally by obtaining professional registration or certification, or by earning post-graduate degrees.

- Our graduates will be entrepreneurially minded innovators who have a positive economic and social impact on their communities, the nation, and society as a whole.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>APHP 1040</td>
<td>Sci Foundation of Health or APHP 10 Sci of Phys Act &amp; Health</td>
<td>2</td>
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<tr>
<td>ENGL 1101</td>
<td>English Composition I</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 1102</td>
<td>English Composition II</td>
<td>3</td>
</tr>
<tr>
<td>MATH 1552</td>
<td>Integral Calculus 2</td>
<td>4</td>
</tr>
<tr>
<td>CS 1371</td>
<td>Computing for Engineers</td>
<td>3</td>
</tr>
<tr>
<td>Any HUM (p. 93)</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>PHYS 2211</td>
<td>Intro Physics 1 2</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 2212</td>
<td>Intro Physics II</td>
<td>4</td>
</tr>
<tr>
<td>MATH 1551</td>
<td>Differential Calculus 2</td>
<td>2</td>
</tr>
<tr>
<td>MATH 1553</td>
<td>Intro to Linear Algebra 2</td>
<td>2</td>
</tr>
<tr>
<td>or MATH 1565</td>
<td>Linear Algebra</td>
<td></td>
</tr>
<tr>
<td>or MATH 1568</td>
<td>Alg w Abstract Vec Sp</td>
<td></td>
</tr>
<tr>
<td>HIST 2111</td>
<td>United States to 1877</td>
<td>3</td>
</tr>
<tr>
<td>HIST 2112</td>
<td>United States since 1877</td>
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<tr>
<td>INTA 1200</td>
<td>American Government</td>
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<td>POL 1101</td>
<td>Government of the U.S.</td>
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<tr>
<td>PUBP 3000</td>
<td>US Constitutional Issues</td>
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<tr>
<td>ECON 2100</td>
<td>Economics and Policy</td>
<td>3</td>
</tr>
<tr>
<td>ECON 2101</td>
<td>The Global Economy</td>
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<tr>
<td>ECON 2105</td>
<td>Prin of Macroeconomics</td>
<td></td>
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<tr>
<td>ECON 2106</td>
<td>Prin of Microeconomics</td>
<td></td>
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<tr>
<td>Any SS (p. 97)</td>
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<td>6</td>
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<tr>
<td>CHEM 1310</td>
<td>General Chemistry 6</td>
<td>4</td>
</tr>
<tr>
<td>ME 1770</td>
<td>Intro to Engr Graphics</td>
<td>3</td>
</tr>
<tr>
<td>MATH 2551</td>
<td>Multivariable Calculus 2</td>
<td>4</td>
</tr>
<tr>
<td>MATH 2552</td>
<td>Differential Equations 2</td>
<td>4</td>
</tr>
<tr>
<td>MSE 2001</td>
<td>Prin&amp;Appl-Engr Materials</td>
<td>3</td>
</tr>
<tr>
<td>Ethics Requirement (p. 100)</td>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>

**Major Requirements**

COE 2001 | Statics 2                                        | 2            |
| ME 2016 | Computing Techniques                             | 3            |
| ME 2110 | Creative Decisions& Dsgn                         | 3            |
| ME 2202 | Dynamics of Rigid Bodies                         | 3            |
| ME 3017 | System Dynamics                                  | 3            |
| ME 3057 | Experimental Methodology                         | 3            |
| ME 3322 | Thermodynamics                                   | 3            |
| ME 3340 | Fluid Mechanics                                  | 3            |
If a course is repeated, only the latest grade is included in the calculation of the Major Requirements GPA. If a course is repeated, only the latest grade is included in the calculation following:

Student must earn a 2.0 GPA within Major Requirements and the No pass-fail courses allowed.

<table>
<thead>
<tr>
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<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
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</tr>
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<td>2</td>
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<tr>
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<td>Instrum &amp; Electronic Lab</td>
<td>1</td>
</tr>
<tr>
<td>ISYE 3025</td>
<td>Engineering Economy</td>
<td>1</td>
</tr>
</tbody>
</table>

Free Electives

Free Electives 3,4,5 6

Total Credit Hours 129

No pass-fail courses allowed.

Student must earn a 2.0 GPA within Major Requirements and the following:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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</thead>
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<tr>
<td>ME 4011</td>
<td>IC Engines</td>
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</tr>
<tr>
<td>ME 4013</td>
<td>Hybrid Vehicle Powertrains</td>
<td></td>
</tr>
<tr>
<td>ME 4321</td>
<td>Refrigeration &amp; Air Cond</td>
<td></td>
</tr>
<tr>
<td>ME 4325</td>
<td>Intro Fuel Cell Systems</td>
<td></td>
</tr>
<tr>
<td>ME 4340</td>
<td>Applied Fluid Mechanics</td>
<td></td>
</tr>
<tr>
<td>ME 4342</td>
<td>Computational Fluid Dyn</td>
<td></td>
</tr>
<tr>
<td>ME 4701</td>
<td>Wind Engineering</td>
<td></td>
</tr>
<tr>
<td>ME 4759</td>
<td>Electrochem Storage</td>
<td></td>
</tr>
<tr>
<td>ME 4803</td>
<td>Multiscale Thermal Engineering</td>
<td></td>
</tr>
<tr>
<td>ME 4803</td>
<td>Nanoengineered Energy Technologies</td>
<td></td>
</tr>
<tr>
<td>ME 4823</td>
<td>Renewable Energy Systems</td>
<td></td>
</tr>
</tbody>
</table>

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The undergraduate program in the School of Music leads to a Bachelor of Science in Music Technology. In the program, students understand the role of technology in enabling new ways to access, consume, and create music. They master existing technologies and develop the skills necessary to innovate and create the ideas that will drive the music industry in the future.

The program combines technical and artistic topics to produce graduates who have both a strong technical and performance portfolio. In addition to the general concentration in Music Technology, students may pursue a minor across campus or pursue one of the two engineering-based concentrations in the Music Technology program. For students interested in augmenting their program with Mechanical Engineering, they may take focused coursework in one of two areas: Acoustics and Vibrations or Controls and Robotics. BSMT students interested in Electrical and Computer Engineering may take focused coursework in that area.

Please note that a portfolio is required for admission into the BSMT program. For more information, visit http://www.music.gatech.edu/bsmt

The Woodruff School offers a BS/MS program for those students who demonstrate an interest in and ability for additional education beyond the BS degree. Woodruff School students with a GPA of 3.5 or higher are eligible to apply for the program after completion of 30 semester credit hours at Georgia Tech, but before the completion of seventy-five semester credit hours, including transfer and advanced placement credits. Students who have more than 75 credit hours will be considered for the program on a case-by-case basis.

Participants in the BS/MS Program in the Woodruff School can obtain a master’s degree in mechanical engineering, nuclear engineering, medical physics, or in Georgia Tech’s interdisciplinary bioengineering graduate program. There are two options to consider:

**Non-Thesis Option**

The Non-Thesis Option is completed by taking 10 classes according to the MS degree requirements. In many cases, two courses can be counted towards both a student’s BS and MS degrees, thereby streamlining the process. With proper planning, most MS non-thesis degrees could be completed in one year.

**Thesis Option**

The Thesis Option involves working with a faculty member on a project in a wide range of research topics being investigated by Woodruff School faculty members. This will give the student hands-on experience in working with a faculty mentor; the opportunity to work in a laboratory or a research environment; and the chance to perform theoretical and experimental work. These efforts will foster the student’s career interests and expand their job prospects with certain employers. In some cases, a student will receive a graduate research assistantship, which includes a stipend and a tuition waiver. The time to graduation depends on the thesis project, the advisor, and the student’s work ethic.

During the first year of graduate studies, students may be encouraged to continue for the PhD. In many cases, students may be working on an interesting topic of study as part of master’s degree research that could provide the basis for doctoral research.

**BS/MS Information** (https://www.me.gatech.edu/undergraduate/bsms)

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**BS/MS Information** (https://www.me.gatech.edu/undergraduate/bsms)
Core C - Humanities
Any HUM (p. 93) 6

Core D - Science, Math, & Technology
PHYS 2211 Intro Physics I 4
PHYS 2212 Intro Physics II 4
MATH 1551 Differential Calculus 2
MATH 1553 Intro to Linear Algebra 2

Core E - Social Sciences
HIST 2111 United States to 1877 3
or HIST 2111 United States since 1877
or INTA 1200 American Government
or POL 1101 Government of the U.S.
or PUBP 3008 Constitutional Issues
ECON 2100 Economics and Policy 3
or ECON 2101 Global Economy
or ECON 2101 Prin of Macroeconomics
or ECON 2101 Prin of Microeconomics
Any SS (p. 97) 6

Core F - Courses Related to Major
MUSI 2010 Funds of Musicianship I 3
MUSI 2011 Funds of Musicianship II 3
MUSI 2012 Fund of Musicianship III 3
MUSI 2013 Fund of Musicianship IV 3
MUSI 2015 Laptop Orchestra 3
MUSI 2525 Intro to Audio Tech I 3
MUSI Ensemble Requirement 1

Major Requirements
MUSI 2526 Intro to Audio Tech II 3
MUSI 4630 Music Recording & Mixing 3
MUSI 3770 Project Studio Tech 4
MUSI 3771 Project Studio Analysis 4
MUSI 4677 Music Percep & Cognition 3
MUSI Upper Division Elective 3
Choose one from the following for MUSI Upper Division Elective:
MUSI 4450 Integrative Music Multimedia
MUSI 4456 Music Tech Hist & Repertoire
MUSI 4457 Computational Music Theory
MUSI 4458 Comp Music Composition
MUSI 4459 Digital Signal Processing
MUSI 4705 Music Tech Capstone I 4
MUSI 4706 Music Tech Capstone II 4

Concentration: ECE/Signal Processing
MATH 2552 Differential Equations 4
ECE 2026 Intro Signal Processing 3
ECE 3710 Circuits & Electronics 2
ECE 3084 Signals and Systems 3
ECE 3741 Instrum & Electronic Lab 1

Select 6 hours:
ECE 4445 Audio Engineering
or ECE 4 Fund-Digital Signal Proc
or ECE 4 Applications of DSP
or ECE 4 Audio Engineering Lab

Free Electives
Free Electives 9

Total Credit Hours 122

1 Students are required to satisfy a 4-course music ensemble requirement. Course options include any four courses from the following list: MUSI 3018 or MUSI 3019 or MUSI 3121 or MUSI 3131 or MUSI 3231 or MUSI 3241 or MUSI 3251 or MUSI 3261 or MUSI 3311 or MUSI 3321 or MUSI 3411 or MUSI 3511 or MUSI 3531 or MUSI 3541 or MUSI 3551 or MUSI 3611. The courses may be used as Humanities (if course has been approved for Humanities credit) and/or free electives.

Bachelor of Science in Music Technology - General

The Bachelor of Science in Music Technology teaches students to master existing technology and gives them tools to innovate and create ideas. Projects range from robots that listen to and play their own improvised music to software that samples and builds music.

Bachelor of Science in Music Technology students will need to consult with the undergraduate adviser to choose a concentration or minor.

Students in the General Concentration follow the rigorous Bachelor of Science in Music Technology curriculum. This standard curriculum lends itself most easily to using the hours of the Breadth Block (http://www.music.gatech.edu/curriculum) to pursue a minor in another School on campus -- and students might find these two minors to be especially interesting:

Computing and People: Allows students to gain added expertise in computing as it relates to people. The minor requires 15 credit hours of coursework in the College of Computing.

Industrial Design: Allows students to strengthen skills and understanding of creative problem solving as it relates to design. The minor requires 15 credit hours of coursework in the School of Industrial Design.

While Computing and Industrial Design are good fits for this degree, they are not the only minors possible. For example, students could also use the International Plan for their Breadth Block.

Code Title Credit Hours
Wellness
APPH 1040 Sci Foundation of Health 2
or APPH 10 Sci of Phys Act & Health

Core A - Essential Skills
ENGL 1101 English Composition I 3
ENGL 1102 English Composition II 3
MATH 1552 Integral Calculus 4

Core B - Institutional Options
CS 1371 Computing for Engineers 3
or CS 1301 Intro to Computing
or CS 1315 Intro Media Computation

Core C - Humanities
Any HUM (p. 93)  

Core D - Science, Math, & Technology
PHYS 2211 Intro Physics I 4
PHYS 2212 Intro Physics II 4
MATH 1551 Differential Calculus 2
MATH 1553 Intro to Linear Algebra 2

Core E - Social Sciences
HIST 2111 United States to 1877 3
or HIST 2112 United States since 1877
or INTA 1200 American Government
or POL 1101 Government of the U.S.
or PUBP 3000 US Constitutional Issues

ECON 2100 Economics and Policy 3
or ECON 211 The Global Economy
or ECON 211 Prin of Macroeconomics
or ECON 211 Prin of Microeconomics

Any SS (p. 97) 6

Core F - Courses Related to Major
MUSI 2010 Funds of Musicianship I 3
MUSI 2011 Funds of Musicianship II 3
MUSI 2012 Fund of Musicianship III 3
MUSI 2013 Fund of Musicianship IV 3
MUSI 2015 Laptop Orchestra 3
MUSI 2525 Intro to Audio Tech I 3
MUSI Ensemble Requirement 1

Major Requirements
MUSI 2526 Intro to Audio Tech II 3
MUSI 4630 Music Recording & Mixing 3
MUSI 3770 Project Studio Tech 4
MUSI 3771 Project Studio Analysis 4
MUSI 4677 Music Percep & Cognition 3
MUSI Upper Division Elective 3

Choose one of the following for MUSI Upper Division Elective:
MUSI 4450 Integrat Mus Multimedia
MUSI 4456 Mus Tech Hist&Repertoire
or MUSI 4008 Tech Hist&Repertoire
MUSI 4457 Computational Mus Anly
or MUSI 4010 Computational Music Anly
MUSI 4458 Comp Music Composition
or MUSI 4300 Music Composition
MUSI 4459 Dig Signal Process-Music
or MUSI 4300 Music Composition
MUSI 4705 Music Tech Capstone I 4
MUSI 4706 Music Tech Capstone II 4

Non-Major Cluster
Advisor approved courses 2  15

Free Electives
16

Total Credit Hours 122

1 Students are required to satisfy a 4-course music ensemble requirement. Course options include any four from the following list: MUSI 3018 or MUSI 3019 or MUSI 3121 or MUSI 3131 or MUSI 3231 or MUSI 3241 or MUSI 3251 or MUSI 3261 or MUSI 3311 or MUSI 3321 or MUSI 3411 or MUSI 3511 or MUSI 3531 or MUSI 3541 or MUSI 3551 or MUSI 3611. The courses may be used as Humanities (if course has been approved for Humanities credit) and/or free electives.

2 General track students must have Non-Major Cluster courses approved by advisor. If student is completing a minor for this area and minor requires excess of 15 hours, then overage hours may be used towards free electives.

Bachelor of Science in Music Technology - Mechanical Engineering: Acoustics and Vibrations

The Bachelor of Science in Music Technology teaches students to master existing technology and gives them tools to innovate and create ideas. Projects range from robots that listen to and play their own improvised music to software that samples and builds music.

Bachelor of Science in Music Technology students will need to consult with the undergraduate adviser to choose a concentration or minor.

The Mechanical Engineering Track allows students to develop in-depth mechanical engineering skills as applied to music technology. Mechanical engineering is directly related to music technology fields in the areas of robotic musicianship, acoustics, and instrument design. Students use their Breadth Block (http://www.music.gatech.edu/curriculum) to take 23 credit hours of coursework in the School of Mechanical Engineering focusing on one of the two options below:

Option 1: Acoustics and Vibrations
Option 2: Controls and Robotics

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<tr>
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<th>Credit Hours</th>
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<td>Any HUM (p. 93)</td>
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</table>

Core D - Science, Math, & Technology
PHYS 2211 Intro Physics I 4
PHYS 2212 Intro Physics II 4
Bachelor of Science in Music Technology - Mechanical Engineering: Controls and Robotics

The Bachelor of Science in Music Technology teaches students to master existing technology and gives them tools to innovate and create ideas. Projects range from robots that listen to and play their own improvised music to software that samples and builds music.

Bachelor of Science in Music Technology students will need to consult with the undergraduate adviser to choose a concentration or minor.

The Mechanical Engineering Track allows students to develop in-depth mechanical engineering skills as applied to music technology. Mechanical engineering is directly related to music technology fields in the areas of robotic musicianship, acoustics, and instrument design. Students use their Breadth Block to take 23 credit hours of coursework in the School of Mechanical Engineering focusing on one of the two options below:

Option 1: Acoustics and Vibrations

Option 2: Controls and Robotics

Free Electives

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<td>or POL 110</td>
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<td>or ECON 212</td>
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<td>Dynamics of Rigid Bodies</td>
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<td>ME 2016</td>
<td>Computing Techniques</td>
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<td>ME 4760</td>
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Free Electives

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1 Students are required to satisfy a 4-course music ensemble requirement. Course options include any four from the following list: MUSI 3018 or MUSI 3019 or MUSI 3121 or MUSI 3131 or MUSI 3231 or MUSI 3241 or MUSI 3251 or MUSI 3261 or MUSI 3311 or MUSI 3321 or MUSI 3411 or MUSI 3511 or MUSI 3531 or MUSI 3541 or MUSI 3551 or MUSI 3611. The courses may be used as Humanities (if course has been approved for Humanities credit) and/ or free electives.
### Bachelor of Science in Neuroscience

Students majoring in neuroscience will complete a 120 credit-hour curriculum (plus a required 2-credit class in health). They will learn fundamental principles and up-to-date advances in the field of neuroscience. The program will build on a strong foundation of required courses in the physical sciences and mathematics (chemistry, computer science, calculus, statistics and physics) in order to prepare students with the analytical skills needed to address the complexity of problems in neuroscience. The program will emphasize technological methods and innovations that have been critical, as well as ones needed to continue progress in neuroscience.

#### Core F - Courses Related to Major

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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<td>MUSI 4677</td>
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<tr>
<td>MUSI Upper Division Elective</td>
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Choose one from the following for MUSI Upper Division Elective:

- MUSI 4450 Integrat Mus Multimedia
- MUSI 4456 Mus Tech Hist&Repertoire
- MUSI 4457 Computational Mus Anly
- MUSI 4458 Comp Music Composition
- MUSI 4459 Dig Signal Process-Music
- MUSI 4705 Music Tech Capstone I
- MUSI 4706 Music Tech Capstone II

#### Concentration: ME/Controls and Robotics

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<td>Structural Vibrations</td>
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<td>ME 4451</td>
<td>Robotics</td>
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<tr>
<td>or ME 4012 Motion Systems</td>
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<tr>
<td>or ME 4405 Fund of Mechatronics</td>
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<td>ME 4452</td>
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#### Free Electives

Free Electives

Total Credit Hours 122

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1 Students are required to satisfy a 4-course music ensemble requirement. Course options include any four courses from the following list: MUSI 3018 or MUSI 3019 or MUSI 3121 or MUSI 3131 or MUSI 3231 or MUSI 3241 or MUSI 3251 or MUSI 3261 or MUSI 3311 or MUSI 3321 or MUSI 3411 or MUSI 3511 or MUSI 3531 or MUSI 3541 or MUSI 3551 or MUSI 3611. The courses may be used as Humanities (if course has been approved for Humanities credit) and/or free electives.
To complete the research option for Neuroscience, the student must:

- Complete ten units of supervised research, over a period of preferably three but at least two terms.
- Research may be for either pay or credit [typically 4698 or 4699] for BS in Neuroscience, this will be NEUR 4699.
- At least six credit hours must be on the same research project, broadly defined.
- Write an undergraduate thesis or other substantial, written report showing results of the research.
- A research proposal must be approved by a faculty advisor and one other faculty member. The proposal will normally be completed at the end of the student’s first semester of research, but must be approved at latest before the start of their final term of research. An approved proposal is required for admission to the class “Writing an Undergraduate Thesis” (see below).
- The thesis/report must be approved and graded by two faculty members.
- Theses will be published in the Georgia Tech Library.
- Take the two-credit class “Writing an Undergraduate Thesis.” [LMC 4701 and LMC 4702]

http://www.undergradresearch.gatech.edu/research-option/

### Major Requirements

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<td>BIOL 1510</td>
<td>Biological Principles</td>
<td>4</td>
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<tr>
<td>CHEM 3511</td>
<td>Survey of Biochemistry</td>
<td>3</td>
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<tr>
<td>NEUR 2001</td>
<td>Neuro-Principles</td>
<td>4</td>
</tr>
</tbody>
</table>

### Neuroscience Depth Electives

Select one research based elective:
- NEUR 4001 Neuro Research Project

Select one interest area elective:
- BIOL 3450 Cell Molecular Biol
- & BIOL 3451and Cell Molecular Biol Lab
- PSYC 4090 Cognitive Neuroscience
- APPH 3755 Human Physiology
- & APPH 37?and Physiology Lab

Select one statistics elective:
- BIOL 4401 Exp&Stat Methods

6-8 credits of additional Neuroscience electives

### Breadth Electives

15

### Free Electives

14

### Total Credit Hours

122

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1. MATH 1553 (2 cr.) is preferred but MATH 1554 (Linear Algebra, 4 cr.) or MATH 1564 (Linear Algebra with Vector Spaces, 4 cr.) can satisfy this requirement with the excess 2 cr. to be applied to free electives.

2. CHEM 2311 is an approved substitution for CHEM 1315 to fulfill Area F only for students who complete a full year of organic chemistry (i.e., both CHEM 2311 and CHEM 2312CHEM 2312 or CHEM 2313 must be completed).

3. CHEM 4511CHEM 4511 is an approved substitution for CHEM 3511 to fulfill Area F only for students who complete a full year of biochemistry (i.e., both CHEM 4511CHEM 4511 and CHEM 4512CHEM 4512 must be completed).

4. Four credits of NEUR 4699 credit is only allowed to substitute for NEUR 4001 if completing the Georgia Tech Research Option. The Research Option requires an additional 6 credits of research (an additional 2 credits of NEUR 4699 may be applied to “Additional Neuroscience Electives”; the additional 3 credits of research credit will be applied to Free Electives), and LMC 4701 (1 credit) and LMC 4702 (1 credit) (applied to Free Electives). A research proposal and thesis/report is also required to complete the Research Option.

5. PSYC 2020 may be completed only for students completing the Psychology Breadth Elective option.

### Research Option

BS in Neuroscience students are able to complete the Georgia Tech Research Option.

To complete the research option for Neuroscience, the student must:

- Complete ten units of supervised research, over a period of preferably three but at least two terms.
- Research may be for either pay or credit [typically 4698 or 4699] for BS in Neuroscience, this will be NEUR 4699.
- At least six credit hours must be on the same research project, broadly defined.
- Write an undergraduate thesis or other substantial, written report showing results of the research.
- A research proposal must be approved by a faculty advisor and one other faculty member. The proposal will normally be completed at the end of the student’s first semester of research, but must be approved at latest before the start of their final term of research. An approved proposal is required for admission to the class “Writing an Undergraduate Thesis” (see below).
- The thesis/report must be approved and graded by two faculty members.
- Theses will be published in the Georgia Tech Library.
- Take the two-credit class “Writing an Undergraduate Thesis.” [LMC 4701 and LMC 4702]
Cooperative Plan
Since 1912, Georgia Tech has offered a five-year Undergraduate Cooperative Program to those students who wish to combine career-related experience with classroom studies. The program is the fourth oldest of its kind in the world and the largest optional co-op program in the country.

Students alternate between industrial assignments and classroom studies until they complete three semesters of work. Co-op students with nuclear and radiological engineering majors complete the same coursework on campus that is completed by regular four-year students. Most co-op students begin the program as freshman or sophomores and are classified as full-time students regardless whether they are attending classes on campus or are full-time at an employer’s location.

Students who participate in the program have the opportunity to develop career interests, become more confident in their career choices, and develop human relation skills through their work experience. Graduates of the program receive a bachelor’s degree with a Cooperative Plan Designation. Woodruff School students have traditionally been the largest group participating in the program.

Students can also complete work assignments in a foreign country as part of the International Cooperative Program. This program is a great opportunity to utilize foreign language skills, gain a global perspective, and experience a diverse culture. Proficiency in a foreign language is necessary to earn the International Cooperative Plan degree designation. For more information on the Cooperative Program, go to www.coop.gatech.edu.

The Undergraduate Professional Internship Program is for nuclear and radiological engineering students who do not participate in the Cooperative Program, but want some career-related experience before graduation. Students generally work for one semester, usually in the summer, with an option for more work. Students must have completed at least thirty hours of coursework at Georgia Tech before they can participate in the program. For more details, see: www.upi.gatech.edu (http://www.upi.gatech.edu).

In addition, there is a Work Abroad Program (www.workabroad.gatech.edu (http://www.workabroad.gatech.edu)), which complements a student’s formal education with paid international work experience directly related to nuclear and radiological engineering. Participating students typically include juniors and seniors. The international work assignments are designed to include practical training, cross-cultural exposure and learning, and the acquisition of needed skills.

For more information about all of the programs in the Center for Career Discovery and Development, visit www.careerdiscovery.gatech.edu (http://careerdiscovery.gatech.edu).

The BS/MS Program
The Woodruff School offers a BS/MS program for those students who demonstrate an interest in and ability for additional education beyond the BS degree. Woodruff School students with a GPA of 3.5 or higher are eligible to apply for the program after completion of 30 credit hours at Georgia Tech, but before the completion of seventy-five credit hours, including transfer and advanced placement credits. Students who have more than 75 credit hours will be considered for the program on a case-by-case basis.

Participants in the BS/MS Program in the Woodruff School can obtain a master’s degree in mechanical engineering, nuclear engineering, medical physics, or in Georgia Tech’s interdisciplinary bioengineering graduate program. There are two options to consider:

Non-Thesis Option
The Non-Thesis Option is completed by taking 10 classes according to the MS degree requirements. In many cases, two courses can be counted towards both a student’s BS and MS degrees, thereby streamlining the process. With proper planning, most MS non-thesis degrees could be completed in one year.

Thesis Option
The Thesis Option involves working with a faculty member on a project in a wide range of research topics being investigated by Woodruff School faculty members. This will give you hands-on experience in working with a faculty mentor; the opportunity to work in a laboratory or a research environment; and the chance to perform theoretical and experimental work. These events will foster your career interests and expand your selection of possible employers. In some cases, a student will receive a graduate research assistantship, which includes a stipend and a tuition waiver. The time to graduation depends on your thesis project, your advisor, and your work ethic.

During the first year of your graduate studies, you will be encouraged to continue for the PhD In many cases, you might be working on an interesting topic of study as part of your master’s degree research that could provide the basis for doctoral research.

BS/MS Information (https://www.me.gatech.edu/undergraduate/bsms)

Bachelor of Science in Nuclear and Radiological Engineering - Nuclear Energy concentration
The undergraduate curriculum in nuclear and radiological engineering is structured to meet the needs of both the student who contemplates employment immediately after graduation and the student planning to pursue graduate study. It provides maximum flexibility in the form of options for each student to develop his or her unique interests and capabilities. The core curriculum covers the basic principles of nuclear engineering, nuclear reactor core design, reactor systems engineering, nuclear power economics, reactor operations, radiation sources and detection instruments, radiation transport, radiation protection, criticality safety, regulatory requirements, and radioactive materials management.

In addition to the Institute’s academic requirements for graduation with a bachelor’s degree, the following are required for a BS NRE degree:

- A C or better must be earned in:

- NRE graduates will conduct themselves with the highest professional and ethical principles that include considerations of public safety and the environment.
- NRE graduates will engage in life long learning through graduate and continuing education, professional development activities, or other career appropriate options.
- Bachelor of Science in Nuclear and Radiological Engineering - Nuclear Engineering (p. 467)
- Bachelor of Science in Nuclear and Radiological Engineering - Radiological Science and Engineering (p. 469)
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During the first year of graduate studies, students may be encouraged to continue for the PhD. In many cases, students may be working on an interesting topic of study as part of master’s degree research that could provide the basis for doctoral research.

BS/MS Information (https://www.me.gatech.edu/undergraduate/bsms)
Bachelor of Science in Nuclear and Radiological Engineering - Nuclear Engineering Concentration

The undergraduate curriculum in nuclear and radiological engineering is structured to meet the needs of both the student who contemplates employment immediately after graduation and the student planning to pursue graduate study. It provides maximum flexibility in the form of options for each student to develop his or her unique interests and capabilities. The core curriculum covers the basic principles of nuclear engineering, nuclear reactor core design, reactor systems engineering, nuclear power economics, reactor operations, radiation sources and detection instruments, radiation transport, radiation protection, criticality safety, regulatory requirements, and radioactive materials management.

In addition to the Institute's academic requirements for graduation with a bachelor's degree, the following are required for a BS NRE degree.

- A C or better must be earned in:

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</tr>
<tr>
<td>MATH 2551</td>
<td>Multivariable Calculus</td>
<td>4</td>
</tr>
<tr>
<td>MATH 2552</td>
<td>Differential Equations</td>
<td>4</td>
</tr>
</tbody>
</table>

- The cumulative GPA of all required NRE and ME classes plus classes used for the concentration must be 2.0 or higher.

Program Educational Objectives

The program educational objectives reflect the needs of the program's constituencies and have been reviewed and validated by our constituents.

- NRE graduates will positively contribute to nuclear and radiological engineering and related fields.
- NRE graduates will conduct themselves with the highest professional and ethical principles that include considerations of public safety and the environment.
- NRE graduates will engage in life long learning through graduate and continuing education, professional development activities, or other career appropriate options.

<table>
<thead>
<tr>
<th>Code</th>
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<tr>
<td>or APPH 10</td>
<td>Sci of Phys Act &amp; Health</td>
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Core A - Essential Skills

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<tr>
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<tr>
<td>ENGL 1102</td>
<td>English Composition II</td>
<td>3</td>
</tr>
<tr>
<td>MATH 1552</td>
<td>Integral Calculus</td>
<td>4</td>
</tr>
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</table>

Core B - Institutional Options

<table>
<thead>
<tr>
<th>Code</th>
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</tr>
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<tbody>
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<td>CS 1371</td>
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<td>3</td>
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Core C - Humanities

<table>
<thead>
<tr>
<th>Code</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Any HUM (p. 93)</td>
<td></td>
<td>6</td>
</tr>
</tbody>
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1. Minimum grade C
2. Ethics Overlay may be Humanities or Social Sciences and can be any course from the GT-approved list: http://www.catalog.gatech.edu/academics/undergraduate/core-curriculum/ethics/.
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4. CHEM 1211K can substitute for CHEM 1310. CHEM 1211K and CHEM 1212K are recommended for pre-health students.
5. Students must satisfy the requirements of EITHER the Nuclear Engineering (NE) Concentration or the Radiological Science and Engineering (RSE) Concentration. NE Concentration requires ME 3345, NRE 4210, and NRE 4214; RSE Concentration requires NRE 4328 and two courses from the following list: NRE 4750, NRE 4803 (Nuclear Safeguards), and NRE 4407. Students may complete both concentrations using free or engineering electives.
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7. Engineering Elective is any class from the College of Engineering at the 2000-level or higher excluding: ME 3141, ME 3700, ME 3720, ME 3743, ME 3744, ME 4741, ME 4742, and ME 4753. Also excludes project-type courses such as VIP and 2699, 2903, 4699, 4903 classes. Cannot duplicate any other material used to satisfy the BSNRE degree requirements.
8. Free 1XXX: Cannot duplicate any other material used to satisfy the BSNRE degree requirements.
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BS/MS Information (https://www.me.gatech.edu/undergraduate/bsms)

Bachelor of Science in Nuclear and Radiological Engineering - Radiological Science and Engineering concentration

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Bachelor of Science in Nuclear and Radiological Engineering - Radiological Science and Engineering concentration

36 ISYE 3025 Engineering Economy
36 ME 3322 Thermodynamics
36 ME 3340 Fluid Mechanics
36 MATH 3670 Statistics and Applns

Radiological Science and Engineering Concentration requirements
36 NRE 4328 Radiation Sources & Appl
Select two courses:
6 NRE 4407 Radiobiology & Oncology
6 NRE 4750 Diagnostic Imaging Phys
6 NRE 4803 Nuclear Safeguards

Math/Science Elective
3 Engineering Elective
3

Free Electives
Free Electives (1000-level or higher)
3 Free Electives (2000-level or higher)
9

Total Credit Hours 126

No Pass-Fail courses allowed

Students must earn a minimum Major GPA of 2.0 (truncated). Major GPA includes all required NRE and ME classes plus classes used for the concentration. If a class is repeated, only the last grade is included in the calculation.

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Participants in the BS/MS Program in the Woodruff School can obtain a master's degree in mechanical engineering, nuclear engineering, medical
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During the first year of graduate studies, students may be encouraged to continue for the PhD. In many cases, students may be working on an interesting topic of study as part of master’s degree research that could provide the basis for doctoral research.

BS/MS Information (https://www.me.gatech.edu/undergraduate/bsms)

**Bachelor of Science in Physics**
The School of Physics offers two undergraduate degrees, the Bachelor of Science in Physics and the Bachelor of Science in Applied Physics. The basis of the Bachelor of Science in Physics degree is the traditional preparation of a student for graduate study in physics.

Each of the baccalaureate programs contains the following:

1. courses needed to meet general institutional degree requirements;
2. a core of technical courses intended to give a strong background in mathematics and the physical principles of mechanics, electricity and magnetism, thermodynamics, and the quantum theory that governs physical phenomena at the microscopic level of molecules, atoms, and nuclei;
3. technical electives that enable the student to explore areas of his or her choice in greater depth;
4. courses involving undergraduate research, and
5. free electives, about fifteen percent of the total hours, which may be employed to schedule additional technical or nontechnical courses.

The considerable flexibility inherent in the physics curricula is advantageous to students who wish to work out individual programs of study. At the same time, this flexibility suggests the need for consultation with advisors so students can make the best use of elective hours and avoid scheduling difficulties that may arise in later semesters. Students may utilize their elective freedom in the physics curricula to specialize in particular areas of physics, to prepare for careers in interdisciplinary areas of science, to compose a preprofessional program, or to gain a background in other technical or nontechnical disciplines. Students should contact their academic advisor for assistance in planning programs of study with emphasis directed toward a particular objective. Since some students who earn a degree in physics have transferred from other disciplines, the School has planned its degree programs to enable most students to transfer into physics with little or no loss of credit.

A total of 120 credit hours (exclusive of wellness) and a grade-point average of at least 2.0 in physics courses numbered 3000 and higher are requisites for the bachelor’s degree in physics.

Physics: Undergraduate Information (http://www.physics.gatech.edu/content/undergraduate-program)

- Bachelor of Science in Physics - General (p. 473)
- Bachelor of Science in Physics - Astrophysics (p. 185)
- Bachelor of Science in Physics - Business Option (p. 471)

**Research Option in Physics**
The Research Option is intended for students who seek a concentrated research experience, culminating in an undergraduate thesis, integrated into their undergraduate studies in Physics. The purpose of this program is to prepare students who plan to go on to graduate research after their BS degree. This option includes three or four semesters of focused research in the student’s junior and senior years. Students who complete this option receive a designation on their transcript. For an undergraduate to fulfill the Research Option in the School of Physics, the student must fulfill the following requirements:

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<th>Credit</th>
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<tr>
<td>PHYS 4698</td>
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<td>or PHYS 4699</td>
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<tr>
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<td>LMC 4702</td>
<td>US Rsch Thesis Writing 4</td>
<td>1</td>
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<tr>
<td>Research Thesis 5</td>
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<tr>
<td>Total Credit Hours</td>
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</tbody>
</table>

1. At least three credits must be PHYS 4699.
2. LMC 4701: Undergraduate Research Proposal Writing - typically taken during the first or second semester of research.
3. LMC 4702: Undergraduate Research Thesis Writing - taken during the term in which the thesis is completed.
4. Write and submit an undergraduate research thesis to the School of Physics based on the student’s research that is approved by the student’s research advisor.

Course requirements are detailed in brochures available from the School of Physics. For specific questions, students should contact the Associate Chair for Undergraduate Studies in the School of Physics.

**Bachelor of Science in Physics - Business Option**
The School of Physics offers two undergraduate degrees, the Bachelor of Science in Physics and the Bachelor of Science in Applied Physics. The basis of the Bachelor of Science in Physics degree is the traditional preparation of a student for graduate study in physics.

Each of the baccalaureate programs contains the following:

1. courses needed to meet general institutional degree requirements;
2. a core of technical courses intended to give a strong background in mathematics and the physical principles of mechanics, electricity and...
magnetism, thermodynamics, and the quantum theory that governs physical phenomena at the microscopic level of molecules, atoms, and nuclei;

3. technical electives that enable the student to explore areas of his or her choice in greater depth;

4. courses involving undergraduate research, and

5. free electives, about fifteen percent of the total hours, which may be employed to schedule additional technical or nontechnical courses.

The considerable flexibility inherent in the physics curricula is advantageous to students who wish to work out individual programs of study. At the same time, this flexibility suggests the need for consultation with advisors so students can make the best use of elective hours and avoid scheduling difficulties that may arise in later semesters. Students may utilize their elective freedom in the physics curricula to specialize in particular areas of physics, to prepare for careers in interdisciplinary areas of science, to compose a preprofessional program, or to gain a background in other technical or nontechnical disciplines. Students should contact their academic advisor for assistance in planning programs of study with emphasis directed toward a particular objective.

Since some students who earn a degree in physics have transferred from other disciplines, the School has planned its degree programs to enable most students to transfer into physics with little or no loss of credit. A total of 120 credit hours (exclusive of wellness) and a grade-point average of at least 2.0 in physics courses numbered 3000 and higher are requisites for the bachelor’s degree in physics.

Physics: Undergraduate Information (http://www.physics.gatech.edu/content/undergraduate-program)

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<td>Core D - Science, Math, &amp; Technology</td>
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<td>PHYS 2211</td>
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<tr>
<td>PHYS 2212</td>
<td>Intro Physics II</td>
<td>4</td>
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<tr>
<td>or MATH 1551 Differential Calculus</td>
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<tr>
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PUBP 3000 US Constitutional Issues
ECON 2106 Prin of Microeconomics
Any SS (p. 97)

Core F - Courses Related to Major
MATH 2551 Multivariable Calculus
MATH 2552 Differential Equations
CHEM 1310 General Chemistry
CHEM 1320 Chemical Principles I
PHYS 2213 Intro to Modern Physics
PHYS 3201 Classical Mechanics I

Upper-Level Physics
PHYS 3122 Electro & Magnetostatics
PHYS 3123 Electrodynamics
PHYS 3141 Thermodynamics
PHYS 3143 Quantum Mechanics I
PHYS 4142 Statistical Mechanics
PHYS 4143 Quantum Mechanics II
PHYS 4321 Advanced Lab I
PHYS 4601 Senior Seminar I
PHYS 4602 Senior Seminar II

Physics or Technical Electives
Any PHYS or Technical Electives

Business Option
ACCT 2101 Accounting I
or MGT 3000 Financ & Managerial Acct
MGT 3101 Organizational Behavior
or MGT 3155Prin of Management
or PSYC 2220Industrial/Organiz Psy

Choose one of the following: 6
MGT 3062 Financial Management
MGT 3078 Finance & Investments
MGT 3300 Marketing Management I
MGT 3660 International Business
MGT 4015 Adv Managerial Acct
MGT 4026 Fin Report & Analysis I
MGT 4028 Fin Analy&Rpt-Tech Firms
MGT 4030 International Accounting
MGT 4190 Strategic Quality Mgt
MGT 4191 Entrepreneurship Forum
MGT 4192 IMPACT Forum
MGT 4193 Serv Lead Values Systems
MGT 4194 Social Entrepreneurship
MGT 4303 Personal Sell& Sales Mgt
MGT 4304 Strategic Brand Mgt
MGT 4307 Strategic Marketing
MGT 4335 International Marketing
MGT 4610 Law, Mgt, & Economics
MGT 4670 Entrepreneurship

Free Electives
Free Electives

Total Credit Hours 122
Student must have 2.0 in all PHYS classes 3000-level or higher

1. If PHYS 2231 is taken, extra hour goes toward Free Electives
2. Any PHYS course or BIOL 4478, CHEM 3411, CHEM 3412, CHEM 3511, EAS 2750, EAS 4300, EAS 4430, ECE 4501, MATH 2106, MATH 3215, MATH 3235, MATH 4320, MATH 4347 MATH 4348, MATH 4581, NRE 3301, NRE 4610
3. Minimum of one class in PHYS 3211, PHYS 3226, PHYS 4322
4. Maximum of six credit hours below 3000-level
5. Maximum of nine credit hours PHYS 2699 or PHYS 4699
6. If PHYS 2232 is taken, extra hour goes toward Free Electives

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Research Option in Physics

The Research Option is intended for students who seek a concentrated research experience, culminating in an undergraduate thesis, integrated into their undergraduate studies in Physics. The purpose of this program is to prepare students who plan to go on to graduate research after their BS degree. This option includes three or four semesters of focused research in the student’s junior and senior years. Students who complete this option receive a designation on their transcript. For an undergraduate to fulfill the Research Option in the School of Physics, the student must fulfill the following requirements:

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Course requirements are detailed in brochures available from the School of Physics. For specific questions, students should contact the Associate Chair for Undergraduate Studies in the School of Physics.

Bachelor of Science in Psychology

The curriculum is technically oriented and stresses quantitative and experimental approaches to the study of behavior. The undergraduate curriculum is based on a strong emphasis in the sciences and mathematics and provides an excellent preparation for graduate school in psychology, medical school, law school, and other professional and academic graduate programs. In addition, many students with the BS degree in psychology choose to enter a variety of fields, including computer software design, human resources, marketing, human factors, system design, personnel selection and training, and management.

- Bachelor of Science in Psychology - General (p. 476)
- Bachelor of Science in Psychology - Business Option (p. 475)

International Plan

Psychology’s International Plan follows the Institute model to develop a global competence within the student’s major program of study. It thus integrates the student’s international studies and experiences with the School’s quantitative and experimental approaches to the study of behavior.

In addition to the requirements for the BS in Psychology, students must complete the following:

1. take three international courses, including one from each of the following categories: international relations, global economics, and a course on a specific country or region;
2. spend two consecutive terms abroad engaged in fulfilling psychology electives (must be approved by the School of Psychology prior to enrolling in courses), free electives, humanities, and/or social science electives;
3. demonstrate language proficiency equivalent to two years of college-level language study (to be determined by testing); and;
4. incorporate the international experience within the capstone course or the senior thesis.

Research Option

The curriculum is technically oriented and stresses quantitative and experimental approaches to the study of behavior. The undergraduate curriculum is based on a strong emphasis in the sciences and mathematics and provides an excellent preparation for graduate school in psychology, medical school, law school, and other professional and academic graduate programs. The Research Plan in the School of
Psychology provides additional research experience for those students seeking to continue their education in graduate school.

**Bachelor of Science in Psychology - Business Option**

The curriculum is technically oriented and stresses quantitative and experimental approaches to the study of behavior. The undergraduate curriculum is based on a strong emphasis in the sciences and mathematics and provides an excellent preparation for graduate school in psychology, medical school, law school, and other professional and academic graduate programs. In addition, many students with the BS degree in psychology choose to enter a variety of fields, including computer software design, human resources, marketing, human factors, system design, personnel selection and training, and management.

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**Core A - Essential Skills**

| ENGL 1101 | English Composition I       | 3            |
| ENGL 1102 | English Composition II      | 3            |
| MATH 1552 | Integral Calculus           | 4            |

**Core B - Institutional Options**

| CS 1301 | Intro to Computing          | 3            |
| or CS 1315 | Intro Media Computation     |              |
| or CS 1371 | Computing for Engineers    |              |

**Core C - Humanities**

| Any HUM |                                         | 6            |

**Core D - Science, Math, & Technology**

| CHEM or PHYS 1 |                                       | 8            |
| MATH 1551 | Differential Calculus                | 2            |
| MATH 1553 | Intro to Linear Algebra              | 2            |
| or MATH 1554 Linear Algebra         |              |
| or MATH 1555 Linear Alg w Abstract Vec Sp |            |

**Core E - Social Sciences**

Choose one of the following: 3

| HIST 2111 | United States to 1877               |              |
| HIST 2112 | United States since 1877            |              |
| INTA 1200 | American Government                 |              |
| POL 1101 | Government of the U.S.              |              |
| PUBP 3000 | US Constitutional Issues            |              |

**PSYC 1101 General Psychology 3**

Choose two of the following: 3

| BIOL 1510 | Biological Principles              | 4            |
| or BIOL 1511 Honors Biological Prin |                  |
| BIOL 1520 | Intro to Organismal Biol           | 4            |
| or BIOL 1521 Honors Organismal Biol |                  |
| PSYC 2020 | Psychological Statistics 3         | 4            |

| PSYC Electives | Choose 15 credits from the following: 2,3,7 | 15 |
| PSYC 2103 Human Development |                                   |
| PSYC 2210 Social Psychology |                                         |
| PSYC 2215 Social Psychology |                                         |
| PSYC 2220 Industrial/Organiz Psy |                                     |
| PSYC 2230 Abnormal Psychology |                                         |
| PSYC 2240 Personality Theory |                                         |
| PSYC 2270 Engineering Psychology |                                          |
| PSYC 2280 Psy & Creativity & Art |                                     |
| PSYC 2400 Psy & Contemporary Issues |                                 |
| PSYC 2699 Undergraduate Research |                                       |
| PSYC 2760 Human Language Process |                                     |
| PSYC 2803 Special Topics |                                         |
| PSYC 3031 Exper Analys of Behavior |                               |
| PSYC 4010 Human Abilities |                                         |
| PSYC 4011 Cognitive Psychology |                                          |
| PSYC 4020 Biopsychology |                                         |
| PSYC 4025 Learning and Memory |                                         |
| PSYC 4041 Human Sensation & Percep |                                     |
| PSYC 4050 History and Systems |                                         |
| PSYC 4090 Cognitive Neuroscience |                                      |
| PSYC 4100 Behavioral Pharmacology |                                       |
| PSYC 4200 Adv Topics-Cognitive Psy |                                   |
| PSYC 4260 Psychology of Aging |                                         |
| PSYC 4270 Psychological Testing |                                        |
| PSYC 4600 Senior Thesis I |                                         |
| PSYC 4699 Undergraduate Research |                                       |

**Business Option**

| ACCT 2101 | Accounting I | 3 |
| or MGT 300 | Fin & Managerial Acct | |

| MGT 3101 | Organizational Behavior | 3 |
| or MGT 315 | Prin of Management | |
| or PSYC 22 | Industrial/Organiz Psy | |

Choose one of the following: 6

| MGT 3062 | Financial Management | |
| MGT 3078 | Finance & Investments | |
| MGT 3300 | Marketing Management I | |
| MGT 3660 | International Business | |
| MGT 4015 | Adv Managerial Acct | |
| MGT 4026 | Fin Report & Analysis I | |
MGT 4028  Fin Analy&Rpt-Tech Firms
MGT 4030  International Accounting
MGT 4190  Strategic Quality Mgt
MGT 4191  Entrepreneurship Forum
MGT 4192  IMPACT Forum
MGT 4193  Serv Lead Values Systems
MGT 4194  Social Entrepreneurship
MGT 4303  Personal Sell& Sales Mgt
MGT 4304  Strategic Brand Mgt
MGT 4307  Strategic Marketing
MGT 4335  International Marketing
MGT 4610  Law, Mgt, & Economics
MGT 4670  Entrepreneurship

Free Electives
Free Electives 20

Total Credit Hours 122

Pass-fail only allowed for Free Electives.

At least 39 hours of upper division (3000/4000 level) coursework required for the degree.

At least 21 hours of 3000/4000 level psychology courses must be taken summed across major requirements and PSYC electives.

1. CHEM 1211K or CHEM 1212K or CHEM 1310 or PHYS 2211 or PHYS 2212 or PHYS 2231 or PHYS 2232.
2. Maximum of three credit hours of PSYC 2699 or PSYC 4699 (combined) can be counted towards PSYC electives.
3. Minimum grade of C required.
4. If PSYC 4020 (3 credit hour course) is taken for major field requirement choice, then one additional hour of PSYC elective is required.
5. If PSYC 4025 (3 credit hour course) is taken for major field requirement choice, then one additional hour of PSYC elective is required.
6. Extra 1 credit hour from ECON 2106 applied to Free Electives.
7. PSYC 2220 can be used as either a Business Option elective or a PSYC elective, but cannot be used to fulfill both requirements.

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The curriculum is technically oriented and stresses quantitative and experimental approaches to the study of behavior. The undergraduate curriculum is based on a strong emphasis in the sciences and mathematics and provides an excellent preparation for graduate school in psychology, medical school, law school, and other professional and academic graduate programs. The Research Plan in the School of Psychology provides additional research experience for those students seeking to continue their education in graduate school.

Bachelor of Science in Psychology - General

The curriculum is technically oriented and stresses quantitative and experimental approaches to the study of behavior. The undergraduate curriculum is based on a strong emphasis in the sciences and mathematics and provides an excellent preparation for graduate school in psychology, medical school, law school, and other professional and academic graduate programs. In addition, many students with the BS degree in psychology choose to enter a variety of fields, including computer software design, human resources, marketing, human factors, system design, personnel selection and training, and management.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>APPH 1040</td>
<td>Sci Foundation of Health</td>
<td>2</td>
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<tr>
<td>or APPH 1050</td>
<td>Sci of Phys Act &amp; Health</td>
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Core A - Essential Skills

<table>
<thead>
<tr>
<th>Code</th>
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<th>Credit Hours</th>
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<tbody>
<tr>
<td>ENGL 1101</td>
<td>English Composition I</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 1102</td>
<td>English Composition II</td>
<td>3</td>
</tr>
<tr>
<td>MATH 1552</td>
<td>Integral Calculus</td>
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</table>

Core B - Institutional Options

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>CS 1301</td>
<td>Intro to Computing</td>
<td>3</td>
</tr>
<tr>
<td>or CS 1315</td>
<td>Intro Media Computation</td>
<td></td>
</tr>
<tr>
<td>or CS 1371</td>
<td>Computing for Engineers</td>
<td></td>
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</table>

Core C - Humanities

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any HUM</td>
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</table>

Core D - Science, Math, & Technology

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>CHEM or PHYS</td>
<td>Differential Calculus</td>
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</tr>
<tr>
<td>MATH 1551</td>
<td>Differential Calculus</td>
<td>2</td>
</tr>
<tr>
<td>MATH 1553</td>
<td>Intro to Linear Algebra</td>
<td>2</td>
</tr>
<tr>
<td>or MATH 15LinAlg</td>
<td>w Abstract Vec Sp</td>
<td></td>
</tr>
</tbody>
</table>

Core E - Social Sciences

Choose one of the following:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIST 2111</td>
<td>United States to 1877</td>
<td>3</td>
</tr>
<tr>
<td>HIST 2112</td>
<td>United States since 1877</td>
<td></td>
</tr>
<tr>
<td>INTA 1200</td>
<td>American Government</td>
<td></td>
</tr>
<tr>
<td>POL 1101</td>
<td>Government of the U.S.</td>
<td></td>
</tr>
<tr>
<td>PUBP 3000</td>
<td>US Constitutional Issues</td>
<td></td>
</tr>
<tr>
<td>Course Code</td>
<td>Course Title</td>
<td>Credits</td>
</tr>
<tr>
<td>-------------</td>
<td>------------------------------------------</td>
<td>---------</td>
</tr>
<tr>
<td>PSYC 1101</td>
<td>General Psychology</td>
<td>3</td>
</tr>
<tr>
<td>PSYC 2015</td>
<td>Research Methods</td>
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<tr>
<td>Any SS (p. 97)</td>
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**Core F - Courses Related to Major**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 1510</td>
<td>Biological Principles</td>
<td>4</td>
</tr>
<tr>
<td>or BIOL 151</td>
<td>Honors Biological Prin</td>
<td></td>
</tr>
<tr>
<td>BIOL 1520</td>
<td>Intro to Organismal Biol</td>
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</tr>
<tr>
<td>or BIOL 152</td>
<td>Honors Organismal Biol</td>
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</table>

Choose two of the following: 3

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSYC 2103</td>
<td>Human Development</td>
<td></td>
</tr>
<tr>
<td>PSYC 2210</td>
<td>Social Psychology</td>
<td></td>
</tr>
<tr>
<td>PSYC 2230</td>
<td>Abnormal Psychology</td>
<td></td>
</tr>
<tr>
<td>PSYC 2240</td>
<td>Personality Theory</td>
<td></td>
</tr>
<tr>
<td>PSYC 2020</td>
<td>Psychological Statistics</td>
<td>4</td>
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**Major Requirements**

Choose 8 credits from the following: 3,5,6

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSYC 4011</td>
<td>Cognitive Psychology</td>
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</tr>
<tr>
<td>PSYC 4020</td>
<td>Biopsychology</td>
<td></td>
</tr>
<tr>
<td>PSYC 4025</td>
<td>Learning and Memory</td>
<td></td>
</tr>
<tr>
<td>PSYC 4041</td>
<td>Human Sensation &amp; Percep</td>
<td></td>
</tr>
<tr>
<td>PSYC 4031</td>
<td>Applied Experimental Psy</td>
<td>4</td>
</tr>
<tr>
<td>or PSYC 46</td>
<td>Senior Thesis II</td>
<td></td>
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</table>

**PSYC Electives**

Choose 15 credits from the following: 2,3

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSYC 2103</td>
<td>Human Development</td>
<td></td>
</tr>
<tr>
<td>PSYC 2210</td>
<td>Social Psychology</td>
<td></td>
</tr>
<tr>
<td>PSYC 2220</td>
<td>Industrial/Organiz Psy</td>
<td></td>
</tr>
<tr>
<td>PSYC 2230</td>
<td>Abnormal Psychology</td>
<td></td>
</tr>
<tr>
<td>PSYC 2240</td>
<td>Personality Theory</td>
<td></td>
</tr>
<tr>
<td>PSYC 2270</td>
<td>Engineering Psychology</td>
<td></td>
</tr>
<tr>
<td>PSYC 2280</td>
<td>Psyc of Creativity &amp; Art</td>
<td></td>
</tr>
<tr>
<td>PSYC 2400</td>
<td>Psy&amp; Contemporary Issues</td>
<td></td>
</tr>
<tr>
<td>PSYC 2699</td>
<td>Undergraduate Research</td>
<td></td>
</tr>
<tr>
<td>PSYC 2760</td>
<td>Human Language Process</td>
<td></td>
</tr>
<tr>
<td>PSYC 2803</td>
<td>Special Topics</td>
<td></td>
</tr>
<tr>
<td>PSYC 3031</td>
<td>Exper Anal of Behavior</td>
<td></td>
</tr>
<tr>
<td>PSYC 4010</td>
<td>Human Abilities</td>
<td></td>
</tr>
<tr>
<td>PSYC 4011</td>
<td>Cognitive Psychology</td>
<td></td>
</tr>
<tr>
<td>PSYC 4020</td>
<td>Biopsychology</td>
<td></td>
</tr>
<tr>
<td>PSYC 4025</td>
<td>Learning and Memory</td>
<td></td>
</tr>
<tr>
<td>PSYC 4041</td>
<td>Human Sensation &amp; Percep</td>
<td></td>
</tr>
<tr>
<td>PSYC 4050</td>
<td>History and Systems</td>
<td></td>
</tr>
<tr>
<td>PSYC 4090</td>
<td>Cognitive Neuroscience</td>
<td></td>
</tr>
<tr>
<td>PSYC 4100</td>
<td>Behavioral Pharmacology</td>
<td></td>
</tr>
<tr>
<td>PSYC 4200</td>
<td>Adv Topics-Cognitive Psy</td>
<td></td>
</tr>
<tr>
<td>PSYC 4260</td>
<td>Psychology of Aging</td>
<td></td>
</tr>
<tr>
<td>PSYC 4270</td>
<td>Psychological Testing</td>
<td></td>
</tr>
<tr>
<td>PSYC 4600</td>
<td>Senior Thesis I</td>
<td></td>
</tr>
<tr>
<td>PSYC 4699</td>
<td>Undergraduate Research</td>
<td></td>
</tr>
</tbody>
</table>

**Free Electives**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
</table>

Pass-fail only allowed for Free Electives.

At least 39 hours of upper division (3000/4000 level) coursework are required.

At least 21 hours of 3000/4000 level psychology courses must be taken summed across major requirements and PSYC electives.

1. CHEM 1211K or CHEM 1212K or CHEM 1310 or PHYS 2211 or PHYS 2212 or PHYS 2231 or PHYS 2232.
2. Maximum of three credit hours of PSYC 2699 or PSYC 4699.
3. Minimum grade of C required.
4. The extra hour from Social Science elective may be used to meet free elective hours.
5. If PSYC 4020 (3 credit hour course) is taken for major field requirement choice, then one additional hour of PSYC elective is required.
6. If PSYC 4025 (3 credit hour course) is taken for major field requirement choice, then one additional hour of PSYC elective is required.

**International Plan**

Psychology’s International Plan follows the Institute model to develop a global competence within the student’s major program of study. It thus integrates the student’s international studies and experiences with the School’s quantitative and experimental approaches to the study of behavior.

In addition to the requirements for the BS in Psychology, students must complete the following:

1. take three international courses, including one from each of the following categories: international relations, global economics, and a course on a specific country or region;
2. spend two consecutive terms abroad engaged in fulfilling psychology electives (must be approved by the School of Psychology prior to enrolling in courses), free electives, humanities, and/or social science electives;
3. demonstrate language proficiency equivalent to two years of college-level language study (to be determined by testing); and,
4. incorporate the international experience within the capstone course or the senior thesis.

**Research Option**

The curriculum is technically oriented and stresses quantitative and experimental approaches to the study of behavior. The undergraduate curriculum is based on a strong emphasis in the sciences and mathematics and provides an excellent preparation for graduate school in psychology, medical school, law school, and other professional and academic graduate programs. The Research Plan in the School of Psychology provides additional research experience for those students seeking to continue their education in graduate school.

**Bachelor of Science in Public Policy**

The Bachelor of Science in Public Policy (BS PP) provides an education that combines strong analytical skills with understanding of a range of
The program’s emphasis on the development of problem-solving and analytical skills constitutes a strong comparative advantage for BS PP graduates, many of whom move on to law school, management consulting, public sector policy analysis, or nonprofit management.

The curriculum moves from disciplinary foundations (in politics, economics, philosophy, and organization theory) to methods of research and data analysis, and to detailed studies of particular policy problems. Students choose two clusters in environment and energy policy, science and technology policy, social and urban policy, philosophy, or politics and policy, and can select electives in additional areas such as information and telecommunication policy, bioengineering and ethics, and regional development policy. All students have opportunities for internships, research, and study abroad or exchange programs. The BS PP program culminates in a senior-year two-semester capstone “task force” in which students work in teams with outside clients (e.g., Centers for Disease Control, Marcus Autism Center, Multiple Sclerosis Society, Atlanta Food Bank) on actual policy problems.

Cluster Electives

Environmental and Energy Policy Cluster

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>PUBP 3030</td>
<td>Policy Analysis</td>
<td>3</td>
</tr>
<tr>
<td>PUBP 3120</td>
<td>Stat Analysis-Pub Policy</td>
<td>3</td>
</tr>
<tr>
<td>PUBP 3130</td>
<td>Research Methods</td>
<td>3</td>
</tr>
<tr>
<td>PUBP 4010</td>
<td>Policy Task Force I</td>
<td>3</td>
</tr>
<tr>
<td>PUBP 4020</td>
<td>Policy Task Force II</td>
<td>3</td>
</tr>
<tr>
<td>PUBP 2651</td>
<td>Public Policy Internship</td>
<td>3</td>
</tr>
<tr>
<td>or PUBP 465</td>
<td>Public Policy Internship</td>
<td></td>
</tr>
</tbody>
</table>

Clusters

Students must select nine hours each from two clusters. See Cluster Electives below for options.

Non-Major Cluster

Any POL, PHIL, or PUBP course

Free Electives

Free Electives

Total Credit Hours 122

Pass-fail only allowed for Free Electives.

1. Must be chosen from the following list: any AE, CEE, ECE, ESYE course, AE 1770/CHEM 1770/ME 1770, BC 3630, BIOL 2335, BIOL 2344, BIOL 4755, CHEM 2211, CHEM 2311, CHEM 2312, CHEM 2380, CHEM 3380, COA 6744, CS 6764, CP 4510, CS 1171, CS 1316, CS 1331, CS 1352, CS 6754/ME 6754, EAS 2420, EAS 2600, EAS 2655, EAS 2750, EAS 4420, EAS 4430, EAS 4450, EAS 4602, ECE 2030, ID 3103, ID 4103, LMC 2700, LMC 2730, LMC 3402, LMC 3710, LMC 6312, ME 2016, MGT 2200, MGT 2251, MGT 4051, MGT 4058, MUSI 4630, PHYS 2030, PHYS 2213, PHYS 3123, PHYS 3141, PHYS 3266, PHYS 4142, PSYC 2020, PSYC 2270, PSYC 3011, PSYC 3020, PSYC 3031, PSYC 3040, PSYC 3790, PSYC 4010, PSYC 4031, PSYC 4050, PSYC 4090, PSYC 4100, PSYC 4270.

2. Minimum grade of C required.

3. MATH 1111 and MATH 2804 not allowed.

Cluster Electives

Environmental and Energy Policy Cluster

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHIL 4176</td>
<td>Environmental Ethics</td>
<td>3</td>
</tr>
<tr>
<td>PUBP 3315</td>
<td>Environ Policy &amp; Politics</td>
<td>3</td>
</tr>
<tr>
<td>PUBP 3600</td>
<td>Sustain, Tech &amp; Policy</td>
<td>3</td>
</tr>
<tr>
<td>PUBP 4338</td>
<td>Environ Impact Assesment</td>
<td>3</td>
</tr>
<tr>
<td>PUBP 6300</td>
<td>Earth Systems</td>
<td>3</td>
</tr>
<tr>
<td>PUBP 6310</td>
<td>Environmental Issues</td>
<td>3</td>
</tr>
<tr>
<td>PUBP 6312</td>
<td>Economics-Environ Policy</td>
<td>3</td>
</tr>
<tr>
<td>PUBP 6314</td>
<td>Policy Tools-Environ Mgt</td>
<td>3</td>
</tr>
<tr>
<td>PUBP 6326</td>
<td>Environ Values &amp; Pol Goals</td>
<td>3</td>
</tr>
<tr>
<td>PUBP 6330</td>
<td>Environmental Law</td>
<td>3</td>
</tr>
<tr>
<td>PUBP 6760</td>
<td>Negotiation &amp; Conflict Mgt</td>
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Science and Technology Policy Cluster

<table>
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<tr>
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<th>Title</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>PHIL 3127</td>
<td>Sci, Tech &amp; Human Values</td>
<td>3</td>
</tr>
<tr>
<td>PUBP 3502</td>
<td>IT/Comm/Telecom Policy</td>
<td>3</td>
</tr>
<tr>
<td>PUBP 4111</td>
<td>Internet &amp; Public Policy</td>
<td>3</td>
</tr>
</tbody>
</table>
BS/MS Public Policy

The School of Public Policy offers a BS/MS program for students enrolled in the undergraduate program who demonstrate an interest in and ability for additional education beyond the BS degree.

Students in the BS/MS program remain undergraduates until they meet requirements for the undergraduate degree, at which point they receive their BS degree and change to graduate status. Students are eligible to apply for the program after completion of 30 semester credit hours at Georgia Tech (i.e., at the end of their first year), and if they show appropriate progress in their degree program thereafter. Admissions decisions will be based on GPA and judgments of the faculty who have served as advisors or instructors. Continuation in the program requires the student to maintain a GPA of 3.0 or higher in public policy courses. Students participating in this program will be eligible for the six semester credit-hour Graduate Course Option, which allows students completing both the bachelor’s and master’s in the same discipline to use up to 6 credit hours of graduate-level coursework in the major discipline for both degrees.

The graduate-level credits required in the BS/MS Program are usually as follows:

<table>
<thead>
<tr>
<th>Core</th>
<th>22</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electives</td>
<td>12</td>
</tr>
<tr>
<td>Research Paper</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total Credit Hours</strong></td>
<td>37</td>
</tr>
</tbody>
</table>

### Specific Requirements for the Program

#### Required Courses

- PUBP 6001 Intro to Public Policy
- PUBP 6010 Ethic,Epistem&Public Pol
- PUBP 6112 Research Dsgn-Policy Sci
- PUBP 3130 Research Methods
- PUBP 6114 Applied Policy Methods
- PUBP 6116 Microecon-Policy Analy
- PUBP 6118 Public Finance & Policy
- PUBP 6210 Course PUBP 6210 Not Found

#### Select one of the following:

- PUBP 6014 Organization Theory
- PUBP 6017 Public Management
- PUBP 6018 Policy Implement & Admin

#### Concentration

- Concentration 2 6

**Total Credit Hours** 31

1. NOTE: This course should be taken as an undergraduate instead of PUBP 3130 and will count for both programs.
2. Students are required to develop, in consultation with their advisor, a six credit hour concentration in an area or specialty relevant to public policy and management (e.g. environmental policy, science and technology policy, urban policy, economic development, information and communications policy, policy evaluation, public management).

Contact the BS PP program director for further information.

BS/MS Information (http://www.spp.gatech.edu/graduate/five-year-bsms-program)

### Doctor of Philosophy with a Major in Aerospace Engineering

The School of Aerospace Engineering offers a doctoral degree. The PhD degree is a research degree.

The degree requires fifty semester hours of coursework beyond the bachelor’s degree; however, the main emphasis is on the research leading
to a PhD dissertation. The candidate must pass a qualifying examination and present a thesis proposal and a thesis defense. A GPA of 3.25 is required to graduate with a PhD degree. All coursework, including Special Problems, must be taken on a letter-grade basis. The programs of study for both the master's and doctoral degrees are very flexible and can be tailored, in agreement with the student’s advisor, to meet the candidate's professional goals.

For further details governing the graduate program, access the Aerospace Engineering Graduate Handbook at www.ae.gatech.edu (http://www.ae.gatech.edu). Graduate students may specialize in the following areas: aerodynamics and fluid mechanics, aeroelasticity and structural dynamics, flight mechanics and control, propulsion and combustion, structural mechanics and materials behavior, and system design and optimization. Further information on these areas of specialization and research can be found at www.ae.gatech.edu/research (http://www.ae.gatech.edu/research).

**Doctor of Philosophy with a Major in Algorithms, Combinatorics, and Optimization**

One of the most rapidly growing areas of research in applied mathematics, computer science, and operations research has been dealing with discrete structures. This has been most evident in the fields of combinatorics, discrete optimization, and the analysis of algorithms. Increasingly, work in each of these subjects has come to depend on knowledge of all of them. Indeed, many of the most significant advances have resulted from the efforts of researchers in more than one, if not all three, of these areas.

In response to these developments, Georgia Tech has introduced a doctoral degree program in Algorithms, Combinatorics, and Optimization (ACO). This multidisciplinary program is sponsored jointly by the School of Mathematics, the School of Industrial and Systems Engineering, and the College of Computing. Faculty for the program are drawn from these three sponsoring units, as well as from the School of Electrical and Computer Engineering and the College of Business.

The ACO program is arranged to bring together the study of discrete structures and the design and analysis of algorithms in areas such as graph theory, integer programming, combinatorial optimization, and polyhedral theory. It is intended for students possessing a strong background in one or more of the fields represented by the three sponsoring units. Each student in the program has a single home department chosen from the School of Mathematics, the School of Industrial and Systems Engineering, and the College of Computing. Courses for the program are drawn from all three of these units, and include study in such areas as combinatorial methods, algebraic structures, probability, the analysis of algorithms, computational complexity, linear programming, discrete optimization, and convex analysis.

The College of Computing is one of the sponsors of the multidisciplinary program in Algorithms, Combinatorics, and Optimization (ACO), an approved doctoral degree program at Georgia Tech. The other sponsoring units are the Stewart School of Industrial and Systems Engineering and the School of Mathematics. The degree program is administered by an oversight committee drawn primarily from the sponsoring units.

The study of discrete structures is a rapidly growing area in computer science, applied mathematics, and operations research, most obviously in the analysis of algorithms, combinatorics, and discrete optimization. Collaborative work among the three traditionally separate disciplines is already common. The doctorate in Algorithms, Combinatorics, and Optimization will prepare students for careers in this exciting and expanding field.

Students are expected to be well prepared in at least one of the three fields represented by the sponsoring units (computer science, mathematics, and operations research). Each student in the program is admitted through one of the three sponsoring units, which serves as the home department. Coursework is drawn from all three disciplines. The research advisor may be any member of the ACO program faculty, which is drawn from electrical and computer engineering, management, and other disciplines in addition to the three sponsoring units.

PhD A.C.O. Information (http://www.aco.gatech.edu)

**Doctor of Philosophy with a Major in Applied Physiology**

The School of Biological Sciences offers a multidisciplinary and integrative PhD program in Applied Physiology focused on the study of human movement and mobility, with research concentrations in biomechanics, neuromechanics, motor control and behavior, muscle cellular and systems physiology, and exercise physiology. Applied physiology refers to the study of normal and abnormal regulation and integration of mechanisms across all levels of biological organization (molecules to cells to organs to organ systems). The course of graduate study focuses on original, independent research culminating in the doctoral dissertation.

All students are required to complete the following:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Required Courses</td>
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<tr>
<td></td>
<td>Minor Concentration</td>
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<td>Specialized Focus Area</td>
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<tr>
<td></td>
<td>Dissertation Research</td>
<td>12</td>
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<tr>
<td></td>
<td>Total Credit Hours</td>
<td>42</td>
</tr>
</tbody>
</table>

**Doctor of Philosophy with a Major in Architecture**

The program leading to the Doctor of Philosophy degree in the College of Design has been developed to enable students of exceptional ability to undertake advanced study and original research in the fields of study within the College of Design. Currently the program includes several areas of research emphasis:

1. Design Computation
2. Building Technology & Performance
3. Architecture, History & Society
4. Architecture, Culture & Behavior

**Design Computation**

Digital-based information technologies have profoundly affected architectural discourse and practice. New types of representation and manufacturing, emergent materials and technologies, innovating modes of collaboration and project delivery, all constitute a profoundly new
discourse that has revolutionized the ways architects design, think and talk about architecture, design and buildings. The Design Computation area addresses this emergent all encompassing computational basis for architectural design by inquiring on a variety of related sub-areas including generative and parametric design, digital fabrication, prototyping and robotics, building information modeling (BIM), immersive visualization and virtual reality, databases and user interfaces, formal specification of shape and style, and computer implementation of analytical and design tools. The work draws upon relations with other disciplines at Georgia Tech including allied fields within the College of Design as well as the Colleges of Computing, Engineering, Sciences, Business, and the Liberal Arts.

**Building Technology & Performance**

The Ph.D. specialization in Building Technology & Performance advances the use of building physics, building technology, mathematics, controls, modeling, and simulation for the design and operation of high-performing buildings. The technical performance of buildings is the result of the complex interplay of highly variable boundary conditions with the physical behavior of many components operating in multiple domains. The capture of this interplay at appropriate resolution and aggregation with subsequent use in design and operational decisions is the major focus of our work. Research results generate new building performance knowledge in fields such as energy, sustainability, comfort, health, daylighting, productivity and other performance aspects.

**Architecture, History, and Culture**

The Ph.D. specialization in Architecture, History & Society promotes critical and scholarly reflection in architecture and urban design, with a special focus on issues linking theory and practice. Ongoing work extends a distinguished record of faculty and alumni scholarship in the field based upon the unique range of disciplines and professions available within the College of Design and Georgia Tech. While highlighting modern and contemporary architecture, faculty interests vary significantly by subject area, period, region, and methodological emphasis. These continuously evolving interests are dedicated to understanding the built environment as a form of cultural production. In different ways and with various techniques, faculty contribute to a growing field of cross-cultural studies and interdisciplinary scholarship that use rigorous concepts from humanistic, social scientific, and technical disciplines often considered to be outside the purview of architectural history and theory, to better understand the material, spatial, and intellectual dimensions of the physical world.

**Architecture, Culture, and Behavior**

The field of Architecture, Culture & Behavior explores how individual, social, organizational, and cultural behavior, performance, and experience relate to the design of buildings and urban space. We develop tools and methods to describe and quantify the properties of built form, model performance and evaluate design and their impacts on individual experience and organizational functioning. Underlying themes of inquiry include spatial cognition; the relationship between built space and social networks; the relationship between built space and the morphology of behaviors; the evolution of building types in relation to the changing programmatic requirements of their occupant organizations; the perceptual and functional implications of design languages. Particular studies explore a range of built environments: healthcare facilities that support higher quality care; workplace design that supports organizational culture and productivity; museum design that supports informal learning; urban design that supports active and vibrant communities.

For further details on the program, contact:
Robin Tucker, Academic Advising Manager
robin.tucker@design.gatech.edu
404-894-1213
Website: www.arch.gatech.edu/ (http://www.arch.gatech.edu)
Architecture PhD Information (http://www.arch.gatech.edu/phd-program)

**PhD in Architecture: Major Program Requirements and Key Milestones**

**Course Work Associated with the Major**

In their first two years, students take a minimum of thirty credits in the School of Architecture, as follows:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core courses on Introduction to Architecture Research</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Select Five 3-credit courses in an area of research specialization within the School.</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>Select an additional 12 credits at the 6000 level and above chosen in consultation with the advisor.</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td><strong>Total Credit Hours</strong></td>
<td></td>
<td><strong>30</strong></td>
</tr>
</tbody>
</table>

**Qualifying Paper**

In the second year of their studies students complete a qualifying paper, a paper of publishable standard that makes a contribution to knowledge.

**Comprehensive Examination in the Architecture Major**

At the end of the second year of their studies students take a comprehensive examination covering both the core curriculum and their area of specialization.

**Thesis Topic Proposal**

In their third year of studies students are expected to defend a PhD topic proposal. Upon successful defense of the proposal they are admitted to candidacy and proceed to work on their doctoral theses. The development of a thesis topic normally requires students to register for at least six credits of COA 8999.

**Minor Field of Studies**

In order to graduate students must also satisfy minimum Institute requirements regarding the minor field of study, as described in the relevant link provided in section 2 above. At this time (2010) students satisfy the minor by taking nine credit hours in related courses 6000 level and above, in a field of studies outside the School of Architecture to be determined in consultation with their advisor. This means that the minimum total number of course credits necessary in order to complete the program is forty-five: thirty-six for the major and nine for the minor.

**Doctoral Thesis**

The preparation of a Doctoral thesis normally requires a minimum of 6 credits COA 9000. The defense of the doctoral thesis is the final step in the program. A successful defense results in the student being recommended for the award of the PhD degree.
**Time to Completion of degree**

The minimum requirement to complete the PhD with a major in Architecture is seventy-two credits, which is equivalent to six semesters or three years of full-time study. We strive to ensure that the average time required to complete the PhD degree is no longer than four years. However, students who teach or work as GRAs, particularly those who seek to build a strong record of research, publications and teaching, sometimes take longer.

**Doctor of Philosophy with a Major in Bioengineering**

The Bioengineering PhD degree requires a thesis based on independent study of a bioengineering research topic under the guidance of a bioengineering program faculty member.

The Georgia Tech Interdisciplinary Bioengineering (BioE) Graduate Program was established in 1992. Over 170 students have graduated from the program in a broad spectrum of research by our ninety participating faculty (http://www.bioengineering.gatech.edu/faculty) from the Colleges of Engineering, Computing, Sciences, and Architecture as well as Emory University School of Medicine.

The BioE Program is interdisciplinary in that it is not a standalone academic unit like most departments or schools at Georgia Tech. This interdisciplinary graduate program offers advanced courses in bioengineering, engineering specialties, and life sciences combined with training in cutting-edge bioengineering research. Bioengineering research focuses on the development of new or improved physical and mathematical concepts and techniques that may be applied to problems in medicine and biology, including the fundamental study of biological phenomena and development of new medical devices. The Bioengineering Program offers master’s and doctoral degrees through participating Schools in the College of Engineering and the College of Computing. The curriculum involves engineering and life sciences coursework and provides flexibility to concentrate in specific areas to develop multidisciplinary and integrated training.

Eight different academic units from the Colleges of Engineering and Computing make up the program. However, the BioE Program provides the degree requirements for students accepted into the program. This approach allows a flexible, integrative, and individualized degree program that enforces depth and breadth in coursework, a solid bioengineering research experience, and yet is reflective of the disciplinary background of the student’s home school. Importantly, the BioE Program provides research opportunities for students with any participating program faculty, allowing tremendous diversity and flexibility for research topics and advisors.

Additional information on the Bioengineering Program, including how to apply and a comparison between the Bioengineering Program and traditional engineering programs, can be found at www.bioengineering.gatech.edu (http://www.bioengineering.gatech.edu).

**Objective of the Program**

The mission of the Georgia Tech Bioinformatics PhD Program is to educate and prepare graduate students to reach the forefront of leadership in the field of bioinformatics and computational biology; and to integrate research and education on the use of information technologies in biology and medicine. Thus, the program leading to a PhD in Bioinformatics is an interdisciplinary program spanning a variety of academic departments at Georgia Tech.

Bioinformatics is a multidisciplinary field in which life sciences, computer science, physical sciences, and engineering are merged to solve both fundamental and applied problems in biology and medicine. The outcomes of bioinformatics and computational biology particularly include:

- new and global perspectives into the organization and function of biological systems (fundamental biology);
- new and novel targets for drug discovery and development; and
- genetic/proteomic profiling for pharmaco-genomics or personalized medicine.

Thus, Bioinformatics is emerging as a strategic discipline at the frontier between Biology, Biochemistry, Biomedicine, Bioengineering, Computer Science and Mathematics, impacting fundamental science, medicine, biotechnology, and society.

With its broad mission statement, this program at Georgia Tech has the following focus / strength areas:

- Development of software tools, algorithms, and databases for gene identification, protein structural prediction, clustering analysis, and data mining.
- Application of bioinformatics to disease diagnosis, classification, prognosis, and treatment.
- Application of bioinformatics to fundamental biology and systems biology.

The requirements for each student in the PhD program in Bioinformatics include the successful completion of a set of core courses in Biology, Biochemistry, Mathematics, and Computer Science, while the main emphasis of the program is on the successful completion of an original and independent research project. Each student must also complete a minor program of study in accordance with Institute policies.

PhD Bioinformatics (http://bioinformatics.gatech.edu)

**Doctor of Philosophy with a Major in Biology**

Each PhD student will acquire a thorough knowledge of a selected area of specialization, a broad knowledge of the field, and competence in the basic sciences. The main emphasis is on the successful completion of an original and independent research project. The purpose of our PhD program is to prepare highly qualified scientists who have excellent, up-to-date training in the fields of biology or bioinformatics, who are actively involved in scientific research, are capable of making significant
contribute to their scientific field, possess all the necessary skills for effective oral and written communication with colleagues, and can successfully compete in the job market for postdoctoral and research scientist level positions in academia, science-related industries, and a wide range of other careers.

Biology Graduate Programs Website (http://www.biology.gatech.edu/graduate-programs)

**Doctor of Philosophy with a Major in Biomedical Engineering**

The Joint Biomedical Engineering PhD program is offered through the Wallace H. Coulter (WHC) Department of Biomedical Engineering at Georgia Tech and Emory University. The degree is conferred jointly by Georgia Tech and Emory. The curriculum is based on an integration of life sciences, engineering, and mathematics. The goal is to enable students to postulate and solve biomedical problems quantitatively and with a systems perspective. Both Georgia Tech and Emory faculty provide an integrative teaching medium for students by team teaching courses.

The curriculum will facilitate individual flexibility and depth of study through coursework selected by the student (and thesis advisor) in specific categories: BME Integrative Core, Engineering/ Bioscience Fundamentals, and BME Advanced Graduate Seminar. Other requirements include a bioethics course, a teaching course, a teaching practicum, and a nine-hour minor program of study outside the student’s thesis research area. The resulting total minimum number of required hours is 35. It is anticipated (although not required) that students may take other elective coursework to fulfill the requirements of their individual research projects and/or training grants.

Soon after enrollment, students are matched with a thesis advisor based upon mutual interest. After successfully passing the qualifying examination, students submit a request for approval of their Thesis Reading Committee. Upon successful completion of all degree requirements, students will be awarded the PhD degree by the graduate schools of Georgia Tech and Emory.

**Minimum Prerequisites**

BS in Engineering or Life Sciences
One year of calculus-based physics
One semester of organic chemistry (two semesters recommended)
Calculus through differential equations

Biomedical Information (http://www.bme.gatech.edu)

**Foreign Study Programs**

An additional option for the joint biomedical engineering degree is offered between the WHC Department of Biomedical Engineering at Georgia Tech & Emory University and Peking University in Beijing, China. The curriculum is the same with the addition of global perspectives courses. Students spend the majority of their time in the program on the “home” campus (either Atlanta or Beijing) with one year abroad for research with a faculty co-advisor. This partnership provides the opportunity to create a new paradigm for global biomedical engineering education and research. The program offers a unique means for U.S. and Chinese students who want to learn and work in a global economy and in global health settings. Program graduates will be prepared to become global leaders of innovation who can contribute to cultural, political, economic and health concerns in their home countries and around the world.

**Doctor of Philosophy with a Major in Building Construction**

The Doctor of Philosophy degree program in the School of Building Construction (BC) was approved by the Board of Regents in October 2011; the degree awarded is the Doctor of Philosophy with a major in Building Construction.

For more information, contact:

*Academic Advisor*
School of Building Construction
Georgia Institute of Technology
Atlanta, Georgia 30332-0680
404.385.7089
www.bc.gatech.edu (http://www.bc.gatech.edu)

The program of study requires a minimum of two years of full-time residency (not fewer than four semesters excluding summer) devoted to coursework and other preparation for advancement to candidacy. A total of 60 credit hours will be required for this PhD degree beyond the master’s degree.

Programs of study must include:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>BC 7100</td>
<td>Quant Meth Constr Resch</td>
<td>3</td>
</tr>
<tr>
<td>BC 7200</td>
<td>Adv Readings In BC</td>
<td>6</td>
</tr>
<tr>
<td>BC 8000</td>
<td>PhD Seminar</td>
<td>1</td>
</tr>
<tr>
<td>BC 8100</td>
<td>Research Methodology</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td><strong>Concentration Electives</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Select a minimum of twelve credit hours.</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td><strong>Minor</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Select a minimum of 9 credit hours.</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td><strong>Thesis</strong></td>
<td></td>
</tr>
<tr>
<td>BC 8999</td>
<td>Doctorial Thesis Prep</td>
<td>12</td>
</tr>
<tr>
<td>BC 9000</td>
<td>Doctoral Thesis</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td><strong>Total Credit Hours</strong></td>
<td>60</td>
</tr>
</tbody>
</table>

A minimum of twelve credit hours of concentration electives, chosen from a list of approved electives (revised every semester by the faculty in the School of Building Construction). This list is composed of graduate courses offered by other graduate programs at Georgia Tech.

The major and minor requirements are minimums; the particular field of study may require additional work.

Additional requirements will be established by the PhD advisor, in consultation with the BC Graduate Faculty on a case-by-case basis, in order to ensure each student is taking courses which can directly assist them toward gaining advanced proficiency in their chosen area of research.

A program of study must be approved by the student’s PhD Advisor. Each student will have a plan of study to ensure that the student’s educational goals may be achieved while meeting the academic policies of the Institute and the PhD program. The Building Construction PhD
program will enable students of exceptional ability and with a strong interest in research to undertake advance study in the field of building construction and facility management; it will also build off existing collaborations between the School and other academic units in the Institute to encourage interdisciplinary scholarship.

A student must choose a minor field of study that is most relevant to her or his research, with the major field being in Building Construction. The minor field must be outside of the School of Building Construction, must include at least nine hours of coursework, taken on a letter grade basis of "B" or better, and must be approved by the PhD Advisor, working in consultation with Graduate Faculty in the School of Building Construction, and the Office of Graduate Studies and Admissions. Although the student’s plan of study will be approved, the student must additionally submit a letter and receive approval for the completion of the coursework on the chosen minor.

An overview of program requirements includes:

- A Program of Study must be approved by the student’s PhD Advisor. Additional requirements may be set by the Graduate Faculty in the School of Building Construction.
- The student must have a minor field of study; the minor field must be outside of the School of Building Construction and must include at least nine hours of coursework. The minor must be approved by the PhD Advisor, working in consultation with BC Graduate Faculty, and the Office of Graduate Studies.
- Complete a Qualifying Paper, if applicable.
- Pass a PhD comprehensive (qualifying) examination consisting of written and oral portions.
- Complete a PhD proposal and orally defend the proposal. The student is considered a PhD candidate at that time.
- Complete a PhD dissertation and orally defend the dissertation.

To remain in good standing in the program, a student must be enrolled in a minimum of 6 credit hours of coursework (not including independent study) per semester during completion of the required four semesters in residence. Exceptions to this requirement will be allowed upon approval of the BC Graduate Faculty.

After or while taking the required six credit hours of Advanced Readings in Building Construction (BC 7200), that will prepare the student for the Comprehensive Examinations, the student must register for a minimum of twelve hours of Doctoral Thesis Preparation (BC 8999); generally these hours are taken in the third year of study in preparation for the Dissertation Proposal. Typically, an additional year or more is required to complete the dissertation. During semesters the student is working on the dissertation, he/she must register for a minimum of 3 credit hours of Doctoral Thesis Preparation (BC 9000). In total, a minimum of 14 credit hours of BC 9000 are required for graduation, and a minimum of 26 credit hours of thesis hours are required. Satisfaction of the requirements for the Ph.D. degree includes successful public defense of the dissertation.

### Curriculum Overview

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>BC 7100</td>
<td>Quant Meth Constr Resch</td>
<td>3</td>
</tr>
<tr>
<td>BC 7200</td>
<td>Adv Readings In BC</td>
<td>6</td>
</tr>
<tr>
<td>BC 8000</td>
<td>PhD Seminar</td>
<td>1</td>
</tr>
<tr>
<td>BC 8100</td>
<td>Research Methodology</td>
<td>3</td>
</tr>
</tbody>
</table>

### Concentration Electives

To include the study of: history and precedent in the field; theory and concepts and their evolution; current debate; and methods of analysis and inquiry.

### Minor Field of Study

To include the study of: relevant history and precedent in the field; relevant theory; current debate; and methods of analysis and inquiry.

### Thesis Preparation

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>BC 8999</td>
<td>Doctorial Thesis Prep (minimum)</td>
<td>12</td>
</tr>
<tr>
<td>BC 9000</td>
<td>Doctorial Thesis (minimum)</td>
<td>14</td>
</tr>
</tbody>
</table>

Total Credit Hours 60

### Doctor of Philosophy with a Major in Chemical Engineering

The School of Chemical & Biomolecular Engineering offers graduate programs involving advanced-level coursework and independent research leading to MS and PhD degrees in chemical engineering. The MS degree may also be obtained by coursework only. Course selection for both the MS and doctoral degrees is quite flexible, with individual plans of study developed for each student. Research opportunities exist in a broad range of areas of importance to chemical engineers and society, including catalysis, reaction kinetics, complex fluids, microelectronics, microfluidics, optimization, bioinformatics, polymers, sustainable development, pulp and paper, separations, CO2 capture, biomedicine, solar energy, thermodynamics, MEMS, environmental science, reaction engineering, cancer diagnostics and therapeutics, biofuels, air quality, modeling, and process synthesis and control. Furthermore, the School of Chemical & Biomolecular Engineering participates with several other schools in offering MS and PhD degrees in Bioengineering and Paper Science and Engineering.

Chemical and Biomolecular Engineering Website (http://www.chbe.gatech.edu)

### Doctor of Philosophy with a Major in Chemistry

The goal of the doctoral program is to provide proficient knowledge in a specialized area of chemistry, with particular emphasis being placed on original, independent, and scholarly research. Students working toward a PhD must complete fifteen credit hours of courses and a series of seminar courses. Students should complete all course requirements in the first year of graduate study and present a seminar in the second year. The PhD candidacy examination consists of a series of examinations in the major area based on a reading assignment from the recent literature and an original research proposal to be completed by the end of the second year. Independent research for the PhD is demonstrated by completion of published work.

Chemistry Website (http://www.chemistry.gatech.edu)

### Doctor of Philosophy with a Major in City and Regional Planning

Georgia Tech has been awarding doctoral degrees with concentrations in city and regional planning since 1985, producing distinguished...
academics and scholars who work in universities and other research settings.

PhD students pursue advanced studies and research on issues most critical to the field of city and regional planning. The PhD program engages extensively with other programs, research centers, and colleges as it delivers its major and minor fields of study. Program graduates are expected to be well qualified to serve in a range of settings such as universities, planning consultancies, research and development firms, government agencies, and advanced practice.

Successful applicants have exceptional potential as scholars and fit with the School’s research capabilities. Many applicants have completed an accredited master’s degree in city and regional planning or a related field and have backgrounds in their proposed area of specialization. The program does admit capable applicants lacking this preparation, but these applicants may be required to undertake remedial work. Students are generally admitted for first enrollment for the fall semester only.

The program requires Graduate Record Examination (GRE) test scores taken within the last five years. Scores are expected to be well above the average. Non-native speakers of English are expected to have a minimum IB TOEFL score of at least 620/261/102 (paper, computer, and internet tests, respectively). Prior study in the United States does not waive this requirement.

For more information about the PhD program, contact:

Academic Advisor
Graduate Student Admissions, Advising, and Graduation Clearance
School of City and Regional Planning
College of Design
Georgia Institute of Technology
Atlanta, Georgia 30332-0155
Email: crp@design.gatech.edu

Doctor of Philosophy with a Major in Civil Engineering

The Ph.D. program in the School of Civil and Environmental Engineering is offered to students with an excellent academic background and a capacity for independent research. Doctoral candidates tailor a highly individualized Program of Study (typically 50 credit hours of courses beyond the bachelor's degree) to develop expertise in their major specialization area. As part of the Program of Study, candidates must complete a Minor Field of Study (http://www.ce.gatech.edu/academics/graduate). To demonstrate the ability for independent research, the candidate must pass a qualifying examination, a thesis proposal, and a thesis defense. Candidates are required to complete a doctoral thesis reporting the results of original and independent research that derives from the scientific method and demonstrates creativity and technical expertise in the principles and methods essential to modern Civil & Environmental Engineering.

Major Areas of Specialization are:

- Construction and Infrastructure Systems Engineering
- Environmental Engineering
- Geosystems Engineering
- Structural Engineering, Mechanics and Materials
- Transportation Systems Engineering
- Water Resources Engineering

Doctor of Philosophy with a Major in Computational Science and Engineering

The Computational Science and Engineering (CSE) program is an interdisciplinary program addressing the body of knowledge, skills, and practices associated with the study of computer-based models of natural phenomena and engineered systems. Students will be required to obtain a breadth of knowledge across a set of core areas, depth of knowledge in a specific computational specialization (e.g., numerical computing), and knowledge to apply computational techniques in a domain of application. Students will be expected to integrate principles from mathematics, computing, science, and engineering to be able to create significant computational artifacts (e.g., software), and to complete independent research that advances the state-of-the-art in the CSE discipline.

The CSE Ph.D. degree program is an interdisciplinary program offered by the College of Computing, the College of Engineering, and the College of Sciences. Once admitted, students follow the CSE program’s degree requirements and curriculum.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSE 6001</td>
<td>Intro-Comp Sci &amp; Engr</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td><strong>Core Courses</strong></td>
<td></td>
</tr>
<tr>
<td>CSE/MATH</td>
<td>Numerical Linear Algebra</td>
<td>12</td>
</tr>
<tr>
<td>6643</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CSE 6140</td>
<td>Comp Sci&amp;Engr Algorithms</td>
<td></td>
</tr>
<tr>
<td>CSE 6730</td>
<td>Model&amp;Sim:Found&amp;Implement</td>
<td></td>
</tr>
<tr>
<td>CSE/ISYE</td>
<td>Computational Data Analy</td>
<td></td>
</tr>
<tr>
<td>6740</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CSE 6220</td>
<td>High Perform Computing</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Computation Specialization</strong></td>
<td></td>
</tr>
<tr>
<td>Select at least nine credit hours of specialization courses.</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Application Specialization</strong></td>
<td></td>
</tr>
<tr>
<td>Select at least nine credit hours of specialization courses.</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>Qualifying Exam</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Doctoral Thesis</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total Credit Hours 31

1 The computational specialization includes at least nine hours of courses that increase the student’s depth of understanding of computational methods in a specific area, as approved by the student’s academic advisor. These courses must go beyond “using computers” to deepen understanding of computational methods, preferably in the context of some application domain.

2 At least nine hours of PhD courses must be courses that do not carry the CS/CSE course designation. These hours may be taken in CEE. Hours taken as part of the computation and/or application specialization can be used to fulfill this requirement.

3 The application specialization includes at least nine hours of courses that increase depth of understanding in an application field; these need not be computation-focused courses.
A qualifying examination must be attempted by the end of the second year of enrollment in the CSE doctoral program (normally taken after the student completes CSE core coursework). A qualifying examination committee shall be appointed by the CSE program coordinator for each student and is responsible for making an overall recommendation concerning the outcome of the qualifying examination.

Students are required to complete a doctoral thesis reporting the results of independent research that advances the state-of-the-art in the computational science and engineering discipline. The thesis must be successfully defended to the student's thesis committee.

Doctor of Philosophy with a Major in Computer Science

The Computer Science Doctoral Program begins with research and breadth components. The research component helps students place an early focus on research. Students must complete an "Introduction to Graduate Studies" course (CS 7001) and then take at least three credit hours of directed research study (CS 8903) under faculty guidance each semester until their qualifying examination. The breadth component is intended to facilitate students' learning about a variety of areas within computing, as well as core computer science areas. Students must take at least twelve courses from the different areas of study within the College. The current twelve areas are computer architecture, database systems, graphics and visualization, human-computer interaction, information security, intelligent systems and robotics, learning sciences and technology, networking and communications, programming languages and compilers, software methodology and engineering, systems (including operating systems, distributed and parallel systems), and theoretical computer science. Students must include courses from the systems and theory areas in those breadth courses.

As students’ research progresses, they must select a primary, and possibly secondary, area of focus from the areas listed previously, and then pass a qualifier (comprehensive exam) in that area or areas. The qualifier consists of three parts:

1. A one-day written examination covering the pertinent research area(s)
2. The submission of a high-quality research deliverable, as evidenced by a portfolio consisting of at least an exam committee-reviewed and publishable article, and possibly other work products as approved by the exam committee
3. An oral presentation and examination

After successfully completing the qualifier, a student focuses on research leading toward a dissertation. The topic of the student's research is formalized through a written dissertation proposal followed by an oral presentation. When the student passes his or her proposal, the student is admitted to candidacy and proceeds with dissertation research. This phase is completed with the successful defense and submission of the approved doctoral dissertation. Students are also required to complete a nine-hour minor outside the College.

For more information about the Computer Science PhD program, visit www.cc.gatech.edu (http://www.cc.gatech.edu).

Doctor of Philosophy with a Major in Digital Media

The Digital Media PhD was inaugurated in fall 2004 and is one of the first of its kind worldwide. The program educates research-oriented theorists/practitioners who bring the traditions of the humanities and arts to the design of digital media. The program provides the theoretical and practical foundations for research and leadership careers in academia and industry, critically engaging with the design, use, and role of digital media in culture.

Graduates of the program are prepared to work in industry, public service, and universities, shaping the emerging digital genres and expanding our understanding and mastery of the representational power of the computer.

The PhD program accepts 3-5 new candidates each year.

For more information visit: http://dm.lmc.gatech.edu/program/phd-program/

The core curriculum is designed to cover three fundamental areas:

1. critical history, theory, and practice of using of computing technologies for expressive purposes
2. advanced principles of interaction design
3. applied research methods in digital media

Foundational and Required Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>LMC 6310</td>
<td>The Computer Expressive</td>
<td>3</td>
</tr>
<tr>
<td>LMC 6313</td>
<td>Prin of Interaction Desi</td>
<td>3</td>
</tr>
<tr>
<td>LMC 6316</td>
<td>Historical Approachs Di</td>
<td>3</td>
</tr>
<tr>
<td>LMC 6399</td>
<td>Discovery &amp; Invention</td>
<td>3</td>
</tr>
<tr>
<td>LMC 6650</td>
<td>Project Studio (repeat 2 times)</td>
<td>6</td>
</tr>
<tr>
<td>LMC 6800</td>
<td>DM MS Project Course</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>or LMC 7000Master's Thesis</td>
<td></td>
</tr>
<tr>
<td>LMC 8000</td>
<td>Media Theory</td>
<td>3</td>
</tr>
<tr>
<td>LMC 8001</td>
<td>Digital Media Studies</td>
<td>3</td>
</tr>
<tr>
<td>LMC 9000</td>
<td>Doctoral Thesis</td>
<td>6</td>
</tr>
</tbody>
</table>

Minor Concentration

Minor Concentration 23

Electives

Select five of the following: 4

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
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</thead>
<tbody>
<tr>
<td>LMC 6311</td>
<td>Visual Culture and Desi</td>
</tr>
<tr>
<td>LMC 6312</td>
<td>Dsgn Tech &amp; Representati</td>
</tr>
<tr>
<td>LMC 6314</td>
<td>Design of Networked Medi</td>
</tr>
<tr>
<td>LMC 6315</td>
<td>Produc Production</td>
</tr>
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<td>LMC 6317</td>
<td>Interactive Fiction</td>
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<td>LMC 6318</td>
<td>Experimental Media</td>
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<td>LMC 6319</td>
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<td>LMC 6213</td>
<td>Edu Applications New</td>
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<tr>
<td>LMC 6215</td>
<td>Issues in Media Studies</td>
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<tr>
<td>LMC 6220</td>
<td>Globalization and New Me</td>
</tr>
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<td>LMC 6321</td>
<td>Architecture of Responsi</td>
</tr>
<tr>
<td>LMC 6650</td>
<td>Project Studio</td>
</tr>
<tr>
<td>LMC 7999</td>
<td>PhD Qualifying Prep (variable credit)</td>
</tr>
<tr>
<td>LMC 8803</td>
<td>Special Topics (repeatable)</td>
</tr>
</tbody>
</table>
Doctor of Philosophy with a Major in Earth and Atmospheric Sciences

In the doctoral program at the School of Earth and Atmospheric Sciences, students are engaged primarily in original, independent research that culminates in the doctoral dissertation. In this School, students can specialize in atmospheric chemistry, aerosols, and clouds; dynamics of weather and climate; geochemistry; geophysics; oceanography; paleoclimate; planetary science; and remote sensing. With approval of the School’s faculty, multidisciplinary programs of study are also permitted. In each area of specialization, doctoral students are required to complete a faculty-approved set of core courses and a comprehensive examination. Students are also required to complete nine credit hours of coursework in an academic minor.

Doctor of Philosophy with a Major in Economics

Our curriculum features 24 credit hours of first year core courses, at least 30 credit hours of fields, and electives, and at least 24 credit hours of dissertation research (see Requirements tab). Thus, the minimum number of credit hours to be fulfilled is 72. Students receive rigorous training in microeconomic theory and quantitative methods during their first year of study.

Planned Curriculum and Sample Schedule

First Year

<table>
<thead>
<tr>
<th>Fall</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECON 7004 Math for Economists</td>
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</tr>
<tr>
<td>ECON 7012 Microeconomic Theory I</td>
<td>3</td>
</tr>
<tr>
<td>ECON 7022 Econometrics I</td>
<td>3</td>
</tr>
<tr>
<td>Required Elective ¹</td>
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<tr>
<td><strong>Total Credit Hours</strong></td>
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</table>

Second Year

<table>
<thead>
<tr>
<th>Fall</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>Major Economics Field, Course I</td>
<td>3</td>
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<tr>
<td>Minor Economics Field, Course I</td>
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</tr>
<tr>
<td>Elective</td>
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<tr>
<td><strong>Total Credit Hours</strong></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Spring</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>Major Economics Field, Course II</td>
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</tr>
<tr>
<td>Minor Economics Field, Course II</td>
<td>3</td>
</tr>
<tr>
<td>Elective</td>
<td>6</td>
</tr>
<tr>
<td><strong>Total Credit Hours</strong></td>
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</table>

Third Year

<table>
<thead>
<tr>
<th>Fall</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>Major Economics Field, Course II</td>
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</tr>
<tr>
<td>Minor Economics Field, Course II</td>
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<tr>
<td>Elective</td>
<td>6</td>
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<tr>
<td><strong>Total Credit Hours</strong></td>
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</table>

Fourth Year

<table>
<thead>
<tr>
<th>Fall</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>Major Economics Field, Course III</td>
<td>3</td>
</tr>
<tr>
<td>Minor Economics Field, Course III</td>
<td>3</td>
</tr>
<tr>
<td>Elective</td>
<td>6</td>
</tr>
<tr>
<td><strong>Total Credit Hours</strong></td>
<td><strong>72</strong></td>
</tr>
</tbody>
</table>

¹ Require Elective Options: ECON 7015, ECON 7031, ECON 7032, ECON 8997, CETL 8713, CETL 8717, or course approved by Director of Graduate Studies.

We offer three specialization fields

• Environmental Economics,
• Industrial Organization and
• International Economics.

Our fields build on our set of core courses, providing students with opportunities to explore research topics within three distinct but related areas. Each field provides an equal mix of theory and practice, consisting of two 3 credit hour courses.

Students are required to have a major and at least one minor in fields offered by the School of Economics. Occasionally, the School of Economics will offer elective courses that complement our field courses. In addition, students are allowed to take elective courses outside of Economics subject to the approval of the Director of Graduate Studies. A set of elective courses taken in another discipline will constitute a minor in that particular discipline if at least two courses are taken from this discipline.
### Doctor of Philosophy with a Major in Environmental Engineering

The Ph.D. program in the School of Civil and Environmental Engineering is offered to students with an excellent academic background and a capacity for independent research. Doctoral candidates tailor a highly individualized Program of Study (typically 50 credit hours of courses beyond the bachelor’s degree) to develop expertise in their major specialization area. As part of the Program of Study, candidates must complete a Minor Field of Study (http://www.ce.gatech.edu/academics/graduate). To demonstrate the ability for independent research, the candidate must pass a qualifying examination, a thesis proposal, and a thesis defense. Candidates are required to complete a doctoral thesis reporting the results of original and independent research that derives from the scientific method and demonstrates creativity and technical expertise in the principles and methods essential to modern Civil & Environmental Engineering.

### Programs Leading to the Master’s and Doctoral Degrees in Electrical and Computer Engineering

Programs leading to the master’s and doctoral degrees in Electrical and Computer Engineering are provided by the School. Technical interest areas include bioengineering, computer systems and software, digital signal processing, electrical energy, electromagnetics, electronic design and applications, microsystems, optics and photonics, systems and controls, telecommunications, and VLSI systems and digital design.

The doctoral degree program is research-oriented and highly individualized. Typically, at least four years of study beyond the bachelor’s degree are required to complete the doctoral program.

PhD Information (http://www.ece.gatech.edu/academics/graduate/phdreq.html)

### Doctor of Philosophy with a Major in History and Sociology of Technology and Science

The School offers a program of graduate study in the history and sociology of technology and science at both the master’s and doctoral levels. The two-year master’s program consists of foundation courses in history, social theory, and research methods, as well as more specialized reading and research seminars. The program emphasizes the understanding of technology and science within a broad social and historical context. Students develop a strong general background in history and sociology, and acquire skills in research, social analysis, and writing.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Required Courses</td>
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<tr>
<td></td>
<td>Electives</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>Research Paper (Special Problems) ¹</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Comprehensive Exam (normally taken in the third academic year) ²</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dissertation</td>
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</tr>
<tr>
<td></td>
<td>Total Credit Hours</td>
<td>30</td>
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</tbody>
</table>

¹ Completion of a satisfactory research paper is essential for those students wishing to proceed to doctoral candidacy.

² The examinations cover material from three fields of study, which will be determined by a student’s selection of history or sociology as the area of concentration.

In addition to satisfactory performance in the comprehensive examinations, students pursuing the degree in history must also pass a foreign language examination (normally in French, German, or Spanish) before being admitted to candidacy for the PhD. For students in sociology, an advanced sociological methods course replaces the language requirement. Having met these requirements, the candidate will submit a dissertation proposal, which must meet the approval of his or her dissertation committee. The candidate will then proceed to the final requirement for the degree: the completion of the PhD dissertation and its successful defense by oral examination.

### Doctor of Philosophy with a Major in Engineering Science and Mechanics

The Ph.D. program in the School of Civil and Environmental Engineering is offered to students with an excellent academic background and a capacity for independent research. Doctoral candidates tailor a highly individualized Program of Study (typically 50 credit hours of courses beyond the bachelor’s degree) to develop expertise in their major specialization area. As part of the Program of Study, candidates must complete a Minor Field of Study (http://www.ce.gatech.edu/academics/graduate). To demonstrate the ability for independent research, the candidate must pass a qualifying examination, a thesis proposal, and a thesis defense. Candidates are required to complete a doctoral thesis reporting the results of original and independent research that derives from the scientific method and demonstrates creativity and technical expertise in the principles and methods essential to modern Civil & Environmental Engineering.

### Programs Leading to the Master’s and Doctoral Degrees in Electrical and Computer Engineering

Programs leading to the master’s and doctoral degrees in Electrical and Computer Engineering are provided by the School. Technical interest areas include bioengineering, computer systems and software, digital signal processing, electrical energy, electromagnetics, electronic design and applications, microsystems, optics and photonics, systems and controls, telecommunications, and VLSI systems and digital design.

The doctoral degree program is research-oriented and highly individualized. Typically, at least four years of study beyond the bachelor’s degree are required to complete the doctoral program.

PhD Information (http://www.ece.gatech.edu/academics/graduate/phdreq.html)

### Doctor of Philosophy with a Major in History and Sociology of Technology and Science

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<td>Required Courses</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Electives</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>Research Paper (Special Problems) ¹</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Comprehensive Exam (normally taken in the third academic year) ²</td>
<td></td>
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<tr>
<td></td>
<td>Dissertation</td>
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</tr>
<tr>
<td></td>
<td>Total Credit Hours</td>
<td>30</td>
</tr>
</tbody>
</table>

¹ Completion of a satisfactory research paper is essential for those students wishing to proceed to doctoral candidacy.

² The examinations cover material from three fields of study, which will be determined by a student’s selection of history or sociology as the area of concentration.

In addition to satisfactory performance in the comprehensive examinations, students pursuing the degree in history must also pass a foreign language examination (normally in French, German, or Spanish) before being admitted to candidacy for the PhD. For students in sociology, an advanced sociological methods course replaces the language requirement. Having met these requirements, the candidate will submit a dissertation proposal, which must meet the approval of his or her dissertation committee. The candidate will then proceed to the final requirement for the degree: the completion of the PhD dissertation and its successful defense by oral examination.

### Doctor of Philosophy with a Major in Engineering Science and Mechanics

The Ph.D. program in the School of Civil and Environmental Engineering is offered to students with an excellent academic background and a capacity for independent research. Doctoral candidates tailor a highly individualized Program of Study (typically 50 credit hours of courses beyond the bachelor’s degree) to develop expertise in their major specialization area. As part of the Program of Study, candidates must complete a Minor Field of Study (http://www.ce.gatech.edu/academics/graduate). To demonstrate the ability for independent research, the candidate must pass a qualifying examination, a thesis proposal, and a thesis defense. Candidates are required to complete a doctoral thesis reporting the results of original and independent research that derives from the scientific method and demonstrates creativity and technical expertise in the principles and methods essential to modern Civil & Environmental Engineering.

### Programs Leading to the Master’s and Doctoral Degrees in Electrical and Computer Engineering

Programs leading to the master’s and doctoral degrees in Electrical and Computer Engineering are provided by the School. Technical interest areas include bioengineering, computer systems and software, digital signal processing, electrical energy, electromagnetics, electronic design and applications, microsystems, optics and photonics, systems and controls, telecommunications, and VLSI systems and digital design.

The doctoral degree program is research-oriented and highly individualized. Typically, at least four years of study beyond the bachelor’s degree are required to complete the doctoral program.

PhD Information (http://www.ece.gatech.edu/academics/graduate/phdreq.html)
Doctor of Philosophy with a Major in Human-Centered Computing

Human-Centered Computing (HCC) is the interdisciplinary science of designing computational artifacts that better support human endeavors. HCC students examine issues such as computer-supported collaborative work and learning, human-computer interaction, human-robot interaction, learning sciences and technology, and mobile and ubiquitous computing - that lie at the intersection of human concerns (such as anthropology, cognitive science, human factors, industrial design, media studies, psychology, and sociology) and computing studies (such as artificial intelligence, computational perception, databases, graphics, information security, networks, programming languages, and robotics).

Students must complete a core of the three courses described below. The required courses will help students develop the first two of the four competency areas that must be demonstrated; these competency areas are

• computing concepts and skills,
• evaluation of HCC systems,
• written research communication, and
• oral research communication.

In consultation with their advisors, students must also complete at least three elective courses, including at least one outside the area of HCC specialization. Areas of elective study may include, but are not restricted to,

• artificial intelligence,
• cognitive science,
• collaboration,
• human-computer interaction,
• information security,
• learning sciences and technology,
• software,
• software engineering, and
• visualization.

Students must also pass a written and oral qualifier (comprehensive examination) and submit and receive approval for a dissertation topic and committee. Students may then be admitted to candidacy.

For more information about the HCC program, visit www.cc.gatech.edu (http://www.cc.gatech.edu).

<table>
<thead>
<tr>
<th>Code</th>
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<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Core Courses</td>
<td></td>
</tr>
<tr>
<td></td>
<td>First Year</td>
<td></td>
</tr>
<tr>
<td>CS 6451</td>
<td>Human-Centered Computing</td>
<td>3</td>
</tr>
<tr>
<td>CS 4452</td>
<td>Students who need to develop skills in programming take CS 4452.</td>
<td></td>
</tr>
<tr>
<td>CS 6452</td>
<td>Prototyping Interact Sys</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Second Year</td>
<td></td>
</tr>
<tr>
<td>CS 7455</td>
<td>Issues/Human-Center Comp</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Elective Courses</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Select at least three elective courses</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>including at least one outside the area of HCC specialization</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Minor</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Select at least nine credit hours outside the College of Computing.</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>Total Credit Hours</td>
<td>27</td>
</tr>
<tr>
<td></td>
<td>1 CS 7455 delves deeply into theoretical, methodological, conceptual, and technical issues.</td>
<td></td>
</tr>
</tbody>
</table>

Concurrently, each student develops a research portfolio under the supervision of a faculty advisor. The submission of a conference- or journal-quality paper, and a conference-style presentation, satisfies the competencies of written and oral research communications.

Doctor of Philosophy with a Major in Industrial Engineering - System Informatics & Control Track

| Domain Core | ISYE 6810 Sys Montr&Prognostics | 3            |
| ISYE 7201 Prod&Service Sys Engg | 3            |
| ISYE 7204 Info Prod & Ser Sys   | 3            |

| Methods Core | Select three of the following: | 9            |
| ISYE 6661 Linear Optimization |              |
| ISYE 6761 Stochastic Processes I |              |
| ISYE 7406 Data Mining&Stat Learn |              |
| ECE 6550 Linear Sys and Controls |              |

| Methods Breadth | Select at least three courses from at least two of the areas: | 9            |
| Stochastics and Simulation | ISYE 6644 Simulation |              |
| ISYE 6831 Advanced Simulation |              |
| ISYE 6656 Queueing Theory |              |
| ISYE 6762 Stochastic Processes II |              |

| Statistics | ISYE 6402 Time Series Analysis |              |
| ISYE 6405 Statistical Meth-Mfg Dgn |              |
| ISYE 6412 Theoretical Statistics |              |
| ISYE 6413 Dsgn & Analy-Experiments |              |
| ISYE 6420 Bayesian Statistics |              |
| ISYE 7401 Adv Statistical Modeling |              |
| ISYE 7405 Multivariate Data Analy |              |
| ECE 6555 Optimal Estimation |              |

| Computing and Algorithms | ISYE 6679 Computational Methods |              |
| ISYE 6416 Computational Statistics |              |
| CS 6650 Course CS 6650 Not Found |              |

| Dynamics and Control | ECE 6559 Adv Linear Systems |              |
| ECE 6552 Nonlinear Systems |              |
| ECE 6553 Optimal Control |              |
| ECE 6554 Adaptive Control |              |
| ECE 6551 Digital Control |              |
Graduates of this research-oriented program will be well placed to embark on careers in academic research, or to move into the policy world where their dual expertise will be rare and highly valued.

The PhD program is founded upon a broad, rigorous, and student-centered curriculum. All students must complete INTA 6102 and INTA 6003. Because students come from a wide range of backgrounds, they may petition to substitute or pass-out of certain core requirements based upon previous experiences and coursework and under the guidance and approval of the dissertation committee. However, reduction in credit is limited to a total of nine credit hours.

**Doctor of Philosophy with a Major in International Affairs, Science and Technology**

The PhD in International Affairs, Science and Technology program provides a unique opportunity for students with backgrounds in either social sciences or science and technology to deepen their understanding of international affairs through the advanced study of sub-fields such as international relations theory, international security, international political economy, comparative politics, and methods for social scientific research. There is widespread recognition that a number of important problems in international affairs – such as how to control the proliferation of weapons of mass destruction, or how to promote economic growth in the developing world – cannot properly be understood without an appreciation of the scientific and technological issues involved. At the same time, it is evident that neither the development nor the impact of new technologies is confined within state or national boundaries. Scientific innovation increasingly depends on international collaboration, while the consequences of those innovations, for example in terms of their environmental impact, similarly demand international coordination to be monitored and regulated.

Graduates of this research-oriented program will be well placed to embark on careers in academic research, or to move into the policy world where their dual expertise will be rare and highly valued.

The PhD program is founded upon a broad, rigorous, and student-centered curriculum. All students must complete INTA 6102 and INTA 6003. Because students come from a wide range of backgrounds, they may petition to substitute or pass-out of certain core requirements based upon previous experiences and coursework and under the guidance and approval of the dissertation committee. However, reduction in credit is limited to a total of nine credit hours.

**Required Courses**
- INTA 6102 Intl Relations Theory 3
- INTA 6003 Empirical Research Meth 3
- INTA 9000 Doctoral Thesis 18

**Core Courses**
- INTA 8010 IAST Ph.D. Proseminar 1
- INTA 8000 Sci,Tech&Intl Affairs I 3
- INTA 8001 Sci,Tech&Intl Affairs II 3

**Concentration Tracks**
Each of the predesigned tracks includes a core class and two electives. These tracks are considered core classes and must be completed before examinations.

Select two of four concentration tracks from the following: 18
- International Affairs and Security
- Globalization and Development
- Comparative and Regional Studies
- Student-created (Unique Track): Graduate Program Director- and Faculty-approved Track

**Minor**
Select three related INTA 6000/8000-level courses. 1 9

**Advanced Methods or Language Requirement**
- Advanced Methods or Language Requirement 2 0-18

Total Credit Hours 58-76

1. Students must complete a minor concentration that focuses on an approved topic in the field of science, technology, and international affairs. This may be satisfied by completing three related INTA courses at the 6000 and 8000 levels in international innovation or security or three courses in other Schools of the Ivan Allen College, or in colleges or interdisciplinary fields of the Institute or elsewhere.

2. Students must also satisfy either the language or advanced methods requirement. The language requirement is satisfied through demonstrated competency (reading proficiency only) in one language other than English (equivalent of four semesters of college-level coursework or an equivalent exam). The advanced methods requirement may be satisfied through completion of two semesters of coursework (in addition to core requirements) of advanced statistics, methods, and/or computer science taken either within the School or in other colleges of the Institute.

**Breakdown of Hours Required for Degree**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTA 9000</td>
<td>Doctoral Thesis</td>
<td>18</td>
</tr>
<tr>
<td>INTA 6102</td>
<td>Intl Relations Theory</td>
<td>3</td>
</tr>
</tbody>
</table>
The academic requirements for the PhD in Machine Learning consist of 10 courses, passing the qualifying examination, and successfully defending a PhD thesis. Five of the courses are designated as "core"; students are expected to take these courses in their first two years in the program. The five remaining courses are chosen from a long, diverse list of electives. The qualifying examination consists of a focused literature review that takes place over the course of a semester, for which the student receives course credit.

**Summary of General Requirements for a PhD in Machine Learning**

- Core curriculum (5 courses, 15 hours).
- Area electives (5 courses, 15 hours).
- Responsible Conduct of Research (RCR) (1 course, 1 hour, pass/fail). Georgia Tech requires that all PhD students complete an RCR requirement that consists of an online component and in-person training. The online component is completed during the student's first semester enrolled at Georgia Tech. The in-person training is satisfied by taking PHIL 6000 or their associated academic program's in-house RCR course.
- Qualifying examination (1 course, 3 hours). This consists of a one-semester independent literature review followed by an oral examination.
- Doctoral minor (3 courses, 9 hours).
- Research Proposal. The purpose of the proposal is to give the faculty an opportunity to give feedback on the student's research direction, and to make sure they are developing into able communicators.
- PhD dissertation.

Almost all of the courses in both the core and elective categories are already taught regularly at Georgia Tech. However, two core courses (designated in the next section) are being developed specifically for this program. The proposed outlines for these courses can be found in the Appendix. Students who complete these required courses as part of a master's program will not need to repeat the courses if they are admitted to the ML PhD program.

**Core Courses**

Machine Learning PhD students will be required to complete courses in five different areas. With the exception of the Foundations course, each of these area requirements can be satisfied using existing courses from the College of Computing or Schools of ECE, ISyE, and Mathematics.

**Mathematical Foundations of Machine Learning.** This will be a new course cross-listed between the College of Computing (CS) and Schools of ECE and ISyE. This required course is the gateway into the program, and will cover the key subjects from applied mathematics needed for a rigorous graduate program in ML. Particular emphasis will be put on advanced concepts in linear algebra and probabilistic modeling. A formal
course proposal has been submitted to the graduate committees in the schools listed above; the outline of the material from this proposal can be found in the Appendix. The new course should have a CS/CSE/ECE/ISYE 7740 designation.

Intermediate Statistics. The purpose of this requirement is to expose students to the main concepts in mathematical statistics. It can be met through any one of the three courses listed below. While these courses emphasize different material, they are all centered on mathematical analysis of fundamental problems in statistics.

- ISYE 6412, Theoretical Statistics
- ECE 7251, Signal Detection and Estimation
- MATH 6262, Statistical Estimation

Machine Learning: Theory and Methods. This course serves as an introduction to the foundational problems, algorithms, and modeling techniques in machine learning. Each of the courses listed below treats roughly the same material using a mix of applied mathematics and computer science, and each has a different balance between the two.

- CS 7616, Pattern Recognition
- CSE/ISYE 6740, Computational Data Analysis
- ECE 6254, Statistical Machine Learning
- ECE 6273, Methods of Pattern Recognition with Applications to Voice

Probabilistic Graphical Models and ML in High Dimensions. This will be a new course cross-listed between the College of Computing (CS) and schools of CSE and ECE. The course will provide students with an introduction to the theory and practice of graphical models, one of the most dominant frameworks in machine learning and artificial intelligence. Similar courses have been taught as special topics courses in the School of CSE, including CSE 8803ML (Machine Learning II: Advanced Topics) and CS 8803PM (Introduction to Probabilistic Graphical Models). A formal course proposal has been submitted to the graduate committees in the schools listed above; the outline of the material from this proposal can be found in the Appendix. The course should be designated CS/CSE/ECE 7741.

Optimization. Optimization plays a crucial role in both developing new machine learning algorithms and analyzing their performance. The three courses below all provide a rigorous introduction to this topic; each emphasizes different material and provides a unique balance of mathematics and algorithms.

- ECE 8823, Convex Optimization: Theory, Algorithms, and Applications
- ISYE 6661, Linear Optimization
- ISYE 6663, Nonlinear Optimization
- ISYE 6669, Deterministic Optimization
- ISYE 7683, Advanced Nonlinear Programming

Electives

In addition to meeting the five core area requirements, each student is required to complete five elective courses. These courses are required for getting a complete breadth in ML. These courses must be chosen from at least two of the five subject areas listed below.

i. Statistics and Applied Probability. To build breadth and depth in the areas of statistics and probability as applied to ML.

- AE 6505, Kalman Filtering
- BMED 6700, Biostatistics
- ECE 6558, Stochastic Systems

- ECE 6601, Random Processes
- ECE 6605, Information Theory
- ISYE 6404, Nonparametric Data Analysis
- ISYE 6413, Design and Analysis of Experiments
- ISYE 6414, Regression Analysis
- ISYE 6416, Computational Statistics
- ISYE 6420, Bayesian Statistics
- ISYE 6761, Stochastic Processes I
- ISYE 6762, Stochastic Processes II
- ISYE 7400, Adv Design-Experiments
- ISYE 7401, Adv Statistical Modeling
- ISYE 7405, Multivariate Data Analysis
- MATH 6263, Testing Statistical Hypotheses
- MATH 6266, Statistical Linear Modeling
- MATH 6267, Multivariate Statistical Analysis
- MATH 7244, Stochastic Processes and Stochastic Calculus I
- MATH 7245, Stochastic Processes and Stochastic Calculus II

ii. Advanced Theory. To build a deeper understanding of foundations of ML.

- CS 7280, Network Science
- CS 7510, Graph Algorithms
- CS 7520, Approximation Algorithms
- CS 7530, Randomized Algorithms
- CS 7535, Markov Chain Monte Carlo Algorithms
- CS 7540, Spectral Algorithms
- CS 7545, Machine Learning Theory
- ECE 6283, Harmonic Analysis and Signal Processing
- ECE 6555, Linear Estimation
- ISYE 7682, Convexity
- MATH 6112, Advanced Linear Algebra
- MATH 6221, Advanced Classical Probability Theory
- MATH 6580, Introduction to Hilbert Space
- MATH 7338, Functional Analysis
- MATH 7586, Tensor Analysis
- MATH 88XX, Special Topics: Mathematical Foundations of Learning Theory
- MATH 88XX, Special Topics: High Dimensional Probability and Statistics

iii. Applications. To develop a breadth and depth in variety of applications domains impacted by/with ML.

- AE 6373, Advanced Design Methods
- AE 8803, Machine Learning for Control Systems
- AE 8803, Nonlinear Stochastic Optimal Control
- BMED 6780, Medical Image Processing
- BMED 8813BHI, Biomedical and Health Informatics
- BMED 8813MH, mHealth Informatics
- BMED 8813MLB, Machine Learning in Biomedicine
- BMED 8823ALG, OMICS Data and Bioinformatics Algorithms
- CS 6440, Introduction to Health Informatics
- CS 6465, Computational Journalism
- CS 6474, Social Computing
iv. Computing and Optimization: To provide more breadth and foundation in areas of math, optimization and computation for ML.

- CS 6475, Computational Photography
- CS 6476, Computer Vision
- CS 6601, Artificial Intelligence
- CS 7450, Information Visualization
- CS 7476, Advanced Computer Vision
- CS 7630, Autonomous Robots
- CS 7636, Computational Perception
- CS 7646, Machine Learning for Trading
- CS 7650, Natural Language Processing
- CSE 6141, Massive Graph Analysis
- CSE 6240, Web Search and Text Mining
- CSE 6242, Data and Visual Analytics
- CSE 6301, Algorithms in Bioinformatics and Computational Biology
- ECE 4580, Computational Computer Vision
- ECE 6255, Digital Processing of Speech Signals
- ECE 6258, Digital Image Processing
- ECE 6260, Data Compression and Modeling
- ECE 6273, Methods of Pattern Recognition with Application to Voice
- ECE 6550, Linear Systems and Controls
- ECE 8813, Network Security
- ISYE 6421, Biostatistics
- ISYE 6810, Systems Monitoring and Prognosis
- ISYE 7201, Production Systems
- ISYE 7204 Info Prod & Ser Sys
- ISYE 7203, Logistics Systems
- HS 6000, Healthcare Delivery
- MATH 6759, Stochastic Processes in Finance
- MATH 6783, Financial Data Analysis

Qualifying Examination
The purpose of the Qualifying Examination is to judge the candidate's potential as an independent researcher.

The Ph.D. qualifying exam consists of a focused literature review that will take place over the course of one semester. At the beginning of the second semester of their second year, a qualifying committee consisting of three members of the ML faculty will assign, in consultation with the student and the student's advisor, a course of study consisting of influential papers, books, or other intellectual artifacts relevant to the student's research interests. The student's focus area and current research efforts (and related portfolio) will be considered in defining the course of study.

At the end of the semester, the student will submit a written summary of each artifact which highlights their understanding of the importance (and weaknesses) of the work in question and the relationship of this work to their current research. Subsequently, the student will have a closed oral exam with the three members of the committee. The exam will be interactive, with the student and the committee discussing and criticizing each work and posing questions related to the students current research to determine the breadth of student's knowledge in that specific area.

The success of the examination will be determined by the committee's qualitative assessment of the student's understanding of the theory, methods, and ultimate impact of the assigned syllabus.

Students are expected to perform the review by the end of their second year in the program.

Doctoral Dissertation
The primary requirement of the PhD student is to do original and substantial research. This research is reported for review in the PhD dissertation, and presented at the final defense.

As the first step towards completing a dissertation, the student must prepare and defend a Research Proposal. The proposal is a document of no more than 20 pages in length that carefully describes the topic of the dissertation, including references to prior work, and any preliminary results to date. The written proposal is submitted to a committee of three faculty members from the ML PhD program, and is presented in a public seminar shortly thereafter. The committee members provide feedback on the proposed research directions, comments on the strength of writing and oral presentation skills, and might suggest further courses to solidify the student's background. Approval of the Research Proposal by the committee is required at least six months prior to the scheduling of the PhD defense. It is expected that the student complete this proposal requirement no later than their fourth year in the program. The Ph.D. qualifying exam consists of a focused literature review that will take place over the course of one semester. At the beginning of the second semester of their second year, a qualifying committee consisting of three members of the ML faculty will assign, in consultation with the student and the student's advisor, a course of study consisting of influential papers, books, or other intellectual artifacts relevant to the student's research interests. The student's focus area and current research efforts (and related portfolio) will be considered in defining the course of study.

The Ph.D. qualifying exam consists of a focused literature review that will take place over the course of one semester. At the beginning of the second semester of their second year, a qualifying committee consisting of three members of the ML faculty will assign, in consultation with the student and the student's advisor, a course of study consisting of influential papers, books, or other intellectual artifacts relevant to the student's research interests. The student's focus area and current research efforts (and related portfolio) will be considered in defining the course of study.

Minor
The minor will follow the standard Georgia Tech requirement: 9 hours outside the student's home unit, with a GPA in those courses of at
least 3.0. These courses are in addition to the other core and elective requirements. The courses for the minor should form a cohesive program of study, outside the area of ML, that is approved by the Faculty Advisory Committee. Typical programs will consist of three courses from the same school (any school at the Institute) or three courses from the same elective area in the courses listed above. The courses should all be from the same School or from the same elective area in the courses listed above. Programs that do not meet these criteria cannot be approved by the Graduate Committee.

Doctor of Philosophy with a Major in Management

The PhD program in Management is designed to produce graduates who can make scholarly contributions to their chosen fields. Most graduates undertake careers as researchers, scholars and teachers, in academic environments.

The doctoral program in the Scheller College of Business is intended for full-time students who will complete their entire doctoral program prior to leaving campus. Full-time residence in or near Atlanta is expected. The doctoral program is strongly research-oriented and emphasizes early and effective involvement in research, with students experiencing considerable personal attention and close interaction with faculty. The PhD program complements and reflects the technological emphasis of the Institute and places considerable weight on learning outside the classroom. The tutorial model is the basic educational approach employed throughout the program.

All doctoral students take comprehensive examinations in their area of study. After successful completion of the comprehensive examination and the formal approval of his or her dissertation, the student becomes a candidate for the degree. On completion of the dissertation, the student must take a final oral examination as prescribed in the general regulations of the Graduate Division.

Applicants to the doctoral program in management should note that supplementary application materials are required by the College of Business in addition to those required by Georgia Tech’s Office of Graduate Admissions and Enrollment Services.

Applications and viewbooks are available online at www.mgt.gatech.edu/phd (http://www.mgt.gatech.edu/phd).

For more information, call 404.894.8722 or contact the:

Scheller College of Business Graduate Office
Georgia Institute of Technology
Atlanta, Georgia 30308-0520

Doctor of Philosophy with a Major in Materials Science and Engineering

The Doctor of Philosophy degree is directed to attain proficiency in the pursuit of independent scholarly work. The degree comprises coursework in the general principles of materials, with emphasis on metallurgy, polymers, ceramics, paper science and engineering, or functional electronic materials. Additional requirements include specialized courses both in the area of the doctoral thesis and in one or two other areas, passing qualifying examinations, and an independent research investigation.

PhD Degree Requirements (http://www.mse.gatech.edu/graduate-program)

Doctor of Philosophy with a Major in Mathematics

The doctoral program in Mathematics requires 30 credit hours of graduate-level coursework (600-level or above) in mathematics and an additional 9 credit hours of coursework towards a minor. Work on a master’s thesis (thesis hours) may not be counted toward this requirement, but coursework for the master’s degree may be counted. The coursework is subject to breadth requirements guaranteeing exposure to five areas of mathematics (these requirements are discussed more fully on the School of Mathematics website).

Prior to admission to candidacy for the doctoral degree, each student must pass the comprehensive examination, which consists of written exams and an oral examination in the student’s proposed area of specialization. Doctoral students must also satisfy the institute’s requirements with respect to the dissertation and final oral examination.

PhD Mathematics Website (http://www.math.gatech.edu/graduate-doctoral-programs)

Doctor of Philosophy with a Major in Mechanical Engineering

The doctoral program is designed with great latitude to capitalize on variations in experience and interests of individual students. The PhD degree recognizes proficiency and high achievement in research. Candidates for the Doctor of Philosophy degree must earn a graduate grade-point average of at least 3.3.

ME: Graduate Website (http://www.me.gatech.edu)

Doctor of Philosophy with a Major in Music Technology

The PhD in Music Technology is a full-time day program. Students accepted into the PhD program in Music Technology are expected to hold a Masters degree in Music Technology or from an allied field, such as computing, music, engineering, or media arts and sciences. All applicants must demonstrate mastery of core masters-level material covered in Music Technology. This includes proficiency in: Music theory, performance, composition, and/or analysis; Music Information Retrieval, Digital Signal Processing and Synthesis; Interactive Music Systems Design; and Music Cognition.

Proficiency will be assessed through review of a portfolio of the applicant’s work and an interview process. Students may waive the requirement to enroll in specific courses by appealing to the Music Technology Graduate Program Committee. Such appeals will typically be granted only if the student has already taken the same course at Georgia Tech or has taken a substantially equivalent course at another institution, and if the student has earned an exceptional grade in that course.

The Graduate Record Examination (GRE) is required for all applicants. A minimum TOEFL score of 600 (paper-based), 250 (computer-based), or 100 (Internet-based) is required for all non-native English speaking applicants.
School of Music (http://www.music.gatech.edu)

Doctor of Philosophy with a Major in Nuclear Engineering

The graduate program in nuclear and radiological engineering/medical physics leads to the degrees of

- Master of Science in Nuclear Engineering,
- Master of Science in Medical Physics,
- Master of Science, and
- Doctor of Philosophy.

The doctoral program is designed with great latitude to capitalize on variations in experience and interests of individual students (e.g., nuclear power engineering, radiological engineering, and medical physics). Candidates for the Doctor of Philosophy degree must earn a graduate grade-point average of at least 3.3.

Students may select:

Doctor of Philosophy with a Major in Nuclear Engineering - Medical Physics Option

Doctor of Philosophy with a Major in Nuclear Engineering - Nuclear Enterprise Management Option

Doctor of Philosophy with a Major in Nuclear Engineering - Medical Physics Option

The graduate program in nuclear engineering/medical physics leads to the degrees of

- Master of Science in Nuclear Engineering,
- Master of Science in Medical Physics,
- Master of Science, and
- Doctor of Philosophy.

The medical physics option in the doctoral program is designed for students with a specific interest in the fields of medical physics and leads to a Doctor of Philosophy with a major in Nuclear Engineering. Candidates for the Doctor of Philosophy degree must earn a graduate grade-point average of at least 3.3.

Doctor of Philosophy with a Major in Nuclear Engineering - Nuclear Enterprise Management Option

The graduate program in nuclear and radiological engineering leads to the degrees of

- Master of Science in Nuclear Engineering,
- Master of Science in Medical Physics,
- Master of Science, and
- Doctor of Philosophy.

The specialization in Nuclear Enterprise Management in the doctoral program is designed for students with a specific interest in leadership and management careers throughout the nuclear industry and leads to a Doctor of Philosophy with a major in Nuclear Engineering. Candidates for the Doctor of Philosophy degree must earn a graduate grade-point average of at least 3.3.

Doctor of Philosophy with a major in Ocean Science and Engineering

The mission of the graduate program in Ocean Science and Engineering (OSE) is to educate the next generation of transdisciplinary ocean scientists and engineers by combining the basic and applied sciences with innovative ocean technologies, and to advance interdisciplinary research at the frontiers of the physical, biological, chemical and human dimensions of ocean systems.

Georgia Tech's transdisciplinary PhD OSE program is designed to train and prepare PhD level scientists to identify and solve foundational and applied problems in the ocean sciences and engineering. Training such students involves ensuring that students are well versed in a diverse set of quantitative toolkits in addition to having developed expert-level knowledge and experience in applying quantitative methods. Hence, the program training defines core topics across the three Schools and the essential knowledge required by the students. The expectations exceed that of traditional PhDs in science or engineering as OSE requires an additional layer of integration between the science and engineering and involves research immersion. The program delivery is organized around four priorities:

Priority 1. Develop an OSE student & faculty community at GT.
Priority 2. Prepare students to perform high-quality research in OSE.
Priority 3. Support students as they become independent OSE experts.
Priority 4. Align students’ research with job opportunities in academia, government and industry.

The PhD degree in OSE requires a minimum of 32 semester hours of coursework to cover the core topics articulated in the essential knowledge list (EKL). Students will be considered “in good academic standing” if they are making satisfactory progress toward completion of the degree, and have met a cumulative grade point average (GPA) equal or grater to 3.2 for the number of credits that they have attempted.

Students enrolled in the OSE program are expected to be trained and knowledgeable in at least three core topics of ocean science and engineering (one in each School). This training is available through courses provided in the different schools participating in the program. The core topics are:

CEE:
- Coastal & Ocean Mechanics
- Environmental Biotechnology

BIO:
- Marine Ecology & Conservation
- Biological & Microbial Oceanography

EAS:
- Physical and Chemical Oceanography
- Ocean & Climate
For each of the three selected topics the students will choose one or two courses for a total of 4 core courses around which they will build their Essential Knowledge List (EKL). The EKL will provide the foundation for the Comprehensive Exam to be taken by all students by the end of the second year. Depending on the student background, the program of study may require taking additional courses to fulfill the core topic requirement, or may partially lessen the course load if the student can demonstrate to have acquired the necessary foundation in one of the topics (this applies for example to students with a Master degree relevant to any of the Research Themes). An EKL containing the selection of core topics and associated courses must be completed and approved by the OSE Graduate Studies Committee (GSC) by the end of the first semester.

The OSE PhD program requires completion of four 3-hour credit courses between the ones listed below. Student must choose at least one core topic and one class from each school. First year students must also attend the OSE Seminar (2 credit hours).

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>OSE Core Courses</strong></td>
<td></td>
<td>14</td>
</tr>
<tr>
<td>EAS 8802</td>
<td>Special Topics (OSE Seminar)</td>
<td></td>
</tr>
<tr>
<td>Four courses spanning at least 3 courses, at least one from each School:</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>CEE Core Topics:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coastal and Ocean Mechanics:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CEE 6261</td>
<td>Environ Fluid Mechanics</td>
<td></td>
</tr>
<tr>
<td>CS 8803</td>
<td>Special Topics (Coastal Mechanics)</td>
<td></td>
</tr>
<tr>
<td><strong>Biology Core Topics:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marine Ecology and Conservation:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BIOL 6417</td>
<td>Marine Ecology</td>
<td></td>
</tr>
<tr>
<td>BIOL 6221</td>
<td>Biological Oceanography</td>
<td></td>
</tr>
<tr>
<td><strong>Biological and Microbial Oceanography:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BIOL 6410</td>
<td>Microbial Ecology</td>
<td></td>
</tr>
<tr>
<td>BIOL 6221</td>
<td>Biological Oceanography</td>
<td></td>
</tr>
<tr>
<td><strong>Earth and Atmospheric Sciences Core Topics:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical and Chemical Oceanography</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EAS 6305</td>
<td>Phys &amp; Chem Oceanography</td>
<td></td>
</tr>
<tr>
<td>EAS 6122</td>
<td>Biogeochemical Cycles</td>
<td></td>
</tr>
<tr>
<td>EAS 6490</td>
<td>Adv Environ Data Analy</td>
<td></td>
</tr>
<tr>
<td><strong>Ocean and Climate:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EAS 6140</td>
<td>Thermo of Atmos &amp; Oceans</td>
<td></td>
</tr>
<tr>
<td>EAS 8803</td>
<td>Special Topics (Climate and Global Change)</td>
<td></td>
</tr>
<tr>
<td><strong>Ethics/RCR Training Requirement</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elective courses that increase depth of understanding in the research theme chosen by PhD candidate</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td><strong>Minor:</strong></td>
<td></td>
<td>9</td>
</tr>
<tr>
<td>Courses outside the students’ selected themes</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total Credit Hours</strong></td>
<td></td>
<td>32</td>
</tr>
</tbody>
</table>
3. Presentation of a thesis proposal;
4. Successful completion of set of courses in a ‘minor’ subject;
5. A written PhD thesis

Students are admitted to candidacy when they have completed the first three steps above. The core physics courses required by the School are devoted to coursework as follows:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>First Semester</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>PHYS 6101  Classical Mechanics I</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>PHYS 6103  Electromagnetism I</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>PHYS 6105  Quantum Mechanics I</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>PHYS 6124  Math Methods-Phys I</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td><strong>Second Semester</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>PHYS 6107  Statistical Mechanics I</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>PHYS 6104  Electromagnetism II</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>PHYS 6106  Quantum Mechanics II</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>PHYS 8901  Special Problems</td>
<td>3</td>
</tr>
</tbody>
</table>

The School requires every doctoral student to take two lecture-type graduate physics courses not including those previously listed. In some cases, these may be used to satisfy the Institute requirement that every doctoral student earn 9 credit hours in a minor course of study in a scientific subfield different from the subfield of his or her PhD thesis research. Alternatively, these credit hours are earned in a school other than physics. Finally, each student must prepare a written dissertation that summarizes the PhD research and present a public, oral defense of the dissertation to a Thesis Exam Committee.

## Doctor of Philosophy with a Major in Public Policy

The PhD in Public Policy is a research-oriented program that prepares students for advanced professional work or for academic careers. Georgia Tech houses two PhD programs in Public Policy, including one offered jointly with Georgia State University. The programs stress intellectual and methodological rigor, building upon the theory and applications of political and organizational analysis, research design, quantitative analysis, and economics.

## Financial Aid

Most PhD students receive financial assistance, chiefly through sponsored research projects and teaching assistantships.

[PhD Information](http://www.spp.gatech.edu/doctorate/requirements)

All students must have completed the equivalent of the core courses for the Master of Science in Public Policy (p. 535) before they begin the doctoral core curriculum. The doctoral core curriculum consists of six three-credit-hour courses (seven in the joint program). These courses are designed to provide students with a theoretical and methodological foundation for conducting public policy research.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Core Courses</strong></td>
<td></td>
</tr>
<tr>
<td>PUBP 8200  Adv Research Methods I</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

### Doctor of Philosophy in Public Policy (Joint Degree with Georgia State University)

#### Core Courses

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>PUBP 8200  Adv Research Methods I</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>PUBP 8205  Adv Research Methods II</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>PUBP 8211  Microeconomic Theory</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>PUBP 8500  Research Seminar</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>PUBP 8510  Logic of Policy Inquiry</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>PUBP 8520  Scope&amp;Theory-Public Plcy</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>PUBP 8813  Special Topics (Advanced Topics in Analysis and Evaluation)</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

Details on the requirements of the joint program, including equivalent courses at Georgia State University, are available on the website.

This core is supplemented with in-depth study of a substantive area of public policy. The Georgia Tech program focuses on science and technology policy, environmental and energy policy, and urban and regional economic development policy. The joint program includes several additional majors, including health policy, policy and program evaluation, and public finance. Students may pursue concentrations with groups of courses already developed by the faculty or an individualized concentration with the written approval of the student’s advisor and the Graduate Committee.

In the Georgia Tech program, the major area of concentration consists of four courses and has a capstone seminar at the PhD level that majors are required to complete. The minor concentration is a three-course area of study, preferably taken outside the School of Public Policy.

Other requirements for the PhD include completion of the one-year residency requirement; admission to candidacy for the degree through successful completion of qualifying exams and a dissertation proposal; and completion and successful defense of a doctoral dissertation (9 credit hours).

In summary, the credits required for the PhD are usually as follows:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Joint Program Requirements</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Core</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td>Major</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Minor</td>
<td>9</td>
</tr>
</tbody>
</table>

497
Doctor of Philosophy with a Major in Public Policy (Joint Degree with Georgia State University)

The joint doctoral program in public policy combines the strengths of Georgia State University’s Andrew Young School of Policy Studies and the Georgia Institute of Technology’s School of Public Policy.

Core Courses

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>PUBP 8200</td>
<td>Adv Research Methods I</td>
<td>3</td>
</tr>
<tr>
<td>PUBP 8205</td>
<td>Adv Research Methods II</td>
<td>3</td>
</tr>
<tr>
<td>PUBP 8211</td>
<td>Microeconomic Theory</td>
<td>3</td>
</tr>
<tr>
<td>PUBP 8500</td>
<td>Research Seminar</td>
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<td>Logic of Policy Inquiry</td>
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</tr>
<tr>
<td>PUBP 8520</td>
<td>Scope &amp; Theory-Public Plcy</td>
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<td>Special Topics (Advanced Topics in Analysis and Evaluation)</td>
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</thead>
<tbody>
<tr>
<td>Core</td>
<td></td>
<td>18</td>
</tr>
<tr>
<td>Major</td>
<td></td>
<td>12</td>
</tr>
<tr>
<td>Minor</td>
<td></td>
<td>9</td>
</tr>
<tr>
<td>Qualifiers - Written Exam</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Colloquium - oral: presentation of dissertation proposal</td>
<td>3</td>
<td></td>
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</tbody>
</table>

This total assumes that a student already has satisfied the core requirements of the master's degree (at most an additional twenty-five hours).

Doctor of Philosophy with a Major in Quantitative BioSciences

The mission of the Georgia Tech PhD program in Quantitative Biosciences (QBioS) is to enable the discovery of scientific principles underlying the dynamics, structure, and function of living systems. The QBioS program is designed to provide PhD graduates with the skills and expert knowledge necessary to move directly into academia, industry and/or government, where they can apply their specific domain expertise and broadly relevant modeling tools.

The PhD program in Quantitative Biosciences is offered by the College of Sciences. Students select a home school within the College of Sciences and can select a thesis advisor from the entire list of program faculty, irrespective of School. QBioS PhD students will pursue thesis research across a broad range of research themes spanning molecular and cellular systems, chemical biology, behavior and applied physiology, ecology, evolution and earth systems. The diverse faculty will ensure that students are prepared for quantitative challenges in the biosciences, whether in the analysis of big data, analysis of complex models, and iterative design of theory and experiments.

We welcome applications from high-quality undergraduate students, who are:

1. trained in the physical sciences (e.g., physics, earth systems and chemistry), mathematics, computer science, and engineering, who would like to transition to a career focusing on interface research in the biosciences;
2. trained in the biosciences (e.g., integrative biology, physiology, ecology, evolution, neuroscience, biochem, molecular & cellular biology) with particular strengths and interests in quantitative analysis and modeling.

In addition, students with Masters degrees in those thematic areas are strongly encouraged to apply.

For more information visit www.qbios.gatech.edu (http://www.qbios.gatech.edu)

Doctor of Philosophy with a Major in Robotics

Program website: http://phdrobotics.gatech.edu

Program requirements: http://phdrobotics.gatech.edu/program

Students pursuing a PhD in Robotics must take 36 credit hours of core research and elective courses, pass a comprehensive qualifying exam with written and oral components, and successfully complete, document, and defend a piece of original research culminating in a doctoral thesis. Students select a home school, such as ECE, AE, ME, or IC, and apply for admission to the PhD program in robotics through that home school.

Doctor of Philosophy with a Major in Industrial Engineering

Doctor of Philosophy with a Major in Industrial Engineering - Applied Statistics Track

The emphasis in this track is on the use of statistics as a science that is employed in a technological environment. Within this context, a student takes fundamental coursework in mathematics, probability and statistics suitable to conduct advanced work and research in a variety of application domains. Among these are quality systems, manufacturing, production, and simulation.

Doctor of Philosophy with a Major in Industrial Engineering - Supply Chain Engineering Track

This program focuses on the design and analysis of manufacturing, distribution, and transportation systems. Students take fundamental coursework in optimization, stochastics, and statistics in order to build a firm base from which to deal with the myriad of issues that arise in settings involving modern supply chain systems modeling and analysis: production and inventory systems, vehicle routing and scheduling, warehousing, and logistics.

Doctor of Philosophy with a Major in Industrial Engineering - Economic Decision Analysis Track

Engineering economic decision analysis is a broad-based area of study that concentrates on both theoretical approaches and the applied methodologies in various decision-making domains within an economic environment. Typical settings that attract students to this program include multicriteria decision-making, capital budgeting, auctions, portfolio analysis and selection, economic forecasting, utility theory, and quantitative finance.
The Cognitive Aging specialty area in the Psychology PhD program trains students to develop a thorough understanding of diverse aspects of cognition. Students learn about theories of cognitive phenomena and about the neurobiological bases of cognition and behavior. Students study the major methods used to measure various components of cognition. These components include attention, sensation and perception, working memory, episodic memory, cognitive control, language, metacognition, spatial cognition, and problem solving. Faculty research interests include these areas of cognition as they exist in humans, as well as aspects of comparative psychology (animal behavior and cognition). Some faculty members’ research interests include human cognitive neuroscience, measuring brain activity during cognition with electrophysiological or imaging techniques in persons with or without neurological dysfunction. The program is closely connected to faculty with interests in the Cognitive Aging program, including an emphasis on understanding effects of aging on cognitive mechanisms and how aging influences neural functioning and cognition.

Doctor of Philosophy with a Major in Psychology

Doctor of Philosophy with a Major in Psychology (Specialization in Cognition and Brain Science)

The Cognitive and Brain Science specialty area for the Psychology PhD program trains students to develop a thorough understanding of diverse aspects of cognition. Students learn about theories of cognitive phenomena and about the neurobiological bases of cognition and behavior. Students study the major methods used to measure various components of cognition. These components include attention, sensation and perception, working memory, episodic memory, cognitive control, language, metacognition, spatial cognition, and problem solving. Faculty research interests include these areas of cognition as they exist in humans, as well as aspects of comparative psychology (animal behavior and cognition). Some faculty members’ research interests include human cognitive neuroscience, measuring brain activity during cognition with electrophysiological or imaging techniques in persons with or without neurological dysfunction. The program is closely connected to faculty with interests in the Cognitive Aging program, including an emphasis on understanding effects of aging on cognitive mechanisms and how aging influences neural functioning and cognition.

Doctor of Philosophy with a Major in Psychology (Specialization in Cognitive Aging)

The Cognitive Aging specialty area in the Psychology PhD program emphasizes training students about cognition in adulthood. Students gain an understanding of the biological, psychological, and social aspects of aging as they relate to cognitive development over the adult life span. Areas of interest of the faculty include age differences and age changes in basic cognitive mechanisms (such as working memory, episodic memory, attention, speed of processing, and language), higher-order cognition (including adult intellectual development), and practical and contextual aspects of cognition (such as knowledge acquisition, skill development, everyday problem solving, metacognition, emotion regulation, and social cognition). The program is closely connected to faculty with interests in human factors and aging (in the Engineering Psychology program), cognitive neuroscience of aging (in the Cognitive and Brain Sciences program), and aging issues in work and careers (in the Industrial/Organizational Psychology program).

Doctor of Philosophy with a Major in Psychology (Specialization in Engineering Psychology)

The Engineering Psychology PhD program focuses on understanding the capabilities and limitations of human performance from the perspective of perception, cognition, and movement control and applying this knowledge to the design of systems and environments that accommodate those capabilities and limitations.

Doctor of Philosophy with a Major in Psychology (Specialization in Industrial/Organizational Psychology)

The Industrial/Organizational Psychology (I/O) PhD program concentrates on research related to the psychology of work and the workplace. Students develop specialized I/O knowledge, skills, and experiences through an individually tailored program of seminars, elective courses, participation in laboratory- and field-based research projects, and training in local organizations.

Doctor of Philosophy with a Major in Psychology (Quantitative Psychology)

The Quantitative Psychology Program emphasizes the interface between quantitative methods and psychological issues. Graduates will be trained as quantitative specialists, with a substantial background in psychology. The exact focus of the student’s studies depends on the current interests of the faculty and the student. Current faculty interests and course offerings include psychometric methods, item response theory, structural equation modeling, multivariate statistics, factor analysis, and multilevel modeling, as well as many other topics in psychological methods and statistics.

Dual Degree MCRP/JD in Planning Law (Cooperative Program with Georgia State University)

The Planning Law dual degree supports the interests of students who wish to pursue study in the fields of both law and city and regional planning, provides a focal point for exploring the connections between the two disciplines through the research and instruction between the two programs; and provides an educational opportunity that reflects the fact that land management law and city and regional planning have become increasingly integrated and interdisciplinary in nature. The program promotes a broader educational experience for today's land use law or planning professionals, by providing expertise in both disciplines.

The cooperative J.D./MCRP program will permit students to use credit hours earned in one program to satisfy some of the elective course requirements of the other program, thus permitting them to earn both degrees in a shorter time than would be possible pursuing both degrees separately.

- MCRP + JD (http://www.planning.gatech.edu/mcrp-jd)
Dual Degree MCRP/MSCE

Transportation Planning/Transportation Systems Engineering

The dual Master of City and Regional Planning and Master of Science in Civil Engineering degree program is designed to meet the need of planning agencies and transportation departments for staff who combine expertise in city and regional planning and transportation systems engineering. The program consists of coursework in city and regional planning, transportation systems engineering, and transportation planning. It is administered jointly by the School of City and Regional Planning and the School of Civil and Environmental Engineering.

Dual Degree Information [https://planning.gatech.edu/mcrp-msce](https://planning.gatech.edu/mcrp-msce)

Dual Degree MCRP/Master of Science in Public Policy

The dual MS degree program in Public Policy and City and Regional Planning prepares students for policy analysis and planning work at the national, state, and local levels. Graduates work in public, private, and non-profit settings building on the complementary perspectives and skills of the two professions.

In addition to providing interdisciplinary professional training, the dual degree also provides the opportunity to step toward Ph.D. programs in either Public Policy or Planning with an emphasis on Urban, Environmental, or Economic Development Policy.

PUBP MS Information [http://spp.gatech.edu/masters](http://spp.gatech.edu/masters)

All students must complete a minimum combined requirement of 75 credit hours for the dual degree program. Students receive both degrees.

Required Core Courses for MSPP/MCRP Dual Degree

**MS in Public Policy**

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<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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<td>PUBP 6010</td>
<td>Ethic, Epistem &amp; Public Pol</td>
<td>3</td>
</tr>
<tr>
<td>PUBP 6012</td>
<td>Fund of Policy Processes</td>
<td>3</td>
</tr>
<tr>
<td>PUBP 6112</td>
<td>Research Dsgn-Policy Sci</td>
<td>3</td>
</tr>
<tr>
<td>PUBP 6118</td>
<td>Public Finance &amp; Policy</td>
<td>3</td>
</tr>
<tr>
<td>PUBP 6201</td>
<td>Public Policy Analysis</td>
<td>3</td>
</tr>
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<td>Select one of the following:</td>
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</tr>
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<tr>
<td>PUBP 6017</td>
<td>Public Management</td>
<td></td>
</tr>
<tr>
<td>PUBP 6018</td>
<td>Policy Implement &amp; Admin</td>
<td></td>
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Total Credit Hours 19

**MCRP**

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<thead>
<tr>
<th>Code</th>
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<td>CP 6012</td>
<td>Planning Theory</td>
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<td>CP 6016</td>
<td>Growth Management Law</td>
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<td>CP 6024</td>
<td>Quant &amp; Computer Methods</td>
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<tr>
<td>CP 6052</td>
<td>Planning Studio</td>
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</table>

Total Credit Hours 17

Core Course Options for Dual Degree Students

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<thead>
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<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>PUBP 6114</td>
<td>Applied Policy Methods</td>
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<tr>
<td>or CP 6025</td>
<td>Adv Planning Methods</td>
<td></td>
</tr>
<tr>
<td>PUBP 6116</td>
<td>Microeco-Policy Analy</td>
<td>3</td>
</tr>
<tr>
<td>or CP 6031</td>
<td>Econ Analysis-Planning</td>
<td></td>
</tr>
</tbody>
</table>

Total Credit Hours 6-7

Concentration/Specialization

Students also select one concentration from among MSPP program offerings, each of which involves at least twelve credit hours. Either the Public Policy concentration or the City and Regional Planning specialization must be in the area of Economic Development; Urban and Regional Policy; or Environmental Policy, Planning and Management.

Dual MS Program in ECE GT Lorraine and European Partner Universities

Georgia Tech offers several dual master’s degree programs for students interested in a global educational experience. Each program leads to two MS degrees, one from Georgia Tech and the other from a partner school.

Programs coordinated by Georgia Tech-Lorraine include partner schools in France such as Supelec, ENSEEIHT, Institut d'Electronique de Microélectronique et de Nanotechnologies, and Groupe des Ecoles des Mines and a partner school in Germany, TU-Munich. These programs typically entail three semesters of coursework and a required internship in an industrial setting.


MS Information [http://www.ece.gatech.edu/academics/graduate/msreq.html](http://www.ece.gatech.edu/academics/graduate/msreq.html)

Dual MS Program in ECE Georgia Tech & Korea Advanced Institute of Science and Technology

Students may pursue dual MS degrees from the Korea Advanced Institute of Science and Technology (KAIST) and from Georgia Tech. KAIST offers one of the top engineering programs in Korea and the Far East. All lectures at KAIST are given in English to better serve a growing number of students from overseas. While earning their dual degrees, students spend two semesters each at both Georgia Tech and KAIST. Students completing this dual degree program earn the MSECE from Georgia Tech and the MS in Electrical Engineering from KAIST.

MS Information [http://www.ece.gatech.edu/academics/graduate/msreq.html](http://www.ece.gatech.edu/academics/graduate/msreq.html)
Dual MS Program in ECE with the Politecnico di Torino (Italy)

Georgia Tech offers several dual master's degree programs for students interested in a global educational experience. Each program leads to two MS degrees, one from Georgia Tech and the other from a partner school.

The Politecnico di Torino is Georgia Tech's newest European Dual Master's Degree partner. Students from Georgia Tech and from the Politecnico di Torino can pursue dual master's degrees from both institutions: a non-thesis master's degree from the School of Electrical and Computer Engineering at Georgia Tech and a thesis master's degree from the School of Information Technologies at the Politecnico di Torino located in Torino, Italy. Both degrees can be earned in two years with two semesters spent at Georgia Tech.

MS Information (http://www.ece.gatech.edu/academics/graduate/msreq.html)

Joint Doctor of Philosophy with a Major in Electrical and Computer Engineering with the Politecnico Di Milano

The School of Electrical and Computer Engineering (ECE) offers a joint doctorate degree program between the Georgia Institute of Technology (Georgia Tech) and the Politecnico di Milano (PdM).

Politecnico di Milano is a highly ranked technical university located in one of the most industrialized regions of Italy Lombardy. It has close ties with industry at the national, European, and international levels; it shares similar strategic goals as those of Georgia Tech; it has complimentary resources that fully support students and faculty; and it participates in a number of important academic and economic projects within Europe and abroad.

This joint Ph.D. program will afford graduate students from each university the opportunity to: study and conduct research at an international peer engineering, science and computer research institution; gain confidence in working as a member of an international team; and live and study in an environment outside of their home country.

PhD Information (http://www.ece.gatech.edu/academics/graduate/phdreq.html)

Joint Doctor of Philosophy with a Major in Electrical and Computer Engineering with the Politecnico di Torino (Italy)

The School of Electrical and Computer Engineering (ECE) offers a joint doctorate degree program between the Georgia Institute of Technology (Georgia Tech) and the Politecnico di Torino (PdT).

Politecnico di Torino is a highly ranked technical university located in one of the most industrialized regions of Italy - Piedmont. It has close ties with industry at the national, European, and international levels; it shares similar strategic goals as those of Georgia Tech; it has complimentary resources that fully support students and faculty; and it participates in a number of important academic and economic projects within Europe and abroad.

This joint Ph.D. program will afford graduate students from each university the opportunity to: study and conduct research at an international peer engineering, science and computer research institution; gain confidence in working as a member of an international team; and live and study in an environment outside of their home country.

PhD Information (http://www.ece.gatech.edu/academics/graduate/phdreq.html)

M.D./Ph.D. Program

The Coulter Department of Biomedical Engineering participates with the Emory University School of Medicine and the Georgia Health Sciences University to offer students an opportunity to combine their M.D. with a PhD in Biomedical Engineering or Bioengineering. Prospective students should contact the medical school of interest to begin the exploration and application processes.

M.Arch/MCRP Dual Degree

The dual Master of Architecture and Master of City and Regional Planning degree program trains those who wish to engage directly in the process of city building. The program is intended to meet the needs of planning agencies, consultants, institutions, and architectural firms for graduates who can deal competently with the complexities of urban areas.

Dual Degree Information (http://www.planning.gatech.edu/academics/dualdegrees/architecture)

Master of Architecture (M.Arch.)

The M.Arch. Program, leading to the Master of Architecture as the first professional degree, is oriented toward the professional practice of architecture and is fully accredited by the National Architectural Accrediting Board (NAAB). This degree option provides flexibility for students who have an undergraduate degree with a major in architecture as well as those who have a degree in a field other than architecture. The M.Arch. Program requires a minimum of 60 credit hours and a maximum of 102 credit hours of study, depending upon the applicant's prior education in architecture and the amount of advanced standing credit granted upon admission to the program.

Normally, a student admitted to the program with maximum advanced standing can expect to complete the program within two academic years of full-time study. A student admitted to the program with no advanced standing can expect the program to require three and one-half academic years of full-time study. Graduates from four-year undergraduate programs in architecture similar to that at Georgia Tech can normally expect to complete the program in two academic years, provided they have pursued architecturally related elective coursework during their undergraduate years. Specific information regarding applications for advanced standing and degree requirements is available from the School of Architecture.

Multidisciplinary studies are strongly encouraged in all of the master's programs in architecture. These studies may be part of a formal dual degree program, including architecture and city and regional planning. Other multidisciplinary studies are possible within the College of Design, the Institute, or at other Atlanta area colleges and universities, such as

Joint Doctor of Philosophy with a Major in Electrical and Computer Engineering with the Politecnico Di Milano

The School of Electrical and Computer Engineering (ECE) offers a joint doctorate degree program between the Georgia Institute of Technology (Georgia Tech) and the Politecnico di Milano (PdM).

Politecnico di Milano is a highly ranked technical university located in one of the most industrialized regions of Italy Lombardy. It has close ties with industry at the national, European, and international levels; it shares similar strategic goals as those of Georgia Tech; it has complimentary resources that fully support students and faculty; and it participates in a number of important academic and economic projects within Europe and abroad.

This joint Ph.D. program will afford graduate students from each university the opportunity to: study and conduct research at an international peer engineering, science and computer research institution; gain confidence in working as a member of an international team; and live and study in an environment outside of their home country.

PhD Information (http://www.ece.gatech.edu/academics/graduate/phdreq.html)
Emory University and Georgia State University. Coursework outside the School of Architecture frequently includes city and regional planning, public policy, history, philosophy, real estate development, engineering, and studio art.

The deadline for applications is December 31st for all applicants for the following fall semester. Each applicant must have an outstanding undergraduate record and must submit a portfolio of creative work. The Graduate Record Examination (GRE) is required for all applicants. The TOEFL is the only acceptable language test for admission to Georgia Tech. A score of 90 is required by Georgia Institute of Technology, with a minimum section score of 19 in each section of the test, however, the School of Architecture only accepts TOEFL scores near 100 for all foreign applicants. All applicants should be aware that each program in the School of Architecture has specific application requirements; therefore, all applicants should consult the relevant requirements for their chosen degree programs; by visiting the School of Architecture website or contacting an academic advisor.

The minimum requirements for the M.Arch. degree, for a student with a previous degree in architecture (2-year program), are as follows:

The maximum requirements for the M.Arch. degree, for a student with a previous degree in architecture (3.5-year program), are as follows:

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<tr>
<th>Code</th>
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<th>Credit Hours</th>
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<tr>
<td>ARCH 6069</td>
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<tr>
<td>ARCH 6070</td>
<td>Advanced Arch Design II</td>
<td>6</td>
</tr>
<tr>
<td>ARCH 6071</td>
<td>Arch Des &amp; Res Studio I</td>
<td>6</td>
</tr>
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<td>ARCH 6072</td>
<td>Arch Des &amp; Res Studio 2</td>
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<th>Credit Hours</th>
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<tr>
<td>ARCH 6251</td>
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</tr>
<tr>
<td>ARCH 6230</td>
<td>Construction Tech 2</td>
<td>3</td>
</tr>
<tr>
<td>ARCH 6252</td>
<td>Building Structures II</td>
<td>3</td>
</tr>
<tr>
<td>ARCH 6352</td>
<td>Theory of Architecture 2</td>
<td>3</td>
</tr>
<tr>
<td>ARCH 6532</td>
<td>Environmental Systems II</td>
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<td>ARCH 6350</td>
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<tr>
<td>ARCH 6315</td>
<td>Practice of Arch I</td>
<td>3</td>
</tr>
<tr>
<td>ARCH 7151</td>
<td>History of Urban Form</td>
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The maximum requirements for the M.Arch. degree, for a student with a previous degree in a discipline other than architecture (3.5-year program), are as follows:

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<td>ARCH 6472</td>
<td>Arch Modeling &amp; Media 2</td>
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<tr>
<td>ARCH 6474</td>
<td>Arch Modeling &amp; Media 3</td>
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**Building Technology**

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<tr>
<td>ARCH 6531</td>
<td>Environmental Systems I</td>
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</tr>
<tr>
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<td>Environmental Systems II</td>
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<td>Building Structures II</td>
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<td>Arch History II</td>
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<td>ARCH 7151</td>
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<tr>
<td>ARCH 6315</td>
<td>Practice of Arch I</td>
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<tr>
<td>ARCH 6472</td>
<td>Arch Modeling &amp; Media 2</td>
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<tr>
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<td>Arch Modeling &amp; Media 3</td>
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**History/Theory/Practice**

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<td>ARCH 6106</td>
<td>Arch History II</td>
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<tr>
<td>ARCH 7151</td>
<td>History of Urban Form</td>
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<td>ARCH 6350</td>
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<td>Practice of Arch I</td>
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<th>Credit Hours</th>
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<tbody>
<tr>
<td>ARCH 102</td>
<td>Master of Biomedical Innovation and Development</td>
<td>102</td>
</tr>
</tbody>
</table>

This new BioD master's program will bring together students from mechanical, electrical and computer, human factors, systems analysis and manufacturing backgrounds to learn and work in multi-disciplinary teams on clinically relevant needs for new techniques and medical products. This masters program is composed of thirty-six (36) credit hours over three (3) contiguous semesters with seven (7) required courses, two (2) graduate electives, and a two-semester clinically focused team master's project. The faculty, composed of GT biomedical engineering and management professors, clinical/hospital faculty and industry professionals, will create a multi disciplinary teaching approach to educate graduate students from multiple engineering and science backgrounds. The first class of 20 to 40 students will matriculate in the fall of 2013.

**Master of Business Administration (MBA)**

Georgia Tech’s Scheller College of Business offers the MBA for the 21st century, building business leaders who are innovative, entrepreneurially-minded, analytically-skilled, and can leverage technology in a global setting. Highly qualified candidates from all academic and professional backgrounds enter the program, which is designed to foster teamwork, diversity, and a closely knit network.

The MBA program is offered in full-time, evening, and weekend executive formats. For the full-time and weekend executive MBA programs, entry is in the fall semester only. For the evening program, admission is offered
in both fall and spring semesters. Some of the primary advantages of the MBA program include a close community that promotes enriched student-faculty relationships; classmates with diverse educational and work experiences; small class sizes that foster networking and a true understanding of the business environment; an innovative curriculum that keeps pace with the rapidly changing environment of business and technology. Scheller College’s location within the Tech Square innovation ecosystem, a globally recognized nexus of innovation and entrepreneurial activity in the heart of Midtown Atlanta, provides MBA students access to some of the most dynamic companies and startups. In addition, a dual degree option gives students the opportunity to combine the MBA with Georgia Tech engineering, computing and design masters and Ph.D. programs.

During the summer term between the first and second academic years, full-time MBA students intern with companies ranging from Fortune 500 Companies and major consulting/finance firms to entrepreneurial ventures, innovation centers, and start-ups. These summer internships enhance permanent employment opportunities.

The full-time and evening MBA programs requires 54 hours; 21 semester hours are core classes. Core courses develop a common body of knowledge essential to all MBA students. The remainder of the curriculum consists of electives, which provide flexibility for students to build competence in one or more immersive tracks and concentration areas. This freedom permits students to customize a curriculum directed toward their own educational and career goals.

MBA elective areas include accounting, entrepreneurship, finance, business analytics, leadership, information technology management, law, international business, marketing, operations management, organizational behavior, sustainability, real estate strategic management, and leading innovation.

More information, applications, and viewbooks may be found at: http://scheller.gatech.edu/MBA.

Scheller College of Business
MBA Program Office
Georgia Institute of Technology
Atlanta, Georgia 30308-0520
phone: 404.894.8722

- Request a Full-Time MBA Viewbook (http://www.scheller.gatech.edu/request-more-information.html?register&program=Full-time+MBA)
- Request an Evening MBA Viewbook (http://www.scheller.gatech.edu/request-more-information.html?register&program=Evening+MBA)
- Request an Executive MBA Viewbook (https://www.scheller.gatech.edu/request-more-information.html?register&program=Executive+MBA)

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<tr>
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<td>Principles of Finance (LG)</td>
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<td>Leading People &amp; Org (LG)</td>
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Total Credit Hours 54

Master of Business Administration - Global Business

As the business world becomes increasingly global, executives must understand and actively manage its impact on current business operations and future business trends. Georgia Tech’s MBA - Global Business (Global Executive MBA) program trains executives to take leadership positions in businesses that have global aspirations. Whether you want to work overseas or grow your company at home, understanding how global issues are increasingly affecting every type of business is essential. The MBA - Global Business program will prepare you to effectively lead your business in a global environment of increasing complexity and technological sophistication.

Rigorous Curriculum

The MBA - Global Business program enhances traditional MBA coursework to include international perspectives on finance, operations, economics, technology, and marketing. The core MBA curriculum is supplemented with coursework on global markets, global trade, global supply chain, and global organizations. The curriculum takes advantage of Georgia Tech’s unique academic strengths and international presence.

International Business Experience

Designed to be a truly international experience, the MBA - Global Business program includes two trips overseas to gain firsthand knowledge of key issues in international commerce. These destinations vary from year to year, but focus on regions of emerging importance such as China, India, Latin America, and Eastern Europe. Through lectures and company visits, these international trips examine the cultural, social, and economic aspects of each location. A year-long global strategy capstone project ties together the international residencies and classroom learning to provide an integrative experience across all aspects of the curriculum.

Who Should Apply

Qualified candidates for the MBA-Global Business program have ten to fifteen years of professional experience (a minimum of five years is required), during which they have demonstrated increased responsibility, professional growth, and leadership.

These candidates are highly motivated to develop the business skills that are critical for leaders in a global setting. Industry background, company size, and titles of participants vary, allowing students to gain a broad understanding of global issues and scenarios.
Admission
Applications are reviewed and accepted throughout the year. Priority will be given to applications received prior to April 1. After that date, applications received will be reviewed on a space-available basis.
Taking the GMAT may be required based on a review of your application portfolio. For additional information on admission requirements, please contact us at GlobalEMBA@gatech.edu.

Contact information
MBA - Global Business
Georgia Tech College of Business
800 West Peachtree Street
Suite 310
Atlanta, GA 30308
Phone: 404.385.2254
Fax: 404.894.1464
MBA – Global Business Website (http://mgt.gatech.edu/exec_ed/program/gemba)

Program of Study
The MBA - Global Business degree is a specialized MBA degree requiring fifty semester credit hours of study. It consists of a fixed sequence of courses over a seventeen-month period with a new class beginning each fall semester and graduating at the end of the following fall semester. Classes are held on select weekends (Friday evening and all day Saturday), allowing participants to minimize time away from their jobs. In addition, there are four residencies, including two week long sessions at Georgia Tech and two trips abroad. To graduate, students must earn a cumulative grade point average of at least 2.7. To remain on good standing during the program, students must earn the minimum satisfactory cumulative grade point average of 2.7. Any student receiving three or more grades of U, D, or F, in any combination, may be dismissed from the program.

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<tr>
<td>IMBA 6021</td>
<td>Data Analysis for Bus</td>
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<td>IMBA 6031</td>
<td>Leadership &amp; Org Behavior</td>
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<td>MOT 6133</td>
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<td>IMBA 6121</td>
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<td>IMBA 6140</td>
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<td>IMBA 6260</td>
<td>Glob Supp Chain &amp; E-Comm</td>
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| IMBA 6430 | Bus Str Sustainability                | 2            |
| IMBA 6311 | Anal of Global Environ                | 4            |
| IMBA 6401 | Global Strategy Proj 1                | 2            |
| IMBA 6411 | Global Strategy Proj 2                | 2            |
| IMBA 6420 | Global Strategy Proj 3                | 2            |

| Total Credit Hours | 50 |

Master of Business Administration in Management of Technology
As technology alters the business landscape at an unprecedented pace, the Master of Business Administration – Management of Technology (Executive MBA in Management of Technology or EMBA-MOT) program will help you stay ahead of the curve and the competition. Leverage your technology background for competitive advantage as you learn to cope with the challenges presented by rapid innovation, shorter product life cycles, and emerging technologies.

No one understands innovation and technical experts like Georgia Tech, and the professors in our top-ranked business school know how to enhance your technical knowledge and increase your business savvy. In addition to gaining a foundation in business through MBA core courses, you will learn how to manage innovation and organizational change, conduct technology forecasting, and identify promising emerging technologies.

Through the EMBA-MOT program, you will gain the leadership and communication skills that are essential to maintain an upward trajectory in your career. The program will complement your technology background and help you leverage it for advancement. You will learn not only to speak the language of business fluently, but also to think and plan strategically. You will gain the confidence to communicate with senior leadership and manage teams of technical professionals at home and abroad. As more and more technical jobs are outsourced to employees in newly industrialized countries such as China and India, the role of the technical professional in the U.S. is rapidly changing. You may find that your role is shifting from performing technical duties to managing an international workforce or multiple vendors. The EMBA-MOT program will equip you to handle these new challenges while improving the performance of your company.

At the conclusion of the seventeen-month program, you will go on an international study tour of China, which includes visits to global research and development centers and meetings with executives from top companies. The trip also includes cultural excursions and networking events with local executives to complement your international learning experience.

Who Should Apply
Candidates should have a minimum of five years of professional work experience, a baccalaureate degree from an accredited institution, and a record of positive career growth and achievements through positions of increasing responsibility. The Executive MBA in Management of Technology program is particularly well-suited for technical professionals as well as for professionals working in companies strongly impacted by technology and/or increasing demands for innovative new products and services.

Who Should Apply
Candidates should have a minimum of five years of professional work experience, a baccalaureate degree from an accredited institution, and a record of positive career growth and achievements through positions of increasing responsibility. The Executive MBA in Management of Technology program is particularly well-suited for technical professionals as well as for professionals working in companies strongly impacted by technology and/or increasing demands for innovative new products and services.
Admission

Applications are reviewed and accepted throughout the year. Priority will be given to applications received prior to April 1. After that date, applications will be reviewed on a space-available basis. Taking the GMAT may be required based on a review of your application portfolio. For additional information on admission requirements, please contact us at emba-mot@gatech.edu.

Contact Information

MBA – Management of Technology
Georgia Tech College of Business
800 West Peachtree St. NW
Atlanta, GA 30308-0520
Phone: 404.385.2254
Fax: 404.894.1464
MBA – Management of Technology Website (http://scheller.gatech.edu/exec_ed/program)

Program of Study

The MBA - Global Business degree is a specialized MBA degree requiring fifty semester credit hours of study. It consists of a fixed sequence of courses over a seventeen-month period with a new class beginning each fall semester and graduating at the end of the following fall semester. Classes are held on select weekends (Friday evening and all day Saturday), allowing participants to minimize time away from their jobs. In addition, there are four residencies, including two week long sessions at Georgia Tech and two trips abroad. To graduate, students must earn a cumulative grade point average of at least 2.7. To remain in the program, students must earn a cumulative grade point average of at least 2.7. Any student receiving three or more grades of U, D, or F, in any combination, may be dismissed from the program.

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<tr>
<td>MOT 6133</td>
<td>Ethical Decision Making</td>
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The core courses are designed to impart fundamental planning knowledge applicable to wide sectors of the discipline. These include courses examining planning theory, planning methods, planning law, economic analysis, and planning practice. Students must earn a grade of C or better in all core courses to meet the core course requirements.

In the specialization coursework and the internship, the student develops skills focused on a particular aspect of city and regional planning. To enable students to focus their education on a consistent and cumulative body of knowledge, the program offers six specializations: economic development, environment and health planning management, housing and community development, land use planning, transportation planning, and urban design.

In addition to the core and specialization areas, the curriculum includes electives that can be used to deepen the student’s knowledge in a specialization or to broaden exposure to additional areas of planning. Students may take electives within the school, within the College of Design, in other schools at Georgia Tech (e.g. Architecture, Civil and Environmental Engineering, Public Policy, Information Systems, Earth and Atmospheric Sciences), or at other area universities such as Georgia State University or Emory University. Through the cross-registration system, students are allowed to enroll in a number of courses that are not offered at Georgia Tech.

The applied studio course allows students to synthesize their planning knowledge and skills in a real-world situation ranging from neighborhood to metropolitan regions. Our studies are conducted locally throughout Atlanta, which provides an excellent laboratory, as well as nationally and internationally. Finally, a thesis or applied research paper provides an opportunity for focused study in the student’s major area of specialization.
Students are admitted to the MCRP program to begin studies in the fall term only. With rare exceptions, involving transfer students and dual degree students, applicants will be considered for spring term admission. Applications must be completed by January 15 to ensure consideration for merit-based financial aid, and by February 15 if no financial aid is sought.

For more information about the MCRP program, contact:

Academic Advisor
Graduate Student Admissions, Advising, and Graduation Clearance
School of City and Regional Planning
College of Design
Georgia Institute of Technology
Atlanta, Georgia 30332-0155
Email: crp@design.gatech.edu

Master of City and Regional Planning (http://www.planning.gatech.edu/academics/mcrp/overview)

**Master of Industrial Design (MID)**

Industrial design is the professional service of creating and developing concepts and specifications that optimize the function, value, and appearance of products and systems for the mutual benefit of both user and manufacturer. The industrial designer’s work touches all of our lives in the form of home products and furnishings, communication devices, healthcare equipment, rehabilitation technologies, and a myriad of other consumer and industrial products and services. While giving form to the efforts of industry, the designer is at the same time a consumer advocate, providing the humanizing link between technology and people. As such, the industrial designer’s central responsibilities include fitting the artifact, system, or service to the person through considering appropriate aesthetics and ergonomics, technical processes, requirements for manufacture, marketing opportunities, and economic constraints.

At the graduate-level, Georgia Tech’s Master’s of Industrial Design (MID) focuses on an inclusive design approach that is dedicated to the creation and development of products, systems, services and environments that are usable by all segments of the population. With the growing diversity of the population, inclusive design is becoming increasingly important to designers of tomorrow to ensure that design is responsive to the individual and collective needs of all people.

Capitalizing on Georgia Tech’s rich traditions in technology and research, the MID program stresses a user-centered design process and evidence-based design practice that offers students unique opportunities to explore the design of new and existing technologies. Faculty members, who are practicing designers and experts in their fields, maintain active research programs in tangible products within communication technologies, enabling environments, supportive product systems, rehabilitation technologies, and healthcare systems technologies.

The Georgia Tech MID program offers a well-rounded course of study with early emphasis on exercising design principles and developing project-based design skills. Design projects stress realistic design situations, where students can have the opportunity to be involved in sponsored and/or funded projects. Within this model, the program encourages students to expand individual disciplinary talents and respond to changing opportunities in the field.

Students who have an undergraduate degree in industrial design from an undergraduate ID program similar to Georgia Tech’s can complete a two-year program consisting of 48 graduate credits.

Students who do not have an undergraduate degree in industrial design will need to successfully complete an additional 28 undergraduate industrial design credits, which at a minimum includes one year of undergraduate industrial design studios, Advanced Sketching, History of Industrial Design, Industrial Design Computing I and II, and Professional ID Practices. These classes are the minimum requirements students with a previous degree other than industrial design need before proceeding into the graduate-level studios and coursework.

All graduate students will be reviewed each year for satisfactory progress. Credit toward the MID degree will be granted for courses in which a grade of C or higher is earned.

ID Graduate Studies Information (http://www.id.gatech.edu/academics/graduate/overview)

The minimum requirements for the two-year MID degree for a student with a previous degree in industrial design are as follows:

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<td>ID 6211</td>
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<td>ID 6216</td>
<td>Service Design &amp; Brand</td>
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<td>ID 8803</td>
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<tr>
<td>ID 6212</td>
<td>Studio 2 Health&amp;Wellness</td>
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</tr>
<tr>
<td>ID 6213</td>
<td>Studio 2 Interact Product</td>
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**Graduate Electives**

Select 16 credit hours approved by the school chair. 16

**Thesis/Non-Thesis**

Select one of the following: 12

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<td>Master’s Thesis</td>
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<tr>
<td>ID 6400</td>
<td>Master’s Project (Non-Thesis)</td>
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</table>

Total Credit Hours 48

All work executed in the College becomes the property of the College and will be retained or returned at the discretion of the faculty. The faculty also reserves the right to refuse credit for any project executed outside the precincts of the College or otherwise executed without proper coordination with the instructor.

**Master of Real Estate Development**

Real estate development is a multidisciplinary activity that synthesizes the physical and design components of the development of land and buildings with financial, marketing, planning and policy aspects. The Master of Real Estate Development at Georgia Tech is a collaborative academic program offering a technical, design-based degree that also explores the business, planning, and policy components of responsible real estate development to provide students the knowledge demanded for the sustainable utilization of the land. The program leverages courses and faculty from three Schools in the College of Design, the School of Architecture, the School of Building Construction and the School of City...
and Regional Planning, while pursuing broader, future collaboration with College of Business, the School of Civil and Environmental Engineering, and the School of Public Policy.

The Master of Real Estate Development (MRED) is offered to professionals to further existing real estate careers, professionals looking to change career direction, and full-time students with undergraduate degrees in real estate, construction, architecture, landscape architecture, planning, or engineering.

The MRED is be a 30-credit hour program made available to full-time students and working professionals, with the opportunity for full-time students to complete the degree in 12 to 18 months. Instruction includes regular classroom courses, studio-based real estate development courses, and case studies involving real estate development projects.

Website: https://bc.gatech.edu/master-real-estate-development

This degree encompasses the full spectrum of disciplines involved in real estate development.

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<td>Real Estate Prod Finance</td>
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<td>BC 6350</td>
<td>Design&amp; Construction Law</td>
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<tr>
<td>ARCH 6151</td>
<td>Theories of Urban Design</td>
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<tr>
<td>ARCH 6226</td>
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<td>MGT 6082</td>
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<td>BC 6875</td>
<td>Real Estate Dev Capstone</td>
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Total Credit Hours: 30

APPLICATIONS

Admission to the MRED program requires the following:

- A bachelor’s degree from an accredited institution with a minimum 3.0 GPA
- No work experience is required for applicants with one of the following degrees: Construction Management, Architecture, Architecture Engineering, Civil Engineering, Landscape Architecture, City Planning, or Real Estate
- All other applicants must have a minimum of two years’ experience in the real estate development industry (including Accounting, Finance, Business, and Property Management)
- Proof of English Proficiency (i.e., TOEFL)
- GRE or GMAT test scores within the past five years
- Two letters of recommendation

Application deadline, including all supporting documents, is June 1 for the fall cohort.

For more information, visit: https://bc.gatech.edu/master-real-estate-development

Master of Science (Undesignated)

The undesignated master’s degree (MS) enables you to pursue a program of highly interdisciplinary coursework. For the undesignated degree, the major area is a coherent field of interest in the Woodruff School, but courses taken in the major area need not all have ME designations. Examples of major areas are acoustics and dynamics, bioengineering, materials science, MEMS, and thermal sciences. The list of major areas is limited only by the current interests of the faculty in the Woodruff School. The requirement for a major area is motivated by the need to have some coherent area of special expertise.

Master of Science in Aerospace Engineering

At the graduate-level, the School of Aerospace Engineering offers master’s and doctoral degrees. In addition, the School offers a distance learning-based master’s degree.

The master’s degree may be earned by completing 33 semester hours of coursework, which must include 3 credit hours of Special Problems research credit. Alternatively, the candidate may elect to complete twenty-four semester hours of coursework along with nine hours of MS thesis work. In the latter option, the candidate must propose a thesis topic, complete the thesis, and successfully defend it before being awarded the degree. A GPA of 2.7 is required to graduate with an MS degree. All coursework, including Special Problems, must be taken on a letter-grade basis. The program of study for the master’s degree is very flexible and can be tailored, in agreement with the student’s advisor, to meet the candidate’s professional goals.

For further details governing the graduate program, access the Aerospace Engineering Graduate Handbook at www.ae.gatech.edu. Graduate students may specialize in the following areas: aerodynamics and fluid mechanics, aeroelasticity and structural dynamics, flight mechanics and control, propulsion and combustion, structural mechanics and materials behavior, and system design and optimization. Further information on these areas of specialization and research can be found at www.ae.gatech.edu/research (http://www.ae.gatech.edu/research).

Non-Thesis Option

A GPA of 2.7 is required to graduate with an MS degree

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coursework</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Select 30 credit hours of coursework in Aerospace Engineering ¹</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>Select 3 credit hours of Special Problems research credit. ¹</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

Total Credit Hours: 33
The Master of Science in Analytics is an interdisciplinary program that combines statistics, operations research, computing, and business by melding the world-class expertise of the College of Engineering’s Stewart School of Industrial & Systems Engineering, the College of Computing’s School of Computational Science and Engineering, and the Scheller College of Business. By combining the strengths of these nationally ranked programs, graduates will be afforded the opportunity to integrate analytic skills in a unique and interdisciplinary way that yields deep insights into analytics problems.

Analytics is defined as “the scientific process of transforming data into insight for making better decisions.” Tying together the new opportunities made possible by big data and computing, advanced quantitative methods from statistics and operations research, and the need for better business intelligence and decision support, analytics has quickly become a key facet of business strategy. The MS Analytics program’s graduates will be able to move directly into business, industry, and government positions where they can apply the practical knowledge they have gained to immediately benefit their employers.

Students earning the MS Analytics degree will be able to understand and integrate fundamental principles and advanced concepts across the core analytics disciplines of computing, statistics, operations research, and business. Trained by world-class faculty in all of these areas, students will learn

- identification and framing of problems;
- acquisition, management, and utilization of large and fast-moving streams of data;
- creation, analysis, solution, and interpretation of mathematical models using appropriate methodology; and
- the integration of these interdisciplinary skills to enable graduates to successfully develop and execute analytics projects.

In addition to an integrated breadth of study covering the core areas of analytics, students will satisfy one of the specialized tracks to give them depth in an analytics area of specialization:

### Analytical Tools Track
The Analytical Tools track provides students with a greater understanding of the quantitative methodology of analytics: how to select, build, solve, and analyze models using methodology such as parametric and non-parametric statistics, regression, forecasting, data mining, machine learning, optimization, stochastics, and simulation.

### Business Analytics Track
The Business Analytics track provides students with a deeper understanding of the practice of using analytics in business and industry: how to understand, frame, and solve problems in marketing, operations, finance, management of information technology, human resources, and accounting in order to develop and execute analytics projects within businesses.

### Computational Data Analytics Track
The Computational Data Analytics track provides students with a deeper understanding of the practice of dealing with so-called “big data”: how to acquire, pre-process, store, manage, analyze, and visualize data arriving at high volume, velocity, and variety.

### Prerequisites
The prerequisites of the MS Analytics program include:

1. Interest in analytics, and a high level of ability that has been demonstrated within past performance on appropriate coursework and/or industry experience as well as standardized testing (GRE or GMAT);
2. Basic mathematical background - at least one college-level course in each of calculus, basic linear algebra, and probability and statistics;
3. Basic computing background - at least one college-level course (or equivalent basic knowledge) in computer programming using a high-level language such as Python;
4. A bachelor’s degree or equivalent; and
5. Institute requirements for admission to graduate study.

Applicants who do not satisfy these prerequisites might still be admitted, as long as they will have all of the prerequisites by the time they start the program.
Other multidisciplinary studies are possible within the College of Design, degree program, including architecture and city and regional planning. These studies may be part of a formal dual study offered in the Master of Science in Architecture degree.

Concentrations:
- Applied Analytics Practicum
  - ISYE 6748 Appld Analytics Pract
  - CSE 6748 Appld Analytics Pract
  - MGT 6748 Appld Analytics Pract

Total Credit Hours: 36

1. Students with sufficient background in this area may be allowed to substitute additional elective hours.
2. See http://analytics.gatech.edu for the full list. Online MS in Analytics see http://omsanalytics.gatech.edu for the full list.
3. For the 6-15 semester hours of electives, students choose coursework to satisfy at least one of the three track requirements in analytical tools, business analytics, and computational data analytics. Students are encouraged to choose electives to develop specific expertise within an area of analytics where they have career interests. Courses available to the students either as core requirements or elective options include topics such as forecasting, regression analysis, data mining, statistical learning, machine learning, computational data analytics, design of experiments, simulation, optimization, probabilistic models, data analytics, visualization, databases, text mining, algorithms, high performance computing, graph analytics, business intelligence, pricing analytics, revenue management, business process analysis, financial analysis, decision support, privacy and security, and risk analytics. See http://analytics.gatech.edu for the full list. Online MS in Analytics see http://omsanalytics.gatech.edu for the full list.

The Master of Science in Analytics is also offered online.

For more information, visit: Online Master of Science in Analytics (https://pe.gatech.edu/degrees/analytics).

Master of Science in Architecture

The School of Architecture's Master of Science in Architecture (MS) Program is a non-professional program requiring a minimum of 30 semester hours of advanced study and is oriented toward advanced practice, scholarship and research. Applicants may have previous degrees in architecture or other related fields. The program accepts students with a professional degree in a design or design-related field, as well as students with a baccalaureate degree in a non-design field who wish to pursue an area of study offered in the Master of Science in Architecture degree.

Concentrations:
1. Advanced Production (p. 510)
2. Building Information Systems (p. 511)
3. Design Computation (p. 511)
4. Health and Design (p. 511)
5. High Performance Buildings (p. 512)

Multidisciplinary studies are strongly encouraged in all of the master's programs in architecture. These studies may be part of a formal dual degree program, including architecture and city and regional planning. Other multidisciplinary studies are possible within the College of Design, the Institute, or at other Atlanta area colleges and universities, such as Emory University and Georgia State University. Coursework outside the School of Architecture frequently includes city and regional planning, public policy, history, philosophy, real estate development, engineering, and studio art.

The deadline for applications is December 31st for all applicants for the following fall semester. Each applicant must have an outstanding undergraduate record and must submit a portfolio of creative work. The Graduate Record Examination (GRE) is required for all applicants. The TOEFL is the only acceptable language test for admission to Georgia Tech. A score of 90 is required by Georgia Institute of Technology, with a minimum section score of 19 in each section of the test, however, the School of Architecture only accepts TOEFL scores near 100 for all foreign applicants. All applicants should be aware that each program in the School of Architecture has specific application requirements; therefore, all applicants should consult the relevant requirements for their chosen degree programs; by visiting the School of Architecture website or contacting an academic advisor.

For further details on the program, see www.arch.gatech.edu (http://www.arch.gatech.edu) or contact an academic advisor in the School of Architecture.

MS Information (http://www.arch.gatech.edu/master-science-architecture)

- Master of Science in Architecture - Advanced Production (p. 510)
- Master of Science in Architecture - Building Information Systems (p. 511)
- Master of Science in Architecture - Design Computation (p. 511)
- Master of Science in Architecture - Health and Design (p. 511)
- Master of Science in Architecture - High Performance Buildings (p. 512)

Master of Science in Architecture - Advanced Production

The Master of Science in Architecture with a concentration in Advanced Production focuses on integrating advanced design, computation and manufacturing technologies into workflows for the production of experimental spatial systems, material assemblies and buildings. Coursework for this concentration incorporates emerging design technologies including robotics and automation, Augmented Reality (AR) / Virtual Reality (VR), Small Unmanned Aerial Systems (SuAS; aka “Drones”), additive manufacturing (3d-printing), subtractive computer numerical control (CNC) manufacturing processes, parametric modelling and production logistics. Graduates from this program will be prepared to leverage expertise in advanced digital design and production as consultants to or embedded within progressive architectural firms, digital manufacturing operations and advanced technology start-ups. Additionally, this concentration positions graduates to further pursue research through academic faculty positions or as potential PhD candidates.

Required Courses:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
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<tr>
<td>ARCH 8803</td>
<td>Advanced Productions</td>
<td>3</td>
</tr>
<tr>
<td>ARCH 6511</td>
<td>Robotic Fabrication</td>
<td>3</td>
</tr>
<tr>
<td>ARCH 6506</td>
<td>Materials/Fabrications</td>
<td>3</td>
</tr>
<tr>
<td>ARCH 6507</td>
<td>Parametric Design</td>
<td>3</td>
</tr>
<tr>
<td>ARCH 6502</td>
<td>Design Scripting</td>
<td>3</td>
</tr>
</tbody>
</table>
The Master of Science in Architecture with a concentration in Design Computation explores the theoretical and practical basis of design as a computational premise. The possibility of design is viewed through the lens of history and theoretical foundations of fields as diverse as mathematics, logic, linguistics, and cybernetics. The School of Architecture is one of the leading institutions in the study of Shape Grammars—an area of study that views architectural drawing as a formal logic of geometric shapes. The Shape Computation Lab within the School of Architecture is a leader in the theory of design computation as well as its applications to practice. Students graduating from this concentration are prepared to pursue a professional career in architecture or advanced studies and eventual academic careers at the intersection of the fields of design, computer science, and mathematics.

**Required Courses:**
- ARCH 6508  Shape Grammars  3
- ARCH 6501  Analog-Digital Des Comp  3
- ARCH 6513  Building Systems & Data  3
- ARCH 6502  Design Scripting  3
- ARCH 6210  Architectonics  3
- ARCH 6512  Research Colloquium  3

**Capstone:**
- ARCH 6071 Arch Des & Res Studio I  6
  or ARCH 6072 Des & Res Studio 2
- ARCH 8833 Special Topics  1
- ARCH 7000 Master’s Thesis

**Electives:**
- ARCH 6505 Geometric Constructs  6
- ARCH 6426 3D Modeling  
- ARCH 6427 Adv Modeling & Animation  
- ARCH 6474 Arch Modeling & Media 3  
- ARCH 6501 Analog-Digital Des Comp  
- ARCH 8833 Building Systems and Data  

Total Credit Hours  30

1 Independent Study focused on Advanced Productions guided by Faculty

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The Master of Science in Architecture with a concentration in Health & Design is designed for practicing architects, industrial designers, systems engineers, nurses, occupational therapists, clinicians, construction professionals, and health administrators who wish to gain additional expertise in healthcare design. Whatever their career path, graduates will be prepared to serve as consultants or project managers on healthcare design projects in consulting firms, healthcare organizations, and manufacturers; help conduct quality improvement and other healthcare projects; and other leadership roles.

**Required Courses:**
- ARCH 6509 Comp Creativity Des Cogn  3
- ARCH 6426 3D Modeling  
- ARCH 6474 Arch Modeling & Media 3  
- ARCH 6228 Analyt Invest Urb Design  
- ARCH 6507 Parametric Design  
- ARCH 6505 Geometric Constructs

**Capstone:**
- ARCH 6071 Arch Des & Res Studio I  6
  or ARCH 6072 Des & Res Studio 2
- ARCH 8833 Special Topics  1
- ARCH 7000 Master’s Thesis

**Electives:**
- ARCH 6228 Analyt Invest Urb Design  
- ARCH 6229 Construction Tech I  
- ARCH 6210 Architectonics  
- COA 8685 Building Simulation

Total Credit Hours  30

1 Independent Study focused on Design Computation guided by Faculty
This program is a full-time, post-professional program. It is a research-based program that requires a minimum of 30 credit hours. The objective is to provide students with the theoretical, technical and applied knowledge and skills to practice within a range of health-related disciplines.

The program offers students major concentrations in one of three clusters:

- **Design for Healthy Aging in the Community**
- **Rehabilitation and Assistive Technology Design**
- **Design in Healthcare Environments**

### Required Courses:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>ARCH 6271</td>
<td>Healthcare Des Of Future</td>
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<tr>
<td>ARCH 8843</td>
<td>Universal Design</td>
<td>3</td>
</tr>
<tr>
<td>ARCH 8803</td>
<td>Advanced Planning Methods</td>
<td>3</td>
</tr>
<tr>
<td>COA 8630</td>
<td>Arch, Space &amp; Culture</td>
<td>3</td>
</tr>
<tr>
<td>ARCH 6243</td>
<td>Evidence-Based Design</td>
<td>3</td>
</tr>
<tr>
<td>ARCH 626B</td>
<td>Adv Arch, Cult &amp; Behav</td>
<td>3</td>
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<tr>
<td><strong>Capstone:</strong></td>
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<td><strong>6</strong></td>
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<tr>
<td>ARCH 6071</td>
<td>Arch Des &amp; Res Studio I</td>
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<tr>
<td>or ARCH 8872</td>
<td>Des &amp; Res Studio 2</td>
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<tr>
<td>ARCH 8833 Special Topics in Health and Design</td>
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<td></td>
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<tr>
<td>ARCH 7000 Master’s Thesis</td>
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</tbody>
</table>

### Electives:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Faculty Guided Electives</td>
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</tr>
<tr>
<td><strong>Total Credit Hours</strong></td>
<td></td>
<td><strong>30</strong></td>
</tr>
</tbody>
</table>

1 Independent Study guided by Faculty

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### Master of Science in Architecture - High Performance Building

The Master of Science in Architecture with a concentration in High Performance Buildings is focused around the use of building physics and building technology for sustainable architectural design. Emphasis is placed on the analysis of the energy performance and environmental impacts of buildings, as well as on the integration of these metrics in the development of innovative architecture. The program is founded on a first-principles approach to building physics, envelope design, modeling and analysis, life-cycle assessment, applied simulation, AEC Integration, and critical ecological thinking.

The program is structured so that students with a professional degree in architecture, architectural engineering, or mechanical engineering can complete the MS degree in one year.

The program has been developed to address the need for architecture firms and integrated practices to have “in-house” experts on building technology to judge the impact of architectural design decisions on building performance at the early stages of design. These green building practitioners will be able to oversee the engineering and detailing of the building at later stages of the design process to ensure that performance targets are documented and fulfilled. Graduates of the program will be able to co-engineer and integrate novel building technologies into buildings.

### Required Courses:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARCH 6226</td>
<td>Green Construction</td>
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</tr>
<tr>
<td>ARCH 6242</td>
<td>Bldg Physics Modeling</td>
<td>3</td>
</tr>
<tr>
<td>ARCH 6532</td>
<td>Environmental Systems II</td>
<td>3</td>
</tr>
<tr>
<td>ARCH 6209</td>
<td>Building Enclosure</td>
<td>3</td>
</tr>
<tr>
<td>ARCH 6731</td>
<td>Zero Energy House</td>
<td>3</td>
</tr>
<tr>
<td>ARCH 6241</td>
<td>Bldg Simula Design Pract</td>
<td>3</td>
</tr>
<tr>
<td><strong>Capstone:</strong></td>
<td></td>
<td><strong>6</strong></td>
</tr>
<tr>
<td>ARCH 6071 Arch Des &amp; Res Studio I</td>
<td></td>
<td></td>
</tr>
<tr>
<td>or ARCH 8872 Des &amp; Res Studio 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCH 8833 Special Topics in Architectural Technology</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCH 7000 Master’s Thesis</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Master of Science in Bioinformatics

The Georgia Tech Interdisciplinary Bioengineering Graduate Program was established in 1992. Over 170 students have graduated from the program in a broad spectrum of research by our ninety participating faculty (http://www.bioengineering.gatech.edu/faculty) from the Colleges of Engineering, Computing, Sciences, and Architecture as well as Emory University School of Medicine.

The BioE Program is interdisciplinary in that it is not a standalone academic unit like most departments or schools at Georgia Tech. Rather, eight different academic units from the Colleges of Engineering and Computing make up the program.

However, the BioE Program provides the degree requirements for students accepted into the program. This approach allows a flexible, integrative, and individualized degree program that enforces depth and breadth in coursework, a solid bioengineering research experience, and yet is reflective of the disciplinary background of the student’s home school. Importantly, the BioE Program provides research opportunities for students with any participating program faculty, allowing tremendous diversity and flexibility for research topics and advisors.

Students who wish to pursue a Master’s degree in Bioengineering may also do so through the College of Computing. The specific requirements differ from those of the computer science master’s program, and while the degree is granted from the College, applications for this program are processed through the Bioengineering Center of the Office of Interdisciplinary Programs.

Additional information is available at www.bioengineering.gatech.edu/ (http://bioengineering.gatech.edu).

### Master of Science in Bioinformatics

This is a three-semester-focused professional master's degree program combining 37 credit hours of courses in computer science, advanced molecular biology and biochemistry, statistics, and bioinformatics. A full-time summer internship in a corporate or academic bioinformatics group is an essential part of the curriculum. With input and assistance from corporate partners, the program is geared to training and placing graduates into lucrative jobs in the high-demand specialty field of
bioinformatics. More information is available from the graduate coordinator of the MS Bioinformatics program.

Bioinformatics Website (http://bioinformatics.gatech.edu)

Master of Science in Biology

The School of Biological Sciences offers two distinct programs leading to the M.S. in Biology degree. The M.S. in Biology (non-thesis) is intended for students who plan to pursue advanced training in one aspect of modern biology. The M.S. in Biology (with thesis) is intended for students wishing to obtain a strong background in modern biology and independent research experience in preparation for a wide range of career options, or further training leading to the PhD in biology. Students admitted to the Masters degree program in the School of Biological Sciences are enrolled in a non-thesis program of study. If a student wishes to obtain a Masters degree with Thesis, he or she may petition the Graduate Committee for approval along with support from their thesis advisor.

Biology Graduate Programs Website (http://www.biology.gatech.edu/graduate-programs)

Master of Science in Biomedical Engineering

This master’s degree allows students to pursue advanced studies in biomedical engineering in the following areas: biomedical imaging and instrumentation, biomaterials and regenerative technologies, cellular engineering and mechanics, biomedical informatics and systems modeling, neuroengineering, and biomedical robotics.

The master’s degree program requires 30 credit hours beyond the bachelor’s degree. Both thesis and non-thesis options are available. Courses are offered all three terms; however, full-time students planning to complete the MS degree in 12 months should start their programs in the fall semester.

Thesis Option for Master of Science in Biomedical Engineering

21 hours of coursework plus 9 hours of Thesis

<table>
<thead>
<tr>
<th>Courses</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bioscience Courses</td>
<td>At least 3</td>
</tr>
<tr>
<td>Engineering Courses</td>
<td>At least 3</td>
</tr>
<tr>
<td>Data Science</td>
<td>At least 3</td>
</tr>
<tr>
<td>Approved Electives</td>
<td>At least 6</td>
</tr>
<tr>
<td>Thesis Hours</td>
<td>9</td>
</tr>
</tbody>
</table>

Total Credit Hours for Thesis Option 30

1 The overall balance of bioscience, data science, and engineering courses is determined by the student and his/her academic advisor and should factor the student’s prior knowledge, professional objectives and research interests if the thesis option is pursued. Courses must be documented on the Program of Study form and must be approved by the Graduate Program Committee.

Non-Thesis Option for Master of Science in Biomedical Engineering

30 hours of coursework

<table>
<thead>
<tr>
<th>Courses</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bioscience Courses</td>
<td>At least 3</td>
</tr>
<tr>
<td>Engineering Courses</td>
<td>At least 3</td>
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<tr>
<td>Data Science</td>
<td>At least 3</td>
</tr>
<tr>
<td>Approved Electives</td>
<td>At least 9</td>
</tr>
</tbody>
</table>

Total Credit Hours for Non-Thesis Option 30

1 The overall balance of bioscience, data science, and engineering courses is determined by the student and his/her academic advisor and should factor the student’s prior knowledge, professional objectives and research interests if the thesis option is pursued. Courses must be documented on the Program of Study form and must be approved by the Graduate Program Committee.

BS/MS Option

Students completing both a bachelor’s and master’s in biomedical engineering at Georgia Tech may use up to six credit hours of graduate-level coursework in the major discipline for both degrees. To qualify for this option, students must complete the undergraduate degree with a cumulative GPA of 3.5 or higher and complete the master’s degree within a two-year period from the award date of the bachelor’s degree.

Master of Science in Building Construction and Facility Management

The master’s degree program in the School of Building Construction focuses on management-based education for industry professionals seeking executive leadership positions in the industry. Our graduate training offers a holistic approach to business processes, integrating coursework, seminars, and hands-on learning to equip today’s industry professionals with the resources they need to excel in their professional careers. The graduate program consists of two concentrations:

1. Building Construction
2. Facility Management

The Building Construction concentration offers two tracks of study in construction management and program management.

Students can complete either a thesis or non-thesis option for the degree.

BS/MS Option

Students in the program come from a variety of backgrounds, often with experience in facility management, construction, architecture, engineering, city planning, management, or business. The program is tailored to meet the needs of professionals by offering evening classes, giving students the flexibility of continuing to work while taking courses.

Thesis Option

The curriculum for graduate study with the Thesis Option consists of the following 30 semester hours:
The Facility Management Concentration

The graduate concentration in Facility Management offers a clear understanding of this complex field and its theoretical concepts. It focuses on developing and fine-tuning the management skills necessary for success in the facility management industry. Courses explore the many facets of integrated facility management including asset management, project management, facility operations and maintenance, energy management, workplace design and consulting, facility technology integration, design and construction, and real estate development. The program is accredited by the International Facility Management Association (IFMA) Foundation.

### Core Courses
- BC 6025: Advanced Project Mgmt 3
- BC 6100: Prof Trends-Facility Mgt 3
- BC 6200: Maint Mgt-Built Assets 3
- BC 6300: Safety & Environ Issues 3
- BC 6500: Real Est Assest&Prop Mgt 3

### Common Electives
- BC 6100: Prof Trends-Facility Mgt 3
- BC 6200: Maint Mgt-Built Assets 3
- BC 6300: Safety & Environ Issues 3
- BC 6500: Real Est Assest&Prop Mgt 3

### Required Elective
- BC 6850: Bldg Cons Fac Mgmt Capst 3

### Total Credit Hours
30

### The Construction Management Track (within the Building Construction concentration)

The Construction Management track educates students to understand, analyze, select, and manage the most appropriate and effective project delivery systems for constructing a facility, from the contractor’s perspective. The curriculum emphasizes integrated problem-solving through state-of-the-art technical and management techniques. A variety of project delivery systems, that can be used independently or integrated, are examined. The delivery methods explored include the design-build system, the construction management/agent method, the hybrid bridging and partnering system; the negotiated select team method, as well as the traditional delivery method.

### Core Courses
- BC 6025: Construction Management 3
- BC 6250: Value Mgt-Integrated Dgn 3
- BC 6550: Design&Constr Processes 3
- BC 6650: Advanced Project Mgt 3
- BC 6850: Bldg Cons Fac Mgmt Capst 3

### Required Elective
- BC 6850: Bldg Cons Fac Mgmt Capst 3

### Total Credit Hours
24

### Program Management Track (within the Building Construction concentration)

This track is designed to educate students to manage projects from inception (programming and pre-design) and through the entire project acquisition process to occupancy by the user. Students are taught to manage pre-design activities, design procurement and management, construction procurement and management, and the overall management of the building acquisition process from the owner’s (rather than the designer’s or builder’s) perspective. Graduates are prepared to work in program management positions for consulting firms or organizations.
who build often and must manage complex, often multi-building programs.

### Master of Science in Civil Engineering

The School of Civil & Environmental Engineering (CEE) offers a challenging graduate program that encompasses advanced study and research leading to the degree of Master of Science in Civil Engineering.

#### Major Areas of Specialization
- Construction and Infrastructure Systems Engineering
- Environmental Engineering
- Geosystems Engineering
- Structural Engineering, Mechanics and Materials
- Transportation Systems Engineering
- Water Resources Engineering

#### Non-Thesis Option
21 of the 30 credit hours of coursework must be at the 6000 level or higher

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>BC 6025</td>
<td>Construction Management</td>
<td>3</td>
</tr>
<tr>
<td>BC 6185</td>
<td>Intro to Const Prog Mgt</td>
<td>3</td>
</tr>
<tr>
<td>BC 6285</td>
<td>Mgt of Predesign Phase</td>
<td>3</td>
</tr>
<tr>
<td>BC 6385</td>
<td>Mgt of Design Phase</td>
<td>3</td>
</tr>
<tr>
<td>Required Elective</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Common Electives</td>
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<tr>
<td>Approved Electives</td>
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<td>6</td>
</tr>
<tr>
<td>BC 6850</td>
<td>Bldg Cons Fac Mgmt Capst</td>
<td>3</td>
</tr>
</tbody>
</table>

**Total Credit Hours** 30

### Thesis Option
21 of the 30 credit hours of coursework must be at the 6000 level or higher

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
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</tr>
</thead>
<tbody>
<tr>
<td>CEE 7000</td>
<td>Master's Thesis</td>
<td>6</td>
</tr>
</tbody>
</table>

**Total Credit Hours** 30

### Joint BS/MS Degree Program - Civil Engineering

The joint BS/MS program is designed to attract the best-of-the-best undergraduate students and is especially intended for students who demonstrate an interest in, and ability for, additional education beyond the bachelor’s degree.

Students will be eligible to apply for the program after completion of 30 semester credit hours at Georgia Tech and appropriate progress in their degree program. As a practical matter, students should apply for the program at least three semesters prior to graduation in order to take graduate-level courses prior to receiving their BS degree. Students must have a Georgia Tech GPA of 3.5 or higher for admission into the BS/MS Program in Civil Engineering.

This program is available only to those completing a Bachelor’s degree with the School of Civil and Environmental Engineering.

Students in the joint BS/MS program remain undergraduates until they meet the requirements for the bachelor’s degree, at which point they will receive the BSCE or BSEnvE degree. Their status will then be
changed to graduate status. Graduate school application fees and the GRE requirements are waived.

Once admitted, a GPA of at least 3.0 must be maintained to remain in the program. Additionally, students in the BS/MS program are eligible to use the Graduate Course Option (p. 106) even if their cumulative grade-point average is below 3.5 at the time they complete their bachelor's degree.

## Master of Science in Computational Science and Engineering

The Master of Science in Computational Science and Engineering (CSE) Program is an interdisciplinary program offered by the College of Computing, the College of Engineering, and the College of Sciences. The CSE program addresses the body of knowledge, skills, and practices associated with the study of computer-based models of natural phenomena and engineered systems. Students will be required to obtain a breadth of knowledge across a set of core areas in the CSE discipline, depth of knowledge in a specific computational specialization (e.g., numerical computing), and knowledge to apply computational techniques in a domain of application. Students will be expected to integrate principles from mathematics, computer science, and engineering to be able to create significant computational artifacts (e.g., software).

### Code Title Credit Hours

<table>
<thead>
<tr>
<th>Core Curriculum</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Select four of the following:</td>
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<td>12</td>
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<tr>
<td>CSE/MATH Numerical Linear Algebra</td>
<td>6643</td>
<td></td>
</tr>
<tr>
<td>CSE 6140 Comp Sci&amp;Engr Algorithms</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CSE 6730 Model&amp;Sim:Found&amp;Implement</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CSE/ISYE Computational Data Analy</td>
<td>6740</td>
<td></td>
</tr>
<tr>
<td>CSE 6220 High Perform Computing</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Minor | | |
| Select a specialization minor that includes one applications area | 6 |
| Select at least six hours of non-CS/CSE courses | 6 |

### Course or Thesis Option

| Select one of the following: | 6 |
| Course Option | |
| Thesis | |

Total Credit Hours 30

1 A specialization minor is required consisting of twelve hours of coursework relevant to the CSE discipline that includes one applications area; this must include at least six hours of courses that do not carry the CS/CSE course designation.

2 Students must either complete 6 additional hours of approved coursework (course option) or an MS thesis (thesis option) that is defended to the student’s thesis committee who is responsible for overseeing the student’s research. Students must acquire the approval of their proposed program of study in their first semester of enrollment in the CSE program from both the student’s home unit coordinator and the CSE program director.

## Master of Science in Computer Science

The program for the Master of Science in Computer Science (MSCS) prepares students for more highly productive careers in industry. Graduates receive the MSCS for completing one of three options in the program as described in this section. Students may apply to the program if they possess a bachelor's degree in computer science from an accredited institution. Students without a bachelor's degree in computer science are encouraged to apply as well, with the understanding that they will be required to complete remedial coursework appropriate to their background in addition to the requirements of the MSCS degree. All applicants are evaluated according to their prior academic record, scores on the Graduate Record Examination, a personal statement, and letters of recommendation. Applicants are selected for fall semester admission only. The application deadline is February 1. However, all applicants are encouraged to apply as early as possible because the selection process may begin well before the deadline.

Students entering the program must demonstrate a core competency in computing equivalent to undergraduate-level courses in the following areas:

- systems, design and analysis of algorithms,
- formal languages and automata theory,
- databases,
- networking and communications,
- computer architecture, and
- human-computer interaction.

This requirement can be satisfied by having taken undergraduate courses as a part of an undergraduate degree, taking remedial courses in the MS CS program, or by examination. Students may specialize in areas of their choice. Every student must complete at least one specialization as a part of his or her degree program. The current eleven specialization areas are:

- Computer Graphics, Computing Systems
- High-Performance Computing, Human-Computer Interaction
- Interactive Intelligence
- Machine Learning
- Modeling and Simulations
- Scientific Computing
- Social Computing
- Visual Analytics.

A student who is enrolled in another graduate program of the Institute may pursue an MSCS while that student is also pursuing his or her degree in the other major. To be granted permission to pursue the MSCS, a student must submit to the MS program coordinator of the College of Computing the material required for admission to the MSCS program. This includes transcripts, letters of recommendation, and GRE General Test. If the student is approved by the College to pursue the MSCS, the student will be notified in writing. At no time will a student outside the College be allowed to pursue a concurrent degree without prior permission of the MS program coordinator of the College of Computing.
A student enrolled in the MS degree program in computer science who wishes to be admitted to the PhD program in computer science should apply via the same process as external students. It is expected that such a student will have at least two letters of recommendation from College of Computing faculty.

For more information about the MS CS program, visit [www.cc.gatech.edu](http://www.cc.gatech.edu).

**Program of Study**
The College’s master’s degree requirements supplement the Institute’s master’s requirements listed in this catalog:

- Students must achieve a grade-point average of at least 3.0 to graduate, and no course grades below C will count toward graduation. Students must take all master’s degree coursework on a letter-grade basis.
- Undergraduate courses required for the BSCS degree may not be used toward the MSCS degree. In addition, no graduate credit will be given for 3000 level courses or lower-level courses.
- No course may be used to satisfy the requirements of two degrees. In addition, no graduate credit will be given for CS courses with a number lower than 4140.
- A maximum of 6 hours may be taken at the 4000-level and/or with a subject code other than CS or CSE. See exceptions under the Project and Thesis options below.
- The maximum total credit hours of Special Problems (CS or CSE 89xx) that may be applied toward the MSCS degree is 3. These courses must be within the CoC.
- There is no maximum number of Special Topics (CS or CSE 88xx) courses that may be used towards the degree.
- Each student must complete the requirements for one specialization. Click here (p. 517) for specialization requirements.
- Students may choose from one of three options in pursuing the MSCS degree, including:

### Course Option
This option requires the student to complete 30 hours of coursework.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Course Credit Hours (no MS project or thesis hours)</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>CS and CSE (minimum 24 credit hours)</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td>CS and CSE 6000-8000 Level Courses (minimum 24 credit hours)</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td>6000/8000 Level Courses (minimum 24 credit hours)</td>
<td>24</td>
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### Project Option
This option requires the student to complete 21 credit hours of coursework and a 9 credit hour project. The project requires approval by a faculty advisor and the MS program coordinator in the semester prior to its inception.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>Total Coursework Credit Hours</td>
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<tr>
<td>MSCS Project hours (CS 6999)</td>
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<tr>
<td>Total Credit Hours</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>CS and CSE Courses (minimum of 15 credit hours)</td>
<td>15</td>
<td></td>
</tr>
</tbody>
</table>

### Thesis Option
This option requires the student to complete 18 credit hours of coursework and a 12 credit hour thesis. The thesis process is defined elsewhere in this catalog.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Coursework Credit Hours</td>
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<td></td>
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<tr>
<td>MS Thesis Credit Hours</td>
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<tr>
<td>Total Credit Hours</td>
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<td></td>
</tr>
<tr>
<td>CS and CSE Courses (minimum of 15 credit hours)</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>CS and CSE 6000-8000 Level Courses (minimum of 15 credit hours)</td>
<td>15</td>
<td></td>
</tr>
</tbody>
</table>

May not include MS project or thesis hours.

### Specializations
#### Computational Perception and Robotics

**Core Courses**
Algorithms: Pick one (1) of:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 6505</td>
<td>Computability&amp;Algorithms</td>
<td>3</td>
</tr>
<tr>
<td>CS 6520</td>
<td>Computational Complexity</td>
<td></td>
</tr>
<tr>
<td>CS 6550</td>
<td>Design&amp; Analy-Algorithms</td>
<td></td>
</tr>
<tr>
<td>CS 7520</td>
<td>Approximation Algorithms</td>
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</tr>
<tr>
<td>CS 7530</td>
<td>Randomized Algorithms</td>
<td></td>
</tr>
<tr>
<td>CSE 6140</td>
<td>Comp Sci&amp;Engr Algorithms</td>
<td></td>
</tr>
</tbody>
</table>

And, pick one (1) of:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 6601</td>
<td>Artificial Intelligence</td>
<td>3</td>
</tr>
<tr>
<td>CS 7641</td>
<td>Machine Learning</td>
<td></td>
</tr>
</tbody>
</table>

**Electives**
Pick three (3) courses from Perception and Robotics, with at least one from each:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>CS 6475</td>
<td>Comp. Photography</td>
<td></td>
</tr>
<tr>
<td>CS 6476</td>
<td>Computer Vision</td>
<td></td>
</tr>
<tr>
<td>CS 7499</td>
<td>3D Reconstruction</td>
<td></td>
</tr>
<tr>
<td>CS 7636</td>
<td>Computational Perception</td>
<td></td>
</tr>
<tr>
<td>CS 7650</td>
<td>Natural Language</td>
<td></td>
</tr>
<tr>
<td>CS 8803</td>
<td>Special Topics (Multiview Geometry in Computer Vision)</td>
<td>9</td>
</tr>
</tbody>
</table>

#### Perception

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 6475</td>
<td>Comp. Photography</td>
</tr>
<tr>
<td>CS 6476</td>
<td>Computer Vision</td>
</tr>
<tr>
<td>CS 7499</td>
<td>3D Reconstruction</td>
</tr>
<tr>
<td>CS 7636</td>
<td>Computational Perception</td>
</tr>
<tr>
<td>CS 7650</td>
<td>Natural Language</td>
</tr>
<tr>
<td>CS 8803</td>
<td>Special Topics (Multiview Geometry in Computer Vision)</td>
</tr>
</tbody>
</table>

#### Robotics

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
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</thead>
<tbody>
<tr>
<td>CS 7630</td>
<td>Autonomous Robotics</td>
</tr>
<tr>
<td>CS 7631</td>
<td>Multi-Robot Systems</td>
</tr>
<tr>
<td>CS 7633</td>
<td>Human-Robot Interaction</td>
</tr>
<tr>
<td>CS 7649</td>
<td>Robot Intelli: Planning</td>
</tr>
</tbody>
</table>
### Computer Graphics

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>CS 6491</td>
<td>Computer Graphics</td>
<td>3</td>
</tr>
<tr>
<td>CS 6505</td>
<td>Computability&amp;Algorithms</td>
<td>3</td>
</tr>
<tr>
<td><strong>Electives: select three (3) of:</strong></td>
<td></td>
<td><strong>9</strong></td>
</tr>
<tr>
<td>CS 6457</td>
<td>Video Game Design</td>
<td></td>
</tr>
<tr>
<td>CS 6475</td>
<td>Comp. Photography</td>
<td></td>
</tr>
<tr>
<td>CS 6476</td>
<td>Computer Vision</td>
<td></td>
</tr>
<tr>
<td>CS 6485</td>
<td>Visual Meth-Sci &amp; Engr</td>
<td></td>
</tr>
<tr>
<td>CS 6764</td>
<td>Geometric Modeling</td>
<td></td>
</tr>
<tr>
<td>CS 7490</td>
<td>Adv Image Synthesis</td>
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</tr>
<tr>
<td>CS 7491</td>
<td>3D Complexity</td>
<td></td>
</tr>
<tr>
<td>CS 7492</td>
<td>Simulation of Biology</td>
<td></td>
</tr>
<tr>
<td>CS 7496</td>
<td>Computer Animation</td>
<td></td>
</tr>
<tr>
<td>CS 7497</td>
<td>Virtual Environments</td>
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</table>

**Total Credit Hours** 15

### Computing Systems

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 6505</td>
<td>Computability&amp;Algorithms</td>
<td>3</td>
</tr>
<tr>
<td>And, pick two (2) of:</td>
<td></td>
<td><strong>6</strong></td>
</tr>
<tr>
<td>CS 6210</td>
<td>Adv Operating Systems</td>
<td></td>
</tr>
<tr>
<td>CS 6241</td>
<td>Compiler Design</td>
<td></td>
</tr>
<tr>
<td>CS 6250</td>
<td>Computer Networks</td>
<td></td>
</tr>
<tr>
<td>CS 6290</td>
<td>High Perform Comput Arch</td>
<td></td>
</tr>
<tr>
<td>CS 6300</td>
<td>Software Dev Process</td>
<td></td>
</tr>
<tr>
<td>CS 6390</td>
<td>Programming Languages</td>
<td></td>
</tr>
<tr>
<td>CS 6400</td>
<td>DB Sys Concepts&amp; Design</td>
<td></td>
</tr>
<tr>
<td><strong>Electives: pick three (3) of:</strong></td>
<td></td>
<td><strong>9</strong></td>
</tr>
<tr>
<td>CS 6035</td>
<td>Intro To Info Security</td>
<td></td>
</tr>
<tr>
<td>CS 6200</td>
<td>Graduate Intro to OS</td>
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</tr>
<tr>
<td>CS 6235</td>
<td>Real-Time Systems</td>
<td></td>
</tr>
<tr>
<td>CS 6238</td>
<td>Secure Computer Systems</td>
<td></td>
</tr>
<tr>
<td>CS 6260</td>
<td>Applied Cryptography</td>
<td></td>
</tr>
<tr>
<td>CS 6262</td>
<td>Network Security</td>
<td></td>
</tr>
<tr>
<td>CS 6263</td>
<td>Intro Cyber Phys Sys Sec</td>
<td></td>
</tr>
<tr>
<td>CS 6291</td>
<td>Embedded Software Opt.</td>
<td></td>
</tr>
<tr>
<td>CS 6310</td>
<td>Software Arch &amp; Design</td>
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</tr>
<tr>
<td>CS 6340</td>
<td>Software Analysis &amp; Test</td>
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</tr>
<tr>
<td>CS 6365</td>
<td>Intro Enterprise Comput.</td>
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<tr>
<td>CS 6422</td>
<td>Database System Implemnt</td>
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<tr>
<td>CS 6550</td>
<td>Design&amp; Analy-Algorithms</td>
<td></td>
</tr>
<tr>
<td>CS 6675</td>
<td>Advance Internet Comput</td>
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<tr>
<td>CS 7210</td>
<td>Distributed Computing</td>
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**Total Credit Hours** 15

### High-Performance Computing

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<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSE 6140</td>
<td>Comp Sci&amp;Engr Algorithms</td>
<td>3</td>
</tr>
<tr>
<td>CSE 6220</td>
<td>High Perform Computing</td>
<td>3</td>
</tr>
<tr>
<td><strong>Electives</strong></td>
<td></td>
<td><strong>9</strong></td>
</tr>
<tr>
<td>CSE 6221</td>
<td>Multicore Computing</td>
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</tr>
<tr>
<td>CS 6230</td>
<td>High Perf Parallel Comp</td>
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</tr>
<tr>
<td>or CSE 6230</td>
<td>High Perf Parallel Comp</td>
<td></td>
</tr>
<tr>
<td>CS 6241</td>
<td>Compiler Design</td>
<td></td>
</tr>
<tr>
<td>CS 6290</td>
<td>High Perform Comput Arch</td>
<td></td>
</tr>
<tr>
<td>CS 8803</td>
<td>Special Topics (Parallel Numerical Algorithms)</td>
<td>or CSE 8803</td>
</tr>
<tr>
<td>CSE 6236</td>
<td>Parallel&amp;Distributed Sim</td>
<td></td>
</tr>
<tr>
<td>CSE 8803</td>
<td>Special Topics (Hot Topics in Parallel Computing)</td>
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</table>

**Total Credit Hours** 18

### Human-Centered Computing

<table>
<thead>
<tr>
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<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 6451</td>
<td>Human-Centered Computing</td>
<td>3</td>
</tr>
<tr>
<td>CS 6452</td>
<td>Prototyping Interact Sys</td>
<td>3</td>
</tr>
<tr>
<td>CS 7455</td>
<td>Issues/Human-Center Comp</td>
<td>3</td>
</tr>
<tr>
<td><strong>Electives</strong></td>
<td></td>
<td><strong>6</strong></td>
</tr>
<tr>
<td>CS 6455</td>
<td>User Interface Dsgn&amp;Eval</td>
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</tr>
<tr>
<td>CS 6456</td>
<td>Principles-UI Software</td>
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</tr>
<tr>
<td>CS 6460</td>
<td>Educ Tech-Foundations</td>
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<tr>
<td>CS 6465</td>
<td>Computational Journalism</td>
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<tr>
<td>CS 6470</td>
<td>Online Communities</td>
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<tr>
<td>CS 6474</td>
<td>Social Computing</td>
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</tr>
<tr>
<td>CS 6476</td>
<td>Computer Vision</td>
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</tr>
<tr>
<td>CS 6601</td>
<td>Artificial Intelligence</td>
<td></td>
</tr>
<tr>
<td>CS 6750</td>
<td>Human-Computer Interact</td>
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</tr>
<tr>
<td>CS 6795</td>
<td>Intro-Cognitive Science</td>
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</tr>
<tr>
<td>CS 7450</td>
<td>Inform Visualization</td>
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</tr>
<tr>
<td>CS 7460</td>
<td>Collaborative Computing</td>
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<tr>
<td>CS 7470</td>
<td>Ubiquitous Computing</td>
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**Total Credit Hours** 15
<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 7476</td>
<td>Advanced Computer Vision</td>
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</tr>
<tr>
<td>CS 7610</td>
<td>Modeling and Design</td>
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</tr>
<tr>
<td>CS 7637</td>
<td>Knowledge-Based AI</td>
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</tr>
<tr>
<td>CS 7620</td>
<td>Case-Based Reasoning</td>
<td></td>
</tr>
<tr>
<td>CS 7650</td>
<td>Natural Language</td>
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<tr>
<td>CS 7695</td>
<td>Phil of Cognition</td>
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<tr>
<td>CS 7697</td>
<td>Cognitive Model Sci&amp;Tech</td>
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<tr>
<td>CS 7790</td>
<td>Cognitive Modeling</td>
<td></td>
</tr>
<tr>
<td>CS 8803</td>
<td>Special Topics (Computational Creativity)</td>
<td></td>
</tr>
<tr>
<td>CS 8803</td>
<td>Special Topics (Expressive AI)</td>
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</tr>
<tr>
<td>CS 8803</td>
<td>Special Topics (Game AI)</td>
<td></td>
</tr>
<tr>
<td>CS 8803</td>
<td>Special Topics (Human Robot Interaction)</td>
<td></td>
</tr>
<tr>
<td>CS 8803</td>
<td>Special Topics (Computers, Communications &amp; International Development)</td>
<td></td>
</tr>
</tbody>
</table>
### Modeling and Simulations

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Core Courses</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CSE 6730</td>
<td>Model &amp; Sim: Found &amp; Implement</td>
<td>3</td>
</tr>
<tr>
<td>Pick one (1) of:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CSE 6220</td>
<td>High Perform Computing</td>
<td>3</td>
</tr>
<tr>
<td>ISYE 6644</td>
<td>Simulation</td>
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</tr>
<tr>
<td>MATH 6640</td>
<td>Num Meth-Part Diff Eqs</td>
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</tr>
<tr>
<td><strong>Electives</strong></td>
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</tr>
<tr>
<td>Pick three (3) of:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CSE 6220</td>
<td>High Perform Computing</td>
<td>9</td>
</tr>
<tr>
<td>CSE 6236</td>
<td>Parallel &amp; Distributed Sim</td>
<td></td>
</tr>
<tr>
<td>CSE/CHBE</td>
<td>Special Topics (Quantum Information,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>8803 Computation, and Simulation)</td>
<td></td>
</tr>
<tr>
<td>INTA 6742</td>
<td>Mod, Sim &amp; Military Gaming</td>
<td></td>
</tr>
<tr>
<td>ISYE 6644</td>
<td>Simulation</td>
<td></td>
</tr>
<tr>
<td>MATH 6640</td>
<td>Num Meth-Part Diff Eqs</td>
<td></td>
</tr>
</tbody>
</table>

Total Credit Hours: 15

### Scientific Computing

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Core Courses</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CSE/MATH</td>
<td>Numerical Linear Algebra</td>
<td>3</td>
</tr>
<tr>
<td>6643</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pick one (1) of:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CSE/MATH</td>
<td>Iterative Meth-Sys Eqs</td>
<td>3</td>
</tr>
<tr>
<td>6644</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MATH 6640</td>
<td>Num Meth-Part Diff Eqs</td>
<td></td>
</tr>
<tr>
<td><strong>Electives</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pick three (3) of:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CS/CSE</td>
<td>High Perf Parallel Comp</td>
<td>9</td>
</tr>
<tr>
<td>6230</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CS/CSE</td>
<td>Special Topics (Parallel Numerical Algorithms)</td>
<td>8803</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CSE 6140</td>
<td>Comp Sci &amp; Engr Algorithms</td>
<td></td>
</tr>
<tr>
<td>CSE 6220</td>
<td>High Perform Computing</td>
<td></td>
</tr>
<tr>
<td>CSE/MATH</td>
<td>Iterative Meth-Sys Eqs</td>
<td>6644</td>
</tr>
<tr>
<td>CSE 8803</td>
<td>Special Topics (Algorithms for Medical Imaging and Inverse Problems)</td>
<td>6644</td>
</tr>
<tr>
<td>CSE 8803</td>
<td>Special Topics (Computational Chemistry)</td>
<td></td>
</tr>
</tbody>
</table>

Total Credit Hours: 15

### Visual Analytics

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Core Courses</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CS 7450</td>
<td>Inform Visualization</td>
<td>3</td>
</tr>
<tr>
<td><strong>Electives</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pick three (3) from:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CS 6456</td>
<td>Principles-UI Software</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CS 6465</td>
<td>Computational Journalism</td>
<td></td>
</tr>
<tr>
<td>CS 6485</td>
<td>Visual Meth-Sci &amp; Engr</td>
<td></td>
</tr>
<tr>
<td>CS 6750</td>
<td>Human-Computer Interact</td>
<td></td>
</tr>
<tr>
<td>CS 6795</td>
<td>Intro-Cognitive Science</td>
<td></td>
</tr>
<tr>
<td>CSE 6242</td>
<td>Data &amp; Visual Analytics</td>
<td></td>
</tr>
<tr>
<td>CSE 8803</td>
<td>Special Topics (Visual Data Analytics)</td>
<td></td>
</tr>
</tbody>
</table>

Total Credit Hours: 12

The Master of Science in Computer Science is also offered online.
Master of Science in Cybersecurity

The Master of Science in Cybersecurity degree program requires 32 credit hours of coursework (including a 5 credit practicum project course). Two of the core courses, which students in each specialization will take, will provide a broad overview of technology and policy dimensions of cybersecurity. The third flexible core course will provide breadth because it must come from a specialization separate from the one in which a student is enrolled. Finally, a practicum project (5 credit hours) with common learning objectives across all participating units will be a core requirement. Each participating unit will decide required and elective courses for the MS Cybersecurity degree specialization offered by it (a total of 18 credit hours). These requirements have been defined by the participating units and are described in the next section.

Although all three participating schools will offer a single degree, MS Cybersecurity, the focus of the degree (e.g., technology or policy) will depend on the specialization defined by the offering unit. In particular, each unit will offer the following specializations for the MS degree in Cybersecurity.

- The School of Computer Science (CS) offers the MS Cybersecurity degree with a technology specialization.
- The School of Electrical and Computer Engineering (ECE) offers the MS Cybersecurity degree with a cyber-physical and energy systems specialization.
- The School of Public Policy (PUBP) offers the MS cybersecurity degree with a policy specialization.

### Required Core Courses:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 6035</td>
<td>Intro To Info Security</td>
<td>3</td>
</tr>
<tr>
<td>PUBP/CS/</td>
<td>Info Security Policies</td>
<td>3</td>
</tr>
<tr>
<td>MGT 6725</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CS/ECE/</td>
<td>Cyber Sec Practicum</td>
<td>5</td>
</tr>
<tr>
<td>PUBP 6727</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elective</td>
<td>CS/PUBP/ECE 6000-level course</td>
<td>3</td>
</tr>
</tbody>
</table>

### Specialization Requirements (see below for specialization specific requirements)

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>18</td>
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</tbody>
</table>

### Total Credit Hours

32

### Technology Specialization:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>CS 6260</td>
<td>Applied Cryptography</td>
<td>3</td>
</tr>
<tr>
<td>CS 6238</td>
<td>Secure Computer Systems</td>
<td>3</td>
</tr>
<tr>
<td>CS 6262</td>
<td>Network Security</td>
<td>3</td>
</tr>
<tr>
<td>CS 6255</td>
<td>Information Security Lab</td>
<td>3</td>
</tr>
</tbody>
</table>

Select two courses:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 6210</td>
<td>Adv Operating Systems</td>
<td>3</td>
</tr>
<tr>
<td>CS 6250</td>
<td>Computer Networks</td>
<td>3</td>
</tr>
<tr>
<td>CS 6255</td>
<td>Network Management</td>
<td>3</td>
</tr>
<tr>
<td>CS 6300</td>
<td>Software Dev Process</td>
<td></td>
</tr>
</tbody>
</table>

### Cyber-Physical (Smart Energy) Specialization:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECE 8813</td>
<td>Smart Grids</td>
<td>3</td>
</tr>
<tr>
<td>ECE 8813</td>
<td>Introduction to Cyber-Physical Electric Energy Systems</td>
<td>3</td>
</tr>
<tr>
<td>ECE 8813</td>
<td>Introduction to Cyber-Physical Systems Security</td>
<td>3</td>
</tr>
<tr>
<td>ECE 8803</td>
<td>Computational Aspects of Cyber-Physical Systems</td>
<td>3</td>
</tr>
</tbody>
</table>

Select two courses:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECE 6550</td>
<td>Linear Sys and Controls</td>
<td>3</td>
</tr>
<tr>
<td>ECE 6607</td>
<td>Computer Comm Networks</td>
<td>3</td>
</tr>
<tr>
<td>ECE 6615</td>
<td>Sensor Networks</td>
<td>3</td>
</tr>
<tr>
<td>ECE 6102</td>
<td>Dependable Distribut Sys</td>
<td>3</td>
</tr>
<tr>
<td>ECE 6320</td>
<td>Power Sys Ctrl&amp;Operation</td>
<td>3</td>
</tr>
<tr>
<td>ECE 6323</td>
<td>Power System Protection</td>
<td>3</td>
</tr>
<tr>
<td>ECE 8813</td>
<td>Advanced Computer Security</td>
<td>3</td>
</tr>
<tr>
<td>ECE 8813</td>
<td>Network Forensics</td>
<td>3</td>
</tr>
</tbody>
</table>

### Total Credit Hours

18

### Policy Specialization:

Select 4 courses:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>PUBP 6502</td>
<td>IT/Comm/Telecom Policy</td>
<td>3</td>
</tr>
<tr>
<td>MGT 6726</td>
<td>Privacy Tech Policy Law</td>
<td>3</td>
</tr>
<tr>
<td>PUBP 6111</td>
<td>Internet &amp; Public Policy</td>
<td>3</td>
</tr>
<tr>
<td>INTA 6014</td>
<td>Scenario and Path Gaming</td>
<td>3</td>
</tr>
<tr>
<td>INTA 8803</td>
<td>Data Analytics and Security</td>
<td>3</td>
</tr>
<tr>
<td>PUBP 6501</td>
<td>Information Policy &amp; Mgt</td>
<td>3</td>
</tr>
<tr>
<td>INTA 8803</td>
<td>Challenge of Terrorism in Democratic Societies</td>
<td>3</td>
</tr>
</tbody>
</table>

Select two courses:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>PUBP 6701</td>
<td>Energy Technol &amp; Policy</td>
<td>3</td>
</tr>
<tr>
<td>PUBP 6014</td>
<td>Organization Theory</td>
<td>3</td>
</tr>
<tr>
<td>PUBP 6401</td>
<td>Sci, Tech &amp; Public Policy</td>
<td>3</td>
</tr>
<tr>
<td>INTA 6103</td>
<td>International Security</td>
<td>3</td>
</tr>
<tr>
<td>INTA 6015</td>
<td>Technology &amp; Military Org</td>
<td>3</td>
</tr>
</tbody>
</table>

### Total Credit Hours

18
The Master of Science in Cybersecurity is also offered online.

For more information, visit: Online Master of Science in Cybersecurity (https://pe.gatech.edu/degrees/cybersecurity).

**Master of Science in Digital Media**

The Digital Media graduate program at Georgia Tech provides students with a foundational, theoretical background in digital media and the opportunity to practice what is learned in the classroom through active participation in labs and research. MS DM students follow a studio-based curriculum that places digital design within technical, cultural, aesthetic, and historical contexts. The program has three core themes: Creativity & Knowledge, Arts & Entertainment, and Civic Media to prepare students for professional careers in digital media, including: interaction and information design, game design and production, interactive media design, as well as leadership positions in academia and industry.

The MS DM program accepts roughly 20-25 full-time students each fall term. MS DM students come from a range of educational backgrounds and have diverse intellectual and creative objectives. Many have work experience in a professional field. The program welcomes a socially diverse and international student body. For more information visit: http://dm.lmc.gatech.edu/program/ms-program/

To graduate with the Master of Science in Digital Media, students must take a minimum of 36 credit hours while meeting the following requirements:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>First Year - Fall Semester</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LMC 6310</td>
<td>The Computer Expressive</td>
<td>3</td>
</tr>
<tr>
<td>LMC 6399</td>
<td>Discovery &amp; Invention</td>
<td>3</td>
</tr>
<tr>
<td><strong>First Year - Spring Semester</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LMC 6313</td>
<td>Prin of Interaction Desi</td>
<td>3</td>
</tr>
<tr>
<td><strong>Fall and/or Spring</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LMC 6650</td>
<td>Project Studio (may be taken multiple times)</td>
<td>6</td>
</tr>
<tr>
<td><strong>Electives</strong></td>
<td></td>
<td>15</td>
</tr>
<tr>
<td>Electives 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Project or Thesis</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Select one of the following:</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>LMC 6800</td>
<td>DM MS Project Course</td>
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</tr>
<tr>
<td>LMC 7000</td>
<td>Master’s Thesis</td>
<td></td>
</tr>
<tr>
<td><strong>Summer Internship</strong></td>
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</tr>
<tr>
<td>Total Credit Hours</td>
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<td>36</td>
</tr>
</tbody>
</table>

1 Students are invited to repeat the same Project studio for all four semesters of the program and to do their Masters Project/Thesis in a related area. Please note that all MS students are required to take two (2) sections of LMC 6650, each for 3 credit hours.

2 Students may choose from elective courses in DM or related disciplines, such as Architecture, Industrial Design, Cognitive Science, Computing, Management, or Policy Studies. If a student chooses to take more than three elective courses outside DM, the student must obtain approval from the DM Director of Graduate Studies.

3 8-10 week full-time internship between the first and second year.

**BS/MS Degree Program**

Students who wish to pursue the BS/MS combination in LMC and DM must apply to the School after completing at least seventy-five credit hours of work toward an LMC degree that includes the Interaction Design thread. Applicants should have a 3.5 GPA.

Students admitted to the program take a total of twelve credit hours of graduate coursework during their final undergraduate year. Six credit hours of that work, in DM media courses, will replace any 4000-level course and will count for both undergraduate and graduate credit. During the summer term after their fourth year, students will participate in an approved internship program. During the fifth year, students will take a total of twenty-four credit hours, including either LMC 6800 or LMC 7000, and with no more than three courses taken outside the DM program.

**Master of Science in Earth and Atmospheric Sciences**

Students can choose a program of study leading to either the designated master’s degree (with thesis) or the undesignated master’s degree (without thesis). General requirements for both degrees are found in this catalog under “Information for Graduate Students.” In either program of study, students can specialize in atmospheric chemistry, aerosols, and clouds; dynamics of weather and climate; geochemistry; geophysics; oceanography; paleoclimate; planetary science; and remote sensing. With approval of the School’s faculty, multidisciplinary programs of study are also permitted. Students entering the master’s degree program need an academic background that includes a minimum of one year of university-level courses in calculus, chemistry, and physics. Students who lack this academic background are required to complete appropriate remedial courses, for which they will not receive graduate credit.

Students can satisfy the requirements for the designated master’s degree by completing a faculty-approved set of courses and a master’s thesis in earth and atmospheric sciences. With approval of the School chair, students can satisfy the requirements for the undesignated master’s degree by completing a faculty-approved set of courses and a 3 credit hour Special Problems course. This course must take the form of a research project supervised by the student’s advisor and culminating in a written final report.

**BS/MS Earth and Atmospheric Sciences**

EAS offers a BS/MS Program. EAS majors may apply to the BS/MS program after completing at least thirty semester credit hours at Georgia Tech with a GPA of at least 3.5.

Students admitted to the program must maintain a cumulative GPA of at least 3.0.

As part of the program, students may use up to 6 credit hours of graduate-level coursework in the major discipline for both degrees.

To apply, complete the BS/MS application form, a biographical statement, and two letters of recommendation.

EAS Undergraduate Information (http://www.eas.gatech.edu/academics/SYear_BSMS)

**Master of Science in Economics**

The School of Economics offers a Master of Science degree for those desiring to pursue economics at an advanced level. It is grounded in
applied economic theory and econometrics. The program allows for two tracks to graduate: Internship, and Coursework.

**Internship Option**

Minimum course credit hours at 6000 to 9000 level: 21

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECON 6105</td>
<td>Macroeconomics</td>
<td>3</td>
</tr>
<tr>
<td>ECON 6106</td>
<td>Microeconomic Analysis</td>
<td>3</td>
</tr>
<tr>
<td>ECON 6140</td>
<td>Probability &amp; Statistics</td>
<td>3</td>
</tr>
<tr>
<td>ECON 6160</td>
<td>Econometric Analysis</td>
<td>3</td>
</tr>
<tr>
<td>Economics Electives</td>
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<td>3</td>
</tr>
<tr>
<td>Internship</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Advisor approved electives</td>
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<td>12</td>
</tr>
<tr>
<td>Total Credit Hours</td>
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<td>30</td>
</tr>
</tbody>
</table>

**Coursework Option**

Minimum course credit hours at 6000 to 9000 level: 21

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECON 6105</td>
<td>Macroeconomics</td>
<td>3</td>
</tr>
<tr>
<td>ECON 6106</td>
<td>Microeconomic Analysis</td>
<td>3</td>
</tr>
<tr>
<td>ECON 6140</td>
<td>Probability &amp; Statistics</td>
<td>3</td>
</tr>
<tr>
<td>ECON 6160</td>
<td>Econometric Analysis</td>
<td>3</td>
</tr>
<tr>
<td>Economics Electives</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>Advisor approved electives</td>
<td></td>
<td>12</td>
</tr>
<tr>
<td>Total Credit Hours</td>
<td></td>
<td>30</td>
</tr>
</tbody>
</table>

Within those 30 credit hours, the student can choose 12 credit hours of elective courses in complementary areas such as Mathematics, Statistics, Industrial Engineering, Civil Engineering, International Affairs, various areas in Management, or Public Policy, among other areas, or in Economics. The selection of these electives will be based on the student's chosen areas of concentration. The SOE Director of Graduate Studies along with the Academic Advisor will grant approvals for these courses.

**Master of Science in Electrical and Computer Engineering**

The master's degree allows students to pursue advanced work in electrical and computer engineering technical interest areas including bioengineering, computer systems and software, digital signal processing, electrical energy, electromagnetics, electronic design and applications, microsystems, optics and photonics, systems and controls, telecommunications, and VLSI systems and digital design.

The master's degree program requires 30 credit hours beyond the bachelor's degree, including a minor outside ECE. Both thesis and non-thesis options are available. Courses are offered all three terms; however, full-time students planning to complete the MS degree in 12 months should start their programs in the fall semester.

MS Information (http://www.ece.gatech.edu/academics/graduate/msreq.html)

**BS/MS Electrical and Computer Engineering**

This program allows highly qualified students to receive the Bachelor of Science in either Electrical Engineering or Computer Engineering and a master's degree in Electrical and Computer Engineering. The joint BS/MS degree program affords undergraduate electrical or computer engineering majors the opportunity to broaden their studies and improve their career prospects.

Eligible Georgia Tech undergraduates normally apply for this program during their junior year. Contact the Electrical and Computer Engineering Graduate Affairs Office for program information, eligibility requirements, and applications.

**Master of Science in Engineering Science and Mechanics**

The School of Civil & Environmental Engineering (CEE) offers a challenging graduate program that encompasses advanced study and research leading to the degree of Master of Science in Engineering Science and Mechanics. Students seeking this degree must have a Bachelor of Science in engineering or the physical sciences.

**Non-Thesis Option**

21 of the 30 credit hours of coursework must be at the 6000 level or higher

| Mechanics | 18 |
| Mathematics | 6 |
| Approved Electives | 6 |
| Total Credit Hours | 30 |

**Thesis Option**

21 of the 30 credit hours of coursework must be at the 6000 level or higher

| Mechanics | 12 |
| Mathematics | 6 |
| Approved Electives | 6 |
| CEE 7000 Master's Thesis | 6 |
| Total Credit Hours | 30 |

**Master of Science in Environmental Engineering**

The School of Civil & Environmental Engineering (CEE) offers a challenging graduate program that encompasses advanced study and research leading to the degree of Master of Science in Environmental Engineering.

**Non-Thesis Option**

21 of the 30 credit hours of coursework must be at the 6000 level or higher

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Environmental Engineering Core Courses</td>
<td>15</td>
</tr>
</tbody>
</table>
Approved Electives 15
Total Credit Hours 30

**Thesis Option**
21 of the 30 credit hours of coursework must be at the 6000 level or higher

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Environmental Engineering Core Courses</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Approved Electives</td>
<td>9</td>
</tr>
<tr>
<td>CEE 7000</td>
<td>Master's Thesis</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Total Credit Hours</td>
<td>30</td>
</tr>
</tbody>
</table>

**Non-Thesis Option**
21 of the 30 credit hours of coursework must be at the 6000 level or higher

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Environmental Engineering Core Courses</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Approved Electives</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Total Credit Hours</td>
<td>30</td>
</tr>
</tbody>
</table>

**Thesis Option**
21 of the 30 credit hours of coursework must be at the 6000 level or higher

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Environmental Engineering Core Courses</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Approved Electives</td>
<td>9</td>
</tr>
<tr>
<td>CEE 7000</td>
<td>Master's Thesis</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Total Credit Hours</td>
<td>30</td>
</tr>
</tbody>
</table>

**Joint BS/MS Degree Program - Environmental Engineering**
The joint BS/MS program is designed to attract the best-of-the-best undergraduate students and is especially intended for students who demonstrate an interest in, and ability for, additional education beyond the bachelor’s degree.

Students will be eligible to apply for the program after completion of 30 semester credit hours at Georgia Tech and appropriate progress in their degree program. As a practical matter, students should apply for the program at least three semesters prior to graduation in order to take graduate-level courses prior to receiving their BS degree. Students must have a Georgia Tech GPA of 3.5 or higher for admission into the BS/MS Program in Environmental Engineering.

This program is available only to those completing a Bachelor’s degree within the School of Civil and Environmental Engineering.

The key components of this program are intense interaction among students and faculty, including mentoring and undergraduate research, and careful advising and course planning to enable students to begin challenging coursework in their fourth year of study.

---

Students in the joint BS/MS program remain undergraduates until they meet the requirements for the bachelor’s degree, at which point they will receive the BSEnvE or BSCE degree. Their status will then be changed to graduate status. Graduate school application fees and the GRE requirements are waived.

Once admitted, a GPA of at least 3.0 must be maintained to remain in the program. Additionally, students in the BS/MS program are eligible to use the Graduate Course Option (http://www.catalog.gatech.edu/academics/graduate/masters-degrees/graduate-course-option) even if their cumulative grade-point average is below 3.5 at the time they complete their bachelor’s degree.

**Master of Science in Geographic Information Science and Technology**

Geographic Information Science (GIS) is an emerging field of study centered on the acquisition, management, analysis, and dissemination of information that is spatially-referenced to locations on, above, and below the surface of the earth. This field is highly trans-disciplinary with substantial and growing importance in a number of traditional academic disciplines and related professions including city and regional planning, architecture, civil and environmental engineering, earth and atmospheric sciences, environmental science, demography, logistics, management, public policy and sustainability studies. Full-time students can complete the 34 credit-hour curriculum in one calendar year including two semesters of full-time coursework and a capstone project course offered during the summer. Part-time students may complete the program in two or three academic years plus one summer session for the capstone project course.

For more information about the MS-GIST program, contact:

MS-GIST Program Director
School of City and Regional Planning
College of Design
Georgia Institute of Technology
Atlanta, Georgia 30332-0155
Email: crp@design.gatech.edu

- Master of Science in Geographic Information Science and Technology (http://www.planning.gatech.edu/master-science-geographic-information-science-and-technology)

The components of the current MSGIST curriculum are:

**Prerequisite Course**

A basic understanding of GIS technology is required as a prerequisite of the degree program. As a practical matter, students should apply for the program at least three semesters prior to graduation in order to take graduate-level courses prior to receiving their BS degree. Students must have a Georgia Tech GPA of 3.5 or higher for admission into the BS/MS Program in Environmental Engineering.

This program is available only to those completing a Bachelor’s degree within the School of Civil and Environmental Engineering.

The key components of this program are intense interaction among students and faculty, including mentoring and undergraduate research, and careful advising and course planning to enable students to begin challenging coursework in their fourth year of study.

---

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Core Courses</td>
<td></td>
</tr>
</tbody>
</table>

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### Master of Science in Health Systems

The focus of the Health Systems is to develop, apply, and disseminate new knowledge with respect to the analysis, planning, implementation, demonstration, and evaluation of operational and managerial systems for the delivery of healthcare services to the public.

MS Health Systems Information (http://www.isye.gatech.edu/academics/graduate/masters.php#mshs)

### Master of Science in History and Sociology of Technology and Science

The School offers a program of graduate study in the history and sociology of technology and science at both the master’s and doctoral levels. The two-year master’s program consists of foundation courses in history, social theory, and research methods, as well as more specialized reading and research seminars. The program emphasizes the understanding of technology and science within a broad social and historical context. Students develop a strong general background in history and sociology, and acquire skills in research, social analysis, and writing. The basic curriculum of thirty credit hours consists of fifteen credit hours of required mandatory courses, plus fifteen credit hours of electives for those who do not wish to proceed to the PhD, or plus nine credit hours of electives and six credit hours of special problems (research paper) for those who wish to proceed to the PhD. The curriculum has been changed to establish two tracks, a History Track and a Sociology Track.

### History Track – Curriculum

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>HTS 6001</td>
<td>Proseminar-Social Theory</td>
<td>3</td>
</tr>
</tbody>
</table>

### Sociology Track – Curriculum

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>HTS 6001</td>
<td>Proseminar-Social Theory</td>
<td>3</td>
</tr>
<tr>
<td>HTS 6002</td>
<td>Proseminar-Hist of Tech</td>
<td>3</td>
</tr>
<tr>
<td>HTS 6743</td>
<td>STS Core Seminar</td>
<td>3</td>
</tr>
</tbody>
</table>

### Electives

- Select five of the following:
  - HTS 6101 Soc & Pol Hist of U.S.
  - HTS 6102 Soc & Pol Hist of Europe
  - HTS 6103 Soc & Pol Hist of Non-Western
  - HTS 6105 Business Org & Pol Econ
  - HTS 6106 Gender, Science & Tech
  - HTS 6110 Tech & Modern Culture
  - HTS 6112 Studies-Science & Engr
  - HTS 6113 Development Tech Sci
  - HTS 6114 Hist Science
  - HTS 6115 Sociology Sci Tech
  - HTS 6116 Environmental History
  - HTS 6117 Urbanization
  - HTS 6118 Sci Tech & The Economy
  - HTS 6119 Race and Ethnicity
  - HTS 6120 Inequality Sci Tech
  - HTS 6121 Science Tech Security
  - HTS 6122 History of Medicine
  - HTS 6123 Social & Cultural BIOMED
  - HTS 6124 Sci & Tech Beyond Borders

**Total Credit Hours**: 30

### Notes

- Students who have taken either HTS 6101, HTS 6102, or HTS 6103 to satisfy their mandatory course requirements may take one or both of the other courses, if they are offered, as an elective.
- As this is a multidisciplinary degree, students in the history track can take electives from the sociology track, with the agreement of their advisor.
- Electives may include no more than 6 credit hours of HTS 890X (Special Problems) or HTS 6801 combined. Students who wish to proceed to the PhD must take at least 3 hours of HTS 6801.
- Electives must include at least 12 credit hours within The School of History and Sociology.
Select five of the following:  

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>HTS 6102</td>
<td>Soc &amp; Pol Hist of Europe</td>
<td></td>
</tr>
<tr>
<td>HTS 6103</td>
<td>Soc&amp;Pol Hist-Nonwestern</td>
<td></td>
</tr>
<tr>
<td>HTS 6106</td>
<td>Business Org &amp; Pol Econ</td>
<td></td>
</tr>
<tr>
<td>HTS 6110</td>
<td>Gender,Science &amp; Tech</td>
<td></td>
</tr>
<tr>
<td>HTS 6111</td>
<td>Tech &amp; Modern Culture</td>
<td></td>
</tr>
<tr>
<td>HTS 6112</td>
<td>Studies-Science &amp; Engr</td>
<td></td>
</tr>
<tr>
<td>HTS 6113</td>
<td>Development Tech Sci</td>
<td></td>
</tr>
<tr>
<td>HTS 6114</td>
<td>Hist Science</td>
<td></td>
</tr>
<tr>
<td>HTS 6115</td>
<td>Sociology Sci Tech</td>
<td></td>
</tr>
<tr>
<td>HTS 6116</td>
<td>Environmental History</td>
<td></td>
</tr>
<tr>
<td>HTS 6117</td>
<td>Urbanization</td>
<td></td>
</tr>
<tr>
<td>HTS 6118</td>
<td>Sci Tech &amp; The Economy</td>
<td></td>
</tr>
<tr>
<td>HTS 6119</td>
<td>Race and Ethnicity</td>
<td></td>
</tr>
<tr>
<td>HTS 6120</td>
<td>Inequality Sci Tech</td>
<td></td>
</tr>
<tr>
<td>HTS 6121</td>
<td>Science Tech Security</td>
<td></td>
</tr>
<tr>
<td>HTS 6122</td>
<td>History of Medicine</td>
<td></td>
</tr>
<tr>
<td>HTS 6123</td>
<td>Social &amp; Cultural BIOMED</td>
<td></td>
</tr>
<tr>
<td>HTS 6124</td>
<td>Sci&amp;Tech Beyond Borders</td>
<td></td>
</tr>
</tbody>
</table>

**Total Credit Hours:** 33

1. This course is chosen from a wide variety of courses available in other programs on campus and at Georgia State University, in consultation with their advisor.

### Notes
- Students may be required to take a second course in Advanced Sociological Methods if required to do so by their advisor.
- As this is a multidisciplinary degree students in the sociology track can take electives from the history track, with the agreement of their advisor.
- Electives may include no more than 6 credit hours of HTS 890X (Special Problems) or HTS 6801 combined. Students who wish to proceed to the PhD must take at least 3 hours of HTS 6801.
- Electives must include at least 12 credit hours within The School of History and Sociology.

### Master of Science in Human-Computer Interaction

The interdisciplinary Master of Science in Human-Computer Interaction (HCI) degree program is a cooperative effort of the School of Interactive Computing, the School of Literature, Media and Communication, the School of Industrial Design, and the School of Psychology. The program provides students with the practical and interdisciplinary skills and theoretical understanding they will need to become leaders in the design, implementation, and evaluation of the computer interfaces of the future.

### Course of Study

The HCI master’s degree is a four-semester program consisting of a total of thirty-six credit hours. Each student is required to complete a set of four core courses, a set of elective courses based on their academic background and interests, a set of area specialization courses based on the academic unit in which they reside, and a Master’s project. The specific courses for each student will be determined by the HCI program coordinator in consultation with the academic unit. The area specialization courses are determined by the academic unit in which the student resides. The areas of specialization are: Interactive Computing, Digital Media (DM, through the School of Literature, Media and Communication); Industrial Design; and Psychology.

### Specializations:

#### Interactive Computing Specialization

**Software**

Select 3 credit hours from the following:  

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 6300</td>
<td>Software Dev Process</td>
<td></td>
</tr>
<tr>
<td>CS 6452</td>
<td>Prototyping Interact Sys</td>
<td></td>
</tr>
<tr>
<td>CS 6465</td>
<td>Principles-UI Software</td>
<td></td>
</tr>
<tr>
<td>CS 6457</td>
<td>Video Game Design</td>
<td></td>
</tr>
<tr>
<td>CS 6465</td>
<td>Computational Journalism</td>
<td></td>
</tr>
<tr>
<td>CS 7450</td>
<td>Inform Visualization</td>
<td></td>
</tr>
<tr>
<td>CS 7470</td>
<td>Ubiquitous Computing</td>
<td></td>
</tr>
<tr>
<td>CS 7633</td>
<td>Human-Robot Interaction</td>
<td></td>
</tr>
<tr>
<td>CS 8803</td>
<td>MAS,Mobile Apps and Services</td>
<td></td>
</tr>
</tbody>
</table>

### Design-Evaluation-and Cognitive Modeling

Select 6 credit hours from the following:  

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 6150</td>
<td>Computing for Good</td>
<td></td>
</tr>
<tr>
<td>CS 6440</td>
<td>Intro Health Informatics</td>
<td></td>
</tr>
<tr>
<td>CS 6451</td>
<td>Human-Centered Computing</td>
<td></td>
</tr>
<tr>
<td>CS 6455</td>
<td>User Interface Dsgn&amp;Eval</td>
<td></td>
</tr>
</tbody>
</table>
CS 6457  Video Game Design
CS 6460  Educ Tech-Foundations
CS 6461  Computing Ed Research
CS 6465  Computational Journalism
CS 6470  Online Communities
CS 6474  Social Computing
CS 6770  Mixed Reality Design
or LMC 6 Reality Experience Desi
CS 6763  Design of Environments
CS 6795  Intro-Cognitive Science
CS 7450  Inform Visualization
CS 7460  Collaborative Computing
CS 7632  Game AI
CS 7633  Human-Robot Interaction
CS 7790  Cognitive Modeling
or PSYC 7 Cognitive Modeling
CS 8803  Design Games
CS 8803  DV, Data Visualization Principles and Application
CS 8803  Introduction to Bio Informatics
CS 8803  Visual Data Analytics
CS 8803  CC,Computational Creativity
CS 8803  Technology & Poverty
CS 8803  HI, Personal Health Informatics
CS 8803  PCB,Ubiquitous Computing & Human Behavior

Total Credit Hours 9

A minimum grade of “B” is required in each of the Interactive Computing Specialization classes.

Digital Media (DM) Specialization

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>LMC 6310</td>
<td>The Computer Expressive</td>
<td>3</td>
</tr>
<tr>
<td>LMC 6313</td>
<td>Prin of Interaction Desi</td>
<td>3</td>
</tr>
<tr>
<td>LMC 6399</td>
<td>Discovery &amp; Invention</td>
<td>3</td>
</tr>
<tr>
<td>LMC 6000-</td>
<td>or 8000-level courses</td>
<td>6</td>
</tr>
</tbody>
</table>

Total Credit Hours 9

A minimum grade of “B” is required in each of the Digital Media Specialization classes.

Industrial Design Specialization

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ID 6101</td>
<td>Human Centered Design</td>
<td>3</td>
</tr>
<tr>
<td>ID 8802</td>
<td>Visual Communication for Interaction</td>
<td>2</td>
</tr>
<tr>
<td>Select one of the following courses:</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>ID 6212</td>
<td>Studio 2 Health&amp;Wellness</td>
<td>3</td>
</tr>
<tr>
<td>ID 6213</td>
<td>Studio 2 Interact Product</td>
<td>3</td>
</tr>
</tbody>
</table>

Select one from the following:

A minimum grade of “B” is required in each of the Industrial Design Specialization classes.

Elective Courses:

- 12 credit hours for Interactive Computing
- 12 credit hours for Digital Media
- 9 credit hours for Industrial Design
- 11 credit hours for Psychology

A minimum grade of “B” is required in each of the Psychology Specialization classes.

Psychology Specialization

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSYC 6022</td>
<td>Psyc Stat for HCI (Fall or Spring)</td>
<td>4</td>
</tr>
<tr>
<td>Select 6 credit hours from the following:</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>PSYC 6011</td>
<td>Cognitive Psychology</td>
<td>3</td>
</tr>
<tr>
<td>PSYC 6012</td>
<td>Social Psychology</td>
<td>3</td>
</tr>
<tr>
<td>PSYC 6013</td>
<td>Biopsychology</td>
<td>3</td>
</tr>
<tr>
<td>PSYC 6014</td>
<td>Sensation &amp; Perception</td>
<td>3</td>
</tr>
<tr>
<td>PSYC 6041</td>
<td>Topics in Cog Aging</td>
<td>3</td>
</tr>
<tr>
<td>PSYC 6060</td>
<td>Psych of Aging</td>
<td>3</td>
</tr>
<tr>
<td>PSYC 6270</td>
<td>Psychological Testing</td>
<td>3</td>
</tr>
<tr>
<td>PSYC 7101</td>
<td>Engineering Psy I</td>
<td>3</td>
</tr>
<tr>
<td>PSYC 7102</td>
<td>Engineering Psy II</td>
<td>3</td>
</tr>
<tr>
<td>PSYC 8000</td>
<td>Sem-Experimental Psy</td>
<td>3</td>
</tr>
</tbody>
</table>

Total Credit Hours 10

1 The pre-requisite to this course is PSYC 2020 or equivalent. Note: PSYC 2020 (Psychological Statistics) is currently equivalent to PSYC 6022 (Psychological Statistics for HCI) which is required for all Psychology specialization students.

2 The pre-requisite to this course is PSYC 2020 or equivalent. Note: PSYC 2020 (Psychological Statistics) is currently equivalent to PSYC 6022 (Psychological Statistics for HCI) which is required for all Psychology specialization students.
Any Specialization course may be taken to fulfill an Elective course requirement for any of the four degree tracks. Other approved Electives appear in the list below.

For each area of specialization (track), a certain number of Elective credits must be taken outside of the area:

- Interactive Computing: at least 9 non-CS elective credits must be taken
- Industrial Design, Digital Media, and Psychology: at least 6 non-track elective credits must be taken

A maximum of 3 credit hours of Special Problems in HCI (CS/ID/LMC/PSYC 8903) may count toward the Elective course requirement.

A minimum grade of “C” is required in each of the Elective classes used to satisfy degree requirements.

### Aerospace Engineering

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>AE 6551</td>
<td>Cognitive Engineering</td>
<td>3</td>
</tr>
<tr>
<td>AE 6721</td>
<td>Eval Human Integ Systems</td>
<td>3</td>
</tr>
</tbody>
</table>

Computer Science (NOTE: These courses are still approved electives, but they have been combined with the next section to create a single list of approved Computer Science courses).

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 6150</td>
<td>Computing for Good</td>
<td>3</td>
</tr>
<tr>
<td>CS 6300</td>
<td>Software Dev Process</td>
<td>3</td>
</tr>
<tr>
<td>CS 6440</td>
<td>Intro Health Informatics</td>
<td>3</td>
</tr>
<tr>
<td>CS 6451</td>
<td>Human-Centered Computing</td>
<td>3</td>
</tr>
<tr>
<td>CS 6452</td>
<td>Prototyping Interact Sys</td>
<td>3</td>
</tr>
<tr>
<td>CS 6455</td>
<td>User Interface Dsgn&amp;Eval</td>
<td>3</td>
</tr>
<tr>
<td>CS 6456</td>
<td>Principles-UI Software</td>
<td>3</td>
</tr>
<tr>
<td>CS 6457</td>
<td>Video Game Design</td>
<td>3</td>
</tr>
<tr>
<td>CS 6460</td>
<td>Educ Tech-Foundations</td>
<td>3</td>
</tr>
<tr>
<td>CS 6465</td>
<td>Computational Journalism</td>
<td>3</td>
</tr>
<tr>
<td>CS 6470</td>
<td>Online Communities</td>
<td>3</td>
</tr>
<tr>
<td>CS 6474</td>
<td>Social Computing</td>
<td>3</td>
</tr>
<tr>
<td>CS/ID 6763</td>
<td>Design of Environments</td>
<td>3</td>
</tr>
</tbody>
</table>

### Industrial Design

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ID 6100</td>
<td>Intro to ID Grad Studies</td>
<td>3</td>
</tr>
<tr>
<td>ID 6101</td>
<td>Human Centered Design</td>
<td>3</td>
</tr>
<tr>
<td>ID 6213</td>
<td>Studio 2 Interact Product</td>
<td>4</td>
</tr>
<tr>
<td>ID 6214</td>
<td>Strategic Design Language</td>
<td>3</td>
</tr>
<tr>
<td>ID 6216</td>
<td>Service Design &amp; Brand</td>
<td>3</td>
</tr>
<tr>
<td>ID 6215</td>
<td>Service Design</td>
<td>3</td>
</tr>
<tr>
<td>ID 6509</td>
<td>Comp Creativity Des Cogn</td>
<td>3</td>
</tr>
<tr>
<td>ID 6510</td>
<td>Design for Interaction</td>
<td>3</td>
</tr>
<tr>
<td>ID 6515</td>
<td>Interface Prototyping</td>
<td>3</td>
</tr>
<tr>
<td>ID 6420</td>
<td>Advanced Sketching</td>
<td>3</td>
</tr>
<tr>
<td>ID 6271</td>
<td>Healthcare Des of Future</td>
<td>3</td>
</tr>
<tr>
<td>ID/CS 6763</td>
<td>Design Interactv Environ</td>
<td>3</td>
</tr>
<tr>
<td>ID 6800</td>
<td>Adv Universal Design</td>
<td>3</td>
</tr>
<tr>
<td>ID 6820</td>
<td>Web Usability &amp; Access</td>
<td>3</td>
</tr>
<tr>
<td>ID 8802</td>
<td>Visual Communication for Interaction</td>
<td>2</td>
</tr>
<tr>
<td>ID 8903</td>
<td>Special Problems in Human-Computer Interaction</td>
<td>3</td>
</tr>
</tbody>
</table>
## Literature, Media, and Communication (Digital Media)

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>LMC 6215</td>
<td>Issues in Media Studies</td>
<td>3</td>
</tr>
<tr>
<td>LMC 6310</td>
<td>The Computer Expressive</td>
<td>3</td>
</tr>
<tr>
<td>LMC 6311</td>
<td>Visual Culture and Design</td>
<td>3</td>
</tr>
<tr>
<td>LMC 6312</td>
<td>Dsgn Tech &amp; Representation</td>
<td>3</td>
</tr>
<tr>
<td>LMC 6313</td>
<td>Prin of Interaction Desi</td>
<td>3</td>
</tr>
<tr>
<td>LMC 6314</td>
<td>Design of Networked Medi</td>
<td>3</td>
</tr>
<tr>
<td>LMC 6315</td>
<td>Produc Production</td>
<td>3</td>
</tr>
<tr>
<td>LMC 6316</td>
<td>Historical Approachs Di</td>
<td>3</td>
</tr>
<tr>
<td>LMC 6317</td>
<td>Interactive Fiction</td>
<td>3</td>
</tr>
<tr>
<td>LMC 6318</td>
<td>Experimental Media</td>
<td>3</td>
</tr>
<tr>
<td>LMC 6319</td>
<td>Intellectual Property</td>
<td>3</td>
</tr>
<tr>
<td>LMC 6325</td>
<td>Game Design and Analysis</td>
<td>3</td>
</tr>
<tr>
<td>LMC 6340/CS 6770</td>
<td>Reality Experience Desi</td>
<td>3</td>
</tr>
<tr>
<td>LMC 6399</td>
<td>Discovery &amp; Invention</td>
<td>3</td>
</tr>
<tr>
<td>LMC 6650</td>
<td>Project Studio</td>
<td>3</td>
</tr>
<tr>
<td>LMC 6748</td>
<td>Social Justice &amp; Design</td>
<td>3</td>
</tr>
<tr>
<td>LMC 8000</td>
<td>Media Theory</td>
<td>3</td>
</tr>
<tr>
<td>LMC 8001</td>
<td>Digital Media Studies</td>
<td>3</td>
</tr>
<tr>
<td>LMC 8903</td>
<td>Special Problems in HCI</td>
<td>3</td>
</tr>
</tbody>
</table>

## Management of Technology (MOT)

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MGT 6056</td>
<td>Electronic Commerce</td>
<td>3</td>
</tr>
<tr>
<td>MGT 6057</td>
<td>Bus Process Analy&amp;Design</td>
<td>3</td>
</tr>
<tr>
<td>MGT 6059</td>
<td>Emerging Technologies</td>
<td>3</td>
</tr>
<tr>
<td>MGT 6086</td>
<td>Entrep Financ&amp;Pvt Equity</td>
<td>3</td>
</tr>
<tr>
<td>MGT 6111</td>
<td>Innov&amp;Entrepreneur Behav</td>
<td>3</td>
</tr>
<tr>
<td>MGT 6165</td>
<td>Venture Creation</td>
<td>3</td>
</tr>
<tr>
<td>MGT 6326</td>
<td>Collaborative Prod Dev</td>
<td>3</td>
</tr>
<tr>
<td>MGT 6359</td>
<td>Bus Str Sustainability</td>
<td>3</td>
</tr>
<tr>
<td>MGT 6450</td>
<td>Project Management</td>
<td>3</td>
</tr>
<tr>
<td>MGT 6772</td>
<td>Mgt Resources-Tech Firms</td>
<td>3</td>
</tr>
<tr>
<td>MGT 6799</td>
<td>Legal Issues-Tech Transf</td>
<td>3</td>
</tr>
<tr>
<td>MGT 6789</td>
<td>Technology Ventures</td>
<td>3</td>
</tr>
<tr>
<td>MGT 8803</td>
<td>Big Data Analytics in Business</td>
<td>3</td>
</tr>
</tbody>
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## Psychology

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
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<tbody>
<tr>
<td>PSYC 6011</td>
<td>Cognitive Psychology</td>
<td>3</td>
</tr>
<tr>
<td>PSYC 6012</td>
<td>Social Psychology</td>
<td>3</td>
</tr>
<tr>
<td>PSYC 6014</td>
<td>Sensation &amp; Perception</td>
<td>3</td>
</tr>
<tr>
<td>PSYC 6022</td>
<td>Psyc Stat for HCI</td>
<td>4</td>
</tr>
<tr>
<td>PSYC 6041</td>
<td>Topics in Cog Aging</td>
<td>1</td>
</tr>
<tr>
<td>PSYC 7101</td>
<td>Engineering Psy I</td>
<td>3</td>
</tr>
<tr>
<td>PSYC 7102</td>
<td>Engineering Psy II</td>
<td>3</td>
</tr>
<tr>
<td>PSYC 7104</td>
<td>Psychomotor &amp; Cog Skill</td>
<td>3</td>
</tr>
<tr>
<td>PSYC/CS 7790</td>
<td>Cognitive Modeling</td>
<td>4</td>
</tr>
<tr>
<td>PSYC 8040</td>
<td>Seminar-Engineering Psy</td>
<td>3</td>
</tr>
<tr>
<td>PSYC 8903</td>
<td>Special Problems in HCI</td>
<td>3</td>
</tr>
</tbody>
</table>

## Public Policy

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>PUBP 6111</td>
<td>Internet &amp; Public Policy</td>
<td>3</td>
</tr>
<tr>
<td>PUBP 6401</td>
<td>Sci,Tech &amp; Public Policy</td>
<td>3</td>
</tr>
</tbody>
</table>

## Research Project (6 credit hours)

Each student completes this requirement, under the supervision of a faculty member, typically during the last two semesters of their program. Students must submit a project proposal and a final report and present their work to program coordinators and other MS - HCI students late during the semester of graduation.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Select one of the following:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CS 6998</td>
<td>HCI Master's Project</td>
<td>1</td>
</tr>
<tr>
<td>LMC 6998</td>
<td>HCI Master’s Project</td>
<td>1</td>
</tr>
<tr>
<td>PSYC 6998</td>
<td>HCI Master’s Project</td>
<td>1</td>
</tr>
<tr>
<td>ID 6998</td>
<td>HCI Master’s Project</td>
<td>1</td>
</tr>
</tbody>
</table>

1 repeatable; up to 6 credits

A minimum grade of “B” is required in the project course.

## Other expectations

All students are expected to complete a corporate internship in an HCI-relevant position between their second and third semesters.

## Master of Science in Industrial Engineering

The School of Industrial and Systems Engineering (ISYE) offers eight master’s degrees:

- Master of Science in Industrial Engineering (MS IE);
• Master of Science in Operations Research (MS OR);
• Master of Science in Supply Chain Engineering (MS SCE);
• Master of Science in Statistics (MS STAT);
• Master of Science in Health Systems (MS HS);
• Master of Science in Quantitative and Computational Finance (MS QCF);
• Master of Science in International Logistics (MS IL) that is part of the executive program; and
• Master of Science in Computational Science and Engineering (MS CSE).

Three of these programs are interdisciplinary:
• MS QCF (joint with School of Mathematics, College of Business),
• MS STAT (joint with School of Mathematics) and
• MS SCE (joint with College of Computing, School of Mathematics).

All proposed master's degree programs require thirty semester credit hours with the exception of MS IL and MS QCF (thirty-six credit hours) and MS HS (thirty-three credit hours). None of these MS programs contains a thesis option.

A student seeking a master's degree must have a bachelor’s degree and typically one earned in engineering, science, mathematics, or some other field that provides an adequate background for the successful completion of one of ISyE's programs. Students having backgrounds from unaccredited degree programs or in programs that are found lacking in relative substance can expect to first take preliminary coursework in order to elevate their preparation to the level required. The prerequisite coursework for the various master’s degrees includes strong performance in probability, statistics, linear algebra, and calculus.

Every MS curriculum is based on core classes offered from the School of ISyE, as well as electives offered by ISyE and other Georgia Tech schools in engineering and science. The MS SCE, MS QCF, and MS IL are professional degree programs with separate curriculums from the other regular MS degrees.

MS Human-Integrated Systems (http://www.isye.gatech.edu/academics/graduate/masters.php#msie)

Master of Science in International Affairs

The Master of Science in International Affairs degree program is adaptable to the interests and needs of students who seek to enter professional careers requiring advanced training in international affairs or who intend to continue study at the doctoral level. The program emphasizes both traditional theoretical knowledge of international relations and strategic planning and analysis.

For more information about the MSIA program, visit http://www.grad.gatech.edu/inta.

The program includes core courses in the following:
• International relations theory
• Comparative politics
• International political economy
• International security
• Empirical research methods

Students must also choose two of four elective tracks to in order to focus their studies. The four track options are:
• Comparative and Regional Studies
• Globalization and Development
• International Affairs and Security
• Science and Technology

Students also have the opportunity to design the program to meet their individual interests through elective offerings in the School and interdisciplinary work in the other schools in the Ivan Allen College as well as the Colleges of Sciences, Management, Architecture and Engineering. Overseas programs and internships are encouraged and facilitated by the School.

Three (3) credit hours of technology literacy is required and is satisfied by successfully completing (B or higher) at least one semester of classes with content including at least one of the following while in the Master’s program:
• programming computers;
• database design and operation;
• development and operation;
• data analysis (if part of statistics courses, at least two quarters or two semesters);
• simulation model design and use;
• development and use of geographic information or cartography systems; or
• operation of large computer systems/ computer networks.

In addition to 42 semester credit hours of coursework, students must demonstrate foreign language familiarity and economics. These abilities are essential tools for professional or scholarly work in international affairs. Students must satisfy these requirements before graduating from the program, either through previous undergraduate work or during the Master's program.

Foreign language familiarity is defined as a minimum of two years of college-level work in a single language. This requirement can be fulfilled while in residence or can be demonstrated through an examination taken in the School of Modern Languages.

Economics literacy is satisfied by successful completion of a course or courses in microeconomic and macroeconomic principles and a course in international economics undertaken while at Georgia Tech, or by successful completion of equivalent courses at another institution, either during undergraduate work or while in the Master's program.

The School's master's degree requirements supplement the Institute's master's degree requirements listed in the General Catalog. Students must achieve a grade-point average of at least 3.0 to graduate, and no course below grade C will count toward graduation.

Master of Science in International Logistics

The School of Industrial and Systems Engineering (ISYE) offers eight master's degrees:
• Master of Science in Industrial Engineering (MS IE);
• Master of Science in Operations Research (MS OR);
• Master of Science in Supply Chain Engineering (MS SCE);
• Master of Science in Statistics (MS STAT);
• Master of Science in Health Systems (MS HS);
• Master of Science in Quantitative and Computational Finance (MS QCF);
• Master of Science in International Logistics (MS IL) that is part of the executive program; and
• Master of Science in Computational Science and Engineering (MS CSE).

Three of these programs are interdisciplinary:
• MS QCF (joint with School of Mathematics, College of Business),
• MS STAT (joint with School of Mathematics) and
• MS SCE (joint with College of Computing, School of Mathematics).

All proposed master's degree programs require thirty semester credit hours with the exception of MS IL and MS QCF (thirty-six credit hours) and MS HS (thirty-three credit hours). None of these MS programs contains a thesis option.

A student seeking a master's degree must have a bachelor's degree and typically one earned in engineering, science, mathematics, or some other field that provides an adequate background for the successful completion of one of ISyE’s programs. Students having backgrounds from unaccredited degree programs or in programs that are found lacking in relative substance can expect to first take preliminary coursework in order to elevate their preparation to the level required. The prerequisite coursework for the various master's degrees includes strong performance in probability, statistics, linear algebra, and calculus.

Every MS curriculum is based on core classes offered from the School of ISyE, as well as electives offered by ISyE and other Georgia Tech schools in engineering and science. The MS SCE, MS QCF, and MS IL are professional degree programs with separate curriculums from the other regular MS degrees.

MS Human-Integrated Systems (http://www.isye.gatech.edu/academics/graduate/masters.php#msie)

Master of Science in Materials Science and Engineering

The School of Materials Science and Engineering provides an array of options to both the Undergraduate and Graduate students. The Graduate degrees offered include a MS in Materials Science and Engineering with three program options (thesis, non-thesis, and industrial internship).

MS MSE Information (http://www.mse.gatech.edu/graduate-program)

BS/MS Option

The School of Materials Science and Engineering (MSE) offers a BS/MS program for outstanding students who want to obtain a graduate degree in addition to their BS degree. The advanced degree provides the additional knowledge and specialization needed to further facilitate a technical career. As a participant in this program, students have an opportunity to work with individual faculty members on projects in one of the traditional or innovative research areas in MSE. See www.mse.gatech.edu (http://www.mse.gatech.edu) for more details.

Master of Science in Mathematics

The School of Mathematics provides opportunities for study in a wide range of mathematical disciplines. First-year graduate sequences include algebra, analysis, differential equations, geometry, numerical analysis, probability, quantitative finance, statistics, and topology in addition to courses in methods of applied mathematics.

MS Mathematics Information (https://www.math.gatech.edu/graduate/masters-programs)

A program of study leading to a master's degree in mathematics consists of 30 credit hours and must include at least twelve credit hours at the 6000 level or above in mathematics, with courses in at least three different fields of Mathematics, as follows.

Students must maintain an overall grade-point average of at least 2.7 and receive a grade of C or better in each mathematics course in the program of study.

Non-thesis Option

All courses required by number for the Bachelor of Science in Applied Mathematics or Discrete Mathematics do not carry degree credit for graduate mathematics majors, and may not be used to fulfill these degree requirements including:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 6701</td>
<td>Math Meth-Appl Sci I</td>
<td>3</td>
</tr>
<tr>
<td>MATH 6702</td>
<td>Math Meth-Appl Sci II</td>
<td>3</td>
</tr>
<tr>
<td>MATH 3012</td>
<td>Applied Combinatorics</td>
<td>3</td>
</tr>
<tr>
<td>MATH 3215</td>
<td>Probability &amp; Statistics</td>
<td>3</td>
</tr>
<tr>
<td>MATH 4107</td>
<td>Abstract Algebra I</td>
<td>3</td>
</tr>
<tr>
<td>MATH 4317</td>
<td>Analysis I</td>
<td>3</td>
</tr>
<tr>
<td>MATH 4318</td>
<td>Analysis II</td>
<td>3</td>
</tr>
<tr>
<td>MATH 4320</td>
<td>Complex Analysis</td>
<td>3</td>
</tr>
<tr>
<td>MATH 4640</td>
<td>Numerical Analysis I</td>
<td>3</td>
</tr>
</tbody>
</table>

Analysis Concentration

Select at least two of the following: \(^1,2\)

- MATH 6321 Complex Analysis
- MATH 6337 Real Analysis I
- MATH 6338 Real Analysis II
- MATH 6580 Intro to Hilbert Spaces
- MATH 7334 Operator Theory
- MATH 7337 Harmonic Analysis
- MATH 7338 Functional Analysis

Areas

Select at least one class in two areas. \(^2\)

- 6

Non-Thesis Option

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 6000-level or higher (^2)</td>
<td>6</td>
</tr>
<tr>
<td>6000-level or higher Free Electives</td>
<td>12</td>
</tr>
<tr>
<td>Total Credit Hours</td>
<td>30</td>
</tr>
</tbody>
</table>

\(^1\) One of these two classes must be MATH 6337 or MATH 6338

\(^2\) At least 2 of the above classes must be at the 6000 level and above.
Minimum grade of B or better required.

**Thesis Option**

All courses required by number for the Bachelor of Science in Applied Mathematics or Discrete Mathematics do not carry degree credit for graduate mathematics majors, and may not be used to fulfill these degree requirements including:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 6701</td>
<td>Math Meth-Appl Sci I</td>
<td>3</td>
</tr>
<tr>
<td>MATH 6702</td>
<td>Math Meth-Appl Sci II</td>
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<tr>
<td>MATH 3012</td>
<td>Applied Combinatorics</td>
<td>3</td>
</tr>
<tr>
<td>MATH 3215</td>
<td>Probability &amp; Statistics</td>
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</tr>
<tr>
<td>MATH 4107</td>
<td>Abstract Algebra I</td>
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<tr>
<td>MATH 4317</td>
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<tr>
<td>MATH 4318</td>
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<td>MATH 4320</td>
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<td>3</td>
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<tr>
<td>MATH 4640</td>
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**Analysis Concentration**

Select at least two of the following: ¹,²

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 6321</td>
<td>Complex Analysis</td>
<td>3</td>
</tr>
<tr>
<td>MATH 6337</td>
<td>Real Analysis I</td>
<td>3</td>
</tr>
<tr>
<td>MATH 6338</td>
<td>Real Analysis II</td>
<td>3</td>
</tr>
<tr>
<td>MATH 6580</td>
<td>Intro to Hilbert Spaces</td>
<td>3</td>
</tr>
<tr>
<td>MATH 7334</td>
<td>Operator Theory</td>
<td>3</td>
</tr>
<tr>
<td>MATH 7337</td>
<td>Harmonic Analysis</td>
<td>3</td>
</tr>
<tr>
<td>MATH 7338</td>
<td>Functional Analysis</td>
<td>3</td>
</tr>
</tbody>
</table>

**Areas**

Select at least one class in two areas: ²

<table>
<thead>
<tr>
<th>Code</th>
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<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>MATH 9000</td>
<td>Doctoral Thesis</td>
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</tr>
<tr>
<td>Additional</td>
<td>4000-level or higher Coursework</td>
<td>3</td>
</tr>
</tbody>
</table>

**Total Credit Hours**

30

¹ One of these two classes must be MATH 6337 or MATH 6338

² Minimum grade of B or better required.

**Discrete Mathematics and Algebra**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 6014</td>
<td>Graph Theory</td>
<td>3</td>
</tr>
<tr>
<td>MATH 6121</td>
<td>Algebra I</td>
<td>3</td>
</tr>
<tr>
<td>MATH 6122</td>
<td>Algebra II</td>
<td>3</td>
</tr>
<tr>
<td>MATH 7016</td>
<td>Combinatorics</td>
<td>3</td>
</tr>
<tr>
<td>MATH 7018</td>
<td>Probab Combinatorics</td>
<td>3</td>
</tr>
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</table>

**Geometry and Topology**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>MATH 6441</td>
<td>Algebraic Topology I</td>
<td>3</td>
</tr>
<tr>
<td>MATH 6442</td>
<td>Algebraic Topology II</td>
<td>3</td>
</tr>
</tbody>
</table>

**Differential Equations**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 6307</td>
<td>Ordinary Diff Eqns I</td>
<td>3</td>
</tr>
<tr>
<td>MATH 6308</td>
<td>Ordinary Diff Eqns II</td>
<td>3</td>
</tr>
<tr>
<td>MATH 6341</td>
<td>Partial Diff Eqns I</td>
<td>3</td>
</tr>
<tr>
<td>MATH 6342</td>
<td>Partial Diff Eqns II</td>
<td>3</td>
</tr>
</tbody>
</table>

**Probability and Mathematical Statistics**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 6241</td>
<td>Probability I</td>
<td>3</td>
</tr>
<tr>
<td>MATH 6242</td>
<td>Probability II</td>
<td>3</td>
</tr>
<tr>
<td>MATH 7244</td>
<td>Stochastic Calculus I</td>
<td>3</td>
</tr>
<tr>
<td>MATH 7245</td>
<td>Stochastic Calculus II</td>
<td>3</td>
</tr>
<tr>
<td>MATH 6262</td>
<td>Statistical Estimation</td>
<td>3</td>
</tr>
<tr>
<td>MATH 6263</td>
<td>Testing Stat Hypotheses</td>
<td>3</td>
</tr>
<tr>
<td>MATH 6266</td>
<td>Linear Statistical Model</td>
<td>3</td>
</tr>
<tr>
<td>MATH 6267</td>
<td>Multivariate Stat Analy</td>
<td>3</td>
</tr>
</tbody>
</table>

**Numerical Analysis**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 6640</td>
<td>Num Meth-Part Diff Eqns</td>
<td>3</td>
</tr>
<tr>
<td>MATH 6643</td>
<td>Numerical Linear Algebra</td>
<td>3</td>
</tr>
<tr>
<td>MATH 6644</td>
<td>Iterative Meth-Sys Eqns</td>
<td>3</td>
</tr>
<tr>
<td>MATH 6645</td>
<td>Numerical Approx Theory</td>
<td>3</td>
</tr>
<tr>
<td>MATH 6646</td>
<td>Numer Meth: Ord Diff Eqn</td>
<td>3</td>
</tr>
</tbody>
</table>

**Master of Science in Mechanical Engineering**

The Woodruff School has a challenging graduate program that encompasses advanced study and research leading to the degree of Master of Science in Mechanical Engineering for qualified graduates with backgrounds in engineering, mechanics, mathematics, physical sciences, and life sciences. Most graduate coursework is elective, but the program of study must meet the Woodruff School’s requirements of breadth, depth, and level. Graduate degrees in mechanical engineering can be completed through a combination of studies at Georgia Tech-Lorraine, Georgia Tech Savannah, via video and online course offerings, or by attending classes at the Atlanta campus.

ME: Graduate Website (http://www.me.gatech.edu)

**The BS/MS Program**

The Woodruff School offers a BS/MS program for those students who demonstrate an interest in and ability for additional education beyond the BS degree. Woodruff School students with a GPA of 3.5 or higher are eligible to apply for the program after completion of 30 semester credit hours at Georgia Tech, but before the completion of seventy-
five semester credit hours, including transfer and advanced placement credits. Students who have more than 75 credit hours will be considered for the program on a case-by-case basis.

Participants in the BS/MS Program in the Woodruff School can obtain a master’s degree in mechanical engineering, nuclear engineering, medical physics, or in Georgia Tech's interdisciplinary bioengineering graduate program. There are two options to consider:

**Non-Thesis Option**
The Non-Thesis Option is completed by taking 10 classes according to the MS degree requirements. In many cases, two courses can be counted towards both a student’s BS and MS degrees, thereby streamlining the process. With proper planning, most MS non-thesis degrees could be completed in one year.

**Thesis Option**
The Thesis Option involves working with a faculty member on a project in a wide range of research topics being investigated by Woodruff School faculty members. This will give you hands-on experience in working with a faculty mentor; the opportunity to work in a laboratory or a research environment; and the chance to perform theoretical and experimental work. These events will foster your career interests and expand your selection of possible employers. In some cases, a student will receive a graduate research assistantship, which includes a stipend and a tuition waiver. The time to graduation depends on your thesis project, your advisor, and your work ethic.

During the first year of your graduate studies, you will be encouraged to continue for the PhD. In many cases, you might be working on an interesting topic of study as part of your master’s degree research that could provide the basis for doctoral research.

BS/MS Information [here](https://www.me.gatech.edu/undergraduate/bsms)

**Master of Science in Medical Physics**

The graduate program in medical physics leads to the degree of Master of Science in Medical Physics (MS MP) and a Doctor of Philosophy as an option under the PhD program in nuclear engineering. The program focuses on the application of radiation to medicine, particularly in the diagnosis and treatment of human disease. In addition to the traditional on-campus MS program, a distance learning program leading to the MS MP degree is also offered to accommodate the needs of professionals in the field. A large number of medical physics practitioners in government and industry participate in the video-based program.

Three credit hours for graduate courses taken as an undergraduate at Georgia Tech and used for credit toward an undergraduate degree in science or engineering may also be included in the MS MP program of study if the student graduated with an undergraduate grade-point average of at least 3.5. Medical physics students must earn a graduate grade-point average of at least 3.0 and satisfy all remaining requirements to be certified for the master's degree.

**Master of Science in Music Technology**

Digital technology led to a cultural and social transformation in the manner in which we make, perform, and listen to music. Recent technological developments in areas such as music recording, compression, distribution, and playback have fundamentally changed musical practices and created a need in the industry and academia for well-educated music and audio technologists able to design, develop, and creatively employ the next generation of musical performances, products, and services. The Georgia Tech School of Music's Master of Science in Music Technology program prepares students for careers in the arts and entertainment industries, professional audio software and hardware, as well as in the education/academic markets. This interdisciplinary degree program is executed in close collaboration with other leading programs at Georgia Tech including Human Computer Interaction, Electrical Engineering, Industrial Design, Interactive Digital Technology, and Mechanical Engineering.

The Master of Science in Music Technology is a four-semester program for a total of 48 credit hours. Applicants will be admitted to the program with an undergraduate degree in music, computing, engineering, or a related degree. Applicants will have to demonstrate their musical background in performance, composition and/or theory, as well as basic skills in programming and/or engineering in order to be admitted to the program. An interview process, which will include a portfolio examination, will be used to determine applicant’s qualifications. Upon acceptance, each student will be assigned an academic advisor who will consult and approve student's course selections. After the first year of study and with the approval of their academic advisor, students will choose between two academic tracks:

**Project Track**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Music Technology Courses</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td>Electives</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Research</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Final Master's Project in Music Technology</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total Credit Hours</td>
<td>48</td>
</tr>
</tbody>
</table>

**Thesis Track**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Music Technology Courses</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td>Electives</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>Research</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Thesis Preparation</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Thesis in Music Technology</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total Credit Hours</td>
<td>48</td>
</tr>
</tbody>
</table>

The 48 credit hours program focuses on the design and development of novel enabling music technologies. 36 of the credit hours are course credits (21 required and 15 electives) and a minimum of 12 credit hours are dedicated to research.

For more information see [here](http://gtcmt.gatech.edu/?p=2530)

**Master of Science in Nuclear Engineering**

The graduate program in nuclear and radiological engineering/medical physics leads to the degrees of

- Master of Science in Nuclear Engineering.
Master of Science in Operations Research

The School of Industrial and Systems Engineering (ISYE) offers eight master’s degrees:

- Master of Science in Industrial Engineering (MS IE);
- Master of Science in Operations Research (MS OR);
- Master of Science in Supply Chain Engineering (MS SCE);
- Master of Science in Statistics (MS STAT);
- Master of Science in Health Systems (MS HS);
- Master of Science in Quantitative and Computational Finance (MS QCF);
- Master of Science in International Logistics (MS IL) that is part of the executive program; and
- Master of Science in Computational Science and Engineering (MS CSE).

Three of these programs are interdisciplinary:

- MS QCF (joint with School of Mathematics, College of Business),
- MS STAT (joint with School of Mathematics) and
- MS SCE (joint with College of Computing, School of Mathematics).

All proposed master’s degree programs require thirty semester credit hours with the exception of MS IL and MS QCF (thirty-six credit hours) and MS HS (thirty-three credit hours). None of these MS programs contains a thesis option.

A student seeking a master’s degree must have a bachelor’s degree and typically one earned in engineering, science, mathematics, or some other field that provides an adequate background for the successful completion of one of ISyE’s programs. Students having backgrounds from unaccredited degree programs or in programs that are found lacking in relative substance can expect to first take preliminary coursework in order to elevate their preparation to the level required. The prerequisite coursework for the various master’s degrees includes strong performance in probability, statistics, linear algebra, and calculus.

Every MS curriculum is based on core classes offered from the School of ISYE, as well as electives offered by ISYE and other Georgia Tech schools in engineering and science. The MS SCE, MS QCF, and MS IL are professional degree programs with separate curriculums from the other regular MS degrees.

MS Human-Integrated Systems (http://www.isye.gatech.edu/academics/graduate/masters.php#msie)

Master of Science in Paper Science and Engineering

The Institute of Paper Science and Technology supports the MS degree programs offered by the Georgia Institute of Technology. The Paper Science and Engineering (PSE) program provides students with a multidisciplinary graduate education in the science and engineering involved in the production and properties of paper, tissue, and other products from natural fiber and related industries. The processing and consolidation of natural fiber into a paper web involve complex chemical and mechanical processes. The advantages of a multidisciplinary approach in research and education supporting this field have long been recognized. The Georgia Tech PSE program integrates the former Institute of Paper Science and Technology multidisciplinary graduate program with the science and engineering programs available at Georgia Tech.

The MS degree in PSE is a unique multidisciplinary degree covering basic engineering and science disciplines involved in the production and consolidation of wood fiber products. Students are enrolled in the participating Georgia Tech school (referred to as the "home school") and, upon completion of degree requirements, the home school recommends the award of its MS degree with an emphasis in paper science and engineering. Degrees are being offered by the Schools of Chemical and Biomolecular Engineering, Chemistry and Biochemistry, Mechanical Engineering, and Materials Science and Engineering.

The paper industry continues to evolve through considerable consolidation and reorganization, and the need for innovation in the science and engineering of pulp and paper technology from plant biology to chemical treatment and processes involved in paper production is greater than ever. The PSE program provides research results and equips students with a unique set of skills to lead in this effort.

For more information, visit www.ipst.gatech.edu/degree_progs/index.html (http://www.ipst.gatech.edu/degree_progs).

Master of Science in Physics

Physics: Graduate Information (http://www.physics.gatech.edu/graduate-program)

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS 6101</td>
<td>Classical Mechanics I</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 6103</td>
<td>Electromagnetism I</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 6104</td>
<td>Electromagnetism II</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 6105</td>
<td>Quantum Mechanics I</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 6106</td>
<td>Quantum Mechanics II</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 6107</td>
<td>Statistical Mechanics I</td>
<td>3</td>
</tr>
<tr>
<td>8000- level Special Problems or Master’s Practicum research</td>
<td>6</td>
<td></td>
</tr>
</tbody>
</table>

Elective Courses
Select six credit hours from either of the following: 6
Master of Science in Psychology

The School of Psychology does not accept students seeking a terminal master’s degree. The master’s degree coursework prepares the student for continuation of graduate work toward a PhD. Most students require two to three calendar years to complete the master’s degree.

PSYC: Graduate Information (http://psychology.gatech.edu/graduate/graduate-programs)

Master of Science in Public Policy

The Master of Science in Public Policy is designed for students with strong analytical backgrounds, such as those received in engineering, natural science, or an analytically oriented social science or humanities curriculum. Graduate studies in public policy focus on areas in which either the consequences of scientific and technological activity have significant public policy implications, or technical and scientific information is a significant input to the policy-making process. Current areas of specialization for the School include science and technology policy, environmental and energy policy, information and telecommunication policy, and regional economic development policy.

PUBP MS Information (http://spp.gatech.edu/masters)

The MS in Public Policy requires forty-six credit hours of study, including either:

a. three credit hours devoted to producing a professional policy research paper or team research project or

b. nine credit hours for a thesis.

In general, it is expected that students planning to enter employment upon completing the degree will choose the paper or project option, while students planning to continue their graduate work will choose the thesis option.

The program requires a twenty-five-credit-hour core curriculum consisting of five substantive elements:

1. policy and organizational analysis;
2. ethics, philosophy, and public policy;
3. economics and public finance;
4. methods of analysis, including quantitative analysis and research design; and
5. a capstone course in public policy analysis.

In addition, there is a required one-credit hour introductory graduate seminar in public policy. Based on prior coursework or a test-out exam, students may request up to 6 credit hours of exemptions from core courses. In individual cases, students may be required to take pre-core preparatory courses to be ready for graduate studies in particular methodological or analytical areas.

### Core Courses

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>PUBP 6001</td>
<td>Intro to Public Policy</td>
<td>1</td>
</tr>
<tr>
<td>PUBP 6010</td>
<td>Ethic,Epistem&amp;Public Pol</td>
<td>3</td>
</tr>
<tr>
<td>PUBP 6012</td>
<td>Fund of Policy Processes</td>
<td>3</td>
</tr>
<tr>
<td>PUBP 6112</td>
<td>Research Dsgn-Policy Sci</td>
<td>3</td>
</tr>
<tr>
<td>PUBP 6114</td>
<td>Applied Policy Methods</td>
<td>3</td>
</tr>
<tr>
<td>PUBP 6116</td>
<td>Microeco-Policy Analy</td>
<td>3</td>
</tr>
<tr>
<td>PUBP 6118</td>
<td>Public Finance &amp; Policy</td>
<td>3</td>
</tr>
<tr>
<td>PUBP 6201</td>
<td>Public Policy Analysis</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Select one of the following:</td>
<td></td>
</tr>
<tr>
<td>PUBP 6014</td>
<td>Organization Theory</td>
<td>3</td>
</tr>
<tr>
<td>PUBP 6017</td>
<td>Public Management</td>
<td></td>
</tr>
<tr>
<td>PUBP 6018</td>
<td>Policy Implement &amp; Admin</td>
<td></td>
</tr>
</tbody>
</table>

Total Credit Hours 25

Students must achieve a grade of B or higher in all core courses. In addition to elective courses in the School of Public Policy, students may develop their own programs of study by taking courses in other Georgia Tech schools, including those in the Ivan Allen College and the Colleges of Architecture, Management, Sciences, and Engineering. A summer internship, work experience, or co-op assignment between the first and second years offers students insight into a research or professional setting related to their career interests.

For the MSPP, students are encouraged to pursue one or more concentrations. A concentration consists of at least three 3-credit hour courses, of which at least one is the School of Public Policy. Students can pursue concentrations within groups already developed by the faculty (see above). Or, students can pursue an individualized concentration, with the written approval of the proposed concentration program of study by their advisor.

BS/MS Public Policy

The School of Public Policy offers a BS/MS program for students enrolled in the undergraduate program who demonstrate an interest in and ability for additional education beyond the BS degree.

Students in the BS/MS program will remain undergraduates until they meet requirements for the undergraduate degree, at which point they will receive their BS degree and be changed to graduate status. Students will be eligible to apply for the program after completion of 30 semester credit hours at Georgia Tech (i.e., at the end of their first year), and if they show appropriate progress in their degree program thereafter. Any student in good standing in the BS PP program is eligible to apply to the program. Admissions decisions will be based on GPA and judgments of the faculty who have served as advisors or instructors. Continuation in the program will require the student to maintain a GPA of 3.0 or higher in public policy courses. The program will not penalize students who opt out after the bachelor’s degree. Students participating in this program will be eligible for the six semester credit-hour Graduate Course Option, which allows students completing both the bachelor’s and master’s in the same discipline to use up to 6 credit hours of graduate-level coursework in the major discipline for both degrees.

The graduate-level credits required in the BS/MS Program are usually as follows:

Core 22
Requirements

Core Courses

- PUBP 6001 Intro to Public Policy 1
- PUBP 6010 Ethic, Epistem & Public Pol 3
- PUBP 6112 Research Dsgn-Policy Sci 1
- PUBP 6114 Applied Policy Methods 3
- PUBP 6116 Microecon-Policy Analy 3
- PUBP 6118 Public Finance & Policy 3
- PUBP 6201 Public Policy Analysis 3
- Select one of the following: 3
  - PUBP 6014 Organization Theory
  - PUBP 6017 Public Management
  - PUBP 6018 Policy Implement & Admin

Electives

- Electives 12
- Concentration 2
  - Concentration 6

Capstone/Research Paper

- PUBP 6801 Research Paper 3

Total Credit Hours 43

1 This course should be taken as an undergraduate instead of PUBP 3130 and will count for both programs
2 Students are required to develop, in consultation with their advisor, a six credit hour concentration in an area or specialty relevant to public policy and management (e.g. environmental policy, science and technology policy, urban policy, economic development, information and communications policy, policy evaluation, public management).

Contact the BS PP program director for further information.

BS/MS Information (http://www.spp.gatech.edu/graduate/five-year-bsms-program)

Master of Science in Quantitative and Computational Finance

The School of Industrial and Systems Engineering (ISYE) offers eight master's degrees:

- Master of Science in Industrial Engineering (MS IE);
- Master of Science in Operations Research (MS OR);
- Master of Science in Supply Chain Engineering (MS SCE);
- Master of Science in Statistics (MS STAT);
- Master of Science in Health Systems (MS HS);
- Master of Science in Quantitative and Computational Finance (MS QCF);
- Master of Science in International Logistics (MS IL) that is part of the executive program; and
- Master of Science in Computational Science and Engineering (MS CSE).

Three of these programs are interdisciplinary:

- MS QCF (joint with School of Mathematics, College of Business),
- MS STAT (joint with School of Mathematics) and
- MS SCE (joint with College of Computing, School of Mathematics).

All proposed master's degree programs require thirty semester credit hours with the exception of MS IL and MS QCF (thirty-six credit hours) and MS HS (thirty-three credit hours). None of these MS programs contains a thesis option.

A student seeking a master's degree must have a bachelor's degree and typically one earned in engineering, science, mathematics, or some other field that provides an adequate background for the successful completion of one of ISyE's programs. Students having backgrounds from unaccredited degree programs or in programs that are found lacking in relative substance can expect to first take preliminary coursework in order to elevate their preparation to the level required. The prerequisite coursework for the various master's degrees includes strong performance in probability, statistics, linear algebra, and calculus.

Every MS curriculum is based on core classes offered from the School of ISyE, as well as electives offered by ISyE and other Georgia Tech schools in engineering and science. The MS SCE, MS QCF, and MS IL are professional degree programs with separate curriculums from the other regular MS degrees.

MS Human-Integrated Systems (http://www.isye.gatech.edu/academics/graduate/masters.php#msie)

Program of Study

Core Courses

- MGT 6078 Finance & Investments 3
- MGT 6081 Derivative Securities 3
- MATH 6635 Numerical Meth-Finance 3
- ISYE/MATH 6759 Stoch Process-Finance 3
- ISYE/MATH 6767 Sys-Computation Finance 3
- ISYE/MGT 6769 Fixed Income Securities 3
- ISYE 6673 Financial Optimization 3
- MATH 6235 Stoch Process-Finance II 3
- MGT 6090 Mgt of Fin Institutions 3
- ISYE/MATH 6783 Financial Data Analysis 3
- ISYE/MATH/MGT 6785 The Practice of QCF 3
- MGT 7061 Empirical Finance 3

Foundational and Technical Electives (Select 3 courses) 9

- ISYE 6673 Financial Optimization
- MATH 6235 Stoch Process-Finance II
- MGT 6090 Mgt of Fin Institutions
- ISYE/MATH 6783 Financial Data Analysis
- ISYE/MATH/MGT 6785 The Practice of QCF
- MGT 7061 Empirical Finance

Free electives (Select 3 courses at 6000-level or higher) 9

Total Credit Hours 36

Master of Science in Statistics

The School of Mathematics offers the degree of Master of Science in Statistics (MS STAT) in cooperation with the School of Industrial and
Systems Engineering. It is available for applicants having the BS in mathematics; students with engineering backgrounds should enter the same program through the School of Industrial and Systems Engineering. Prerequisites include work in probability, statistics, linear algebra, calculus, and optimization. The program requires 30 credit hours of coursework. There is no thesis option.

The School of Industrial and Systems Engineering (ISYE) offers eight master's degrees:

- Master of Science in Industrial Engineering (MS IE);
- Master of Science in Operations Research (MS OR);
- Master of Science in Supply Chain Engineering (MS SCE);
- Master of Science in Statistics (MS STAT);
- Master of Science in Health Systems (MS HS);
- Master of Science in Quantitative and Computational Finance (MS QCF);
- Master of Science in International Logistics (MS IL) that is part of the executive program; and
- Master of Science in Computational Science and Engineering (MS CSE).

Three of these programs are interdisciplinary:

- MS QCF (joint with School of Mathematics, College of Business),
- MS STAT (joint with School of Mathematics) and
- MS SCE (joint with College of Computing, School of Mathematics).

All proposed master's degree programs require thirty semester credit hours with the exception of MS IL and MS QCF (thirty-six credit hours) and MS HS (thirty-three credit hours). None of these MS programs contains a thesis option.

A student seeking a master's degree must have a bachelor's degree and typically one earned in engineering, science, mathematics, or some other field that provides an adequate background for the successful completion of one of ISyE's programs. Students having backgrounds from unaccredited degree programs or in programs that are found lacking in relative substance can expect to first take preliminary coursework in order to elevate their preparation to the level required. The prerequisite coursework for the various master's degrees includes strong performance in probability, statistics, linear algebra, and calculus.

Every MS curriculum is based on core classes offered from the School of ISyE, as well as electives offered by ISyE and other Georgia Tech schools in engineering and science. The MS SCE, MS QCF, and MS IL are professional degree programs with separate curriculums from the other schools in engineering and science. The MS SCE, MS QCF, and MS IL are of ISyE, as well as electives offered by ISyE and other Georgia Tech schools in engineering and science.

Every MS curriculum is based on core classes offered from the School of ISyE, as well as electives offered by ISyE and other Georgia Tech schools in engineering and science. The MS SCE, MS QCF, and MS IL are professional degree programs with separate curriculums from the other regular MS degrees.

MS Human-Integrated Systems (http://www.isye.gatech.edu/academics/graduate/masters.php#msie)

MS Statistics ISYE (http://www.isye.gatech.edu/academics/graduate/masters.php#msie)

MS Statistics Math (https://www.math.gatech.edu/ms-statistics)

Program of Study

Core Courses

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>MATH 4261</td>
<td>Math Statistics I</td>
<td>3</td>
</tr>
<tr>
<td>MATH 4262</td>
<td>Math Statistics II</td>
<td>3</td>
</tr>
<tr>
<td>ISYE 6413</td>
<td>Dsgn &amp; Analy-Experiments</td>
<td>3</td>
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</table>

Statistics Electives (Select 5 courses) 15

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 4317</td>
<td>Analysis I</td>
<td>3</td>
</tr>
<tr>
<td>MATH 6262</td>
<td>Statistical Estimation</td>
<td>3</td>
</tr>
<tr>
<td>MATH 6263</td>
<td>Testing Stat Hypotheses</td>
<td>3</td>
</tr>
<tr>
<td>MATH 6266</td>
<td>Linear Statistical Model</td>
<td>3</td>
</tr>
<tr>
<td>MATH 6267</td>
<td>Multivariate Stat Analy</td>
<td>3</td>
</tr>
<tr>
<td>ISYE 6402</td>
<td>Time Series Analysis</td>
<td>3</td>
</tr>
<tr>
<td>ISYE 6404</td>
<td>Nonparametric Data Analy</td>
<td>3</td>
</tr>
<tr>
<td>ISYE 6405</td>
<td>Statistical Meth-Mfg Dgn</td>
<td>3</td>
</tr>
<tr>
<td>ISYE 6412</td>
<td>Theoretical Statistics</td>
<td>3</td>
</tr>
<tr>
<td>ISYE 6416</td>
<td>Computational Statistics</td>
<td>3</td>
</tr>
<tr>
<td>ISYE 6421</td>
<td>Biostatistics</td>
<td>3</td>
</tr>
<tr>
<td>ISYE 6761</td>
<td>Stochastic Processes I</td>
<td>3</td>
</tr>
<tr>
<td>ISYE 6762</td>
<td>Stochastic Processes II</td>
<td>3</td>
</tr>
<tr>
<td>ISYE/ MATH 6781</td>
<td>Reliability Theory</td>
<td>3</td>
</tr>
<tr>
<td>ISYE/ MATH 6783</td>
<td>Financial Data Analysis</td>
<td>3</td>
</tr>
<tr>
<td>ISYE 6805</td>
<td>Reliability Engineering</td>
<td>3</td>
</tr>
<tr>
<td>ISYE 7400</td>
<td>Adv Design-Experiments</td>
<td>3</td>
</tr>
<tr>
<td>ISYE 7401</td>
<td>Adv Statistical Modeling</td>
<td>3</td>
</tr>
<tr>
<td>ISYE 7405</td>
<td>Multivariate Data Analy</td>
<td>3</td>
</tr>
<tr>
<td>ISYE 7406</td>
<td>Data Mining&amp;Stat Learn</td>
<td>3</td>
</tr>
<tr>
<td>ISYE 7441</td>
<td>Theory of Linear Models</td>
<td>3</td>
</tr>
</tbody>
</table>

Free Elective 3

Total Credit Hours 30

Master of Science in Supply Chain Engineering

The Master of Science in Supply Chain Engineering is a new professional graduate degree program created to meet the growing demand for business-savvy engineers who can design and synchronize highly complex global supply chains. The program's intensive 12-month curriculum delivers academic knowledge in analytic methods, supply chain engineering, and enterprise management while building professional practice skills and real-world industry experience.

Program applicants may come from a wide range of academic, business, and geographical backgrounds, but they will share a common motivation: to pursue a highly focused graduate education experience in supply chain engineering and to subsequently explore immediate career opportunities with global enterprises.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>ISYE 6333</td>
<td>Ops Res For Sup Chns I</td>
<td>3</td>
</tr>
<tr>
<td>ISYE 6334</td>
<td>Ops Res For Sup Chns II</td>
<td>3</td>
</tr>
<tr>
<td>ISYE 6335</td>
<td>Supply Chain Engrg I</td>
<td>3</td>
</tr>
<tr>
<td>ISYE 6336</td>
<td>Supply Chain Engrg II</td>
<td>3</td>
</tr>
<tr>
<td>ISYE 6337</td>
<td>Supply Chain Engrg III</td>
<td>3</td>
</tr>
</tbody>
</table>
ISYE 6338  Supply Chain Strategy  3
ISYE 6339  Supply Chain Info Sys  3
ISYE 6340  Seminar in Sup Chn Engrg  3
ISYE 6341  Capstone Project I  3
ISYE 6342  Capstone Project II  3
Total Credit Hours  30

BS/MS Program
A combined BS/MS program that will allow students to graduate with a Bachelor of Science in Industrial Engineering and a Master of Science in Supply Chain Engineering. Contact the School of Industrial Engineering for more information.

Master of Science in Urban Design (MSUD)
The Master of Science in Urban Design (MSUD) degree is oriented to those who wish to expand upon their previous professional education and professional experience, as architects, landscape architects, city planners, or civil engineers, and to enter urban design practices either in private firms or public agencies. The MSUD Program is housed in the School of Architecture and is run jointly by the School of Architecture and the Georgia Tech School of City and Regional Planning. It offers an intensive and richly interdisciplinary experience, with required courses in urban design, architecture and city planning, with additional opportunities in civil and environmental engineering, real estate development, heritage preservation, and other fields. Students in the MSUD Program are in daily contact with architecture and planning students and faculty throughout the College of Design.

Qualifications Needed to Apply
Applicants to the MSUD Program are limited to those with prior accredited professional degrees in

- architecture (M.ARCH or B.ARCH),
- landscape architecture (BLA or MLA),
- City and Regional Planning (MCRP or equivalent), or
- Civil Engineering (BCE or equivalent).

Professional degrees from other countries are acceptable with proper documentation with the understanding that the MSUD cannot serve, in itself, as a professional degree in the US. It is preferable that applicants have a year or more of professional experience.

Applicants must demonstrate their ability for graduate study in urban design by submitting the following in their application package:

1. A design portfolio, including academic and professional work, demonstrating experience and ability to engage professional level urban design problems. The portfolio must be submitted in digital form.
2. Graduate Record Examination (GRE) scores, taken within the past five years, and professional degree grade point records and averages to demonstrate overall ability to engage graduate studies. In general, minimums are 60th percentile or higher for the GRE sections and 3.0 GPA or higher. GRE scores are required for all international applicants, regardless of the language of their first degree.

3. Tests of English as a Foreign Language (TOEFL) scores, with a minimum scores of 600 (paper), 250 (computer) or 100 (Internet) are required for students whose first language is not English.

The MSUD Program only admits students for the fall semester, unless the student plans to participate in one of the College of Design urban design-oriented international summer programs prior to the first semester in the MSUD Program.

The course of study for the Master of Science in Urban Design (MSUD) includes a set of required core courses, totaling 30 credit hours, and professional electives, totaling 9 credit hours. The total minimum credit hour requirement for the MSUD degree is thirty-nine credit hours.

Required Courses

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
</table>
| Seminar and Lecture Courses
| COA 6151  | History of Urban Form                           | 3            |
| ARCH 6151 | Theories of Urban Design                         | 3            |
| CP 6016   | Growth Management Law                           | 3            |
| CP 6611   | Real Estate Fin & Dev                            | 3            |
| Laboratory, Studio or Special Problems Courses
| COA 6011  | Urban Design Laboratory                          | 6            |
| COA 7011  | Urban Design Studio I                            | 6            |
| Select one of the following:                | 6            |
| COA 7012  | Urban Design Studio II                           | 6            |
| COA 8881  | Course COA 8881 Not Found                        | 3            |
| ARCH 7045 | Urban Design Workshop                            | 3            |

Elective Courses
Select 9 credit hours of electives, either in concentrated areas or in distributed subject areas, based on prior professional degrees, professional experience and career interests.

Total Credit Hours 39

Elective Courses
The 9 credit hours of elective courses are organized into six subject areas, reflecting important areas of urban design practice. Students will be advised to take these electives, either in concentrated areas or in distributed subjects, based on their prior professional degrees, professional experience and career interests.

These elective areas are as follows:

- **Urban Design History, Theory and Practice** electives provide depth in several aspects of urban design history, theory and practice. These are especially appropriate for students with strong technical backgrounds, who wish to engage broader aspects of urban design practice.
- **Sustainable Development** electives provide an introduction, as well as policy and technical depth, to issues of sustainable urbanism from a variety of perspectives, ranging from building to city to regional and scales.
- **Transportation Planning** electives are courses in the existing Transportation Dual Degree Program between City and Regional Planning and Civil and Environmental Engineering. Students also may enroll, with permission, in other transportation planning and
design courses in the Georgia Tech School of Civil and Environmental Engineering.

- **Real Estate and Economic Development** electives provide additional depth in real estate development and economic development. Students may also cross enroll, with permission, in the Georgia State University Robinson College of Business. In addition, students may select to complete the Real Estate Certificate Program at Georgia State University.

- **Digital Media** electives respond to the rapidly growing need in urban design practice to bridge among GIS, CAD, 3-D Modeling and Animation. The strengths in the College of Design GIS Center and the Digital Buildings Laboratory provide substantial opportunities in this area, and these opportunities are expanding rapidly.

- **Heritage Preservation** electives address an area of urban design practice that has not had significant academic attention. These electives are based on opportunities for students to cross enroll, with permission, at GSU for courses in the Heritage Preservation Program in the College of Arts and Sciences. In addition, students may select to complete the Historic Preservation Certificate Program at Georgia State University.

For additional information and links see: www.arch.gatech.edu/urban-design/msud (http://www.arch.gatech.edu)

### Master of Science with a Major in Management

The undesignated Master of Science degree program serves students whose educational and career goals may not be best served by the MBA program. Under these circumstances, the student may pursue a specially tailored master's-level curriculum that satisfies the American Assembly of Collegiate Schools of Business (AACSB) common body of knowledge requirements and provides a coherent concentration of elective courses chosen in consultation with an academic advisor. This specialized degree program is designed primarily for students who are admitted to Georgia Tech in approved foreign education programs, but may also be completed by students in the PhD program who are unable to complete the full doctoral degree. Admission to this program must be approved by the MBA Admissions Committee prior to enrollment.

### Minor in Aerospace Engineering

The School of Aerospace Engineering offers a minor in aerospace engineering for students majoring in all disciplines (other than AE) at Georgia Tech.

In partnership with other units on campus, the School also offers interdisciplinary minors in the areas of energy systems, and scientific and engineering computing.

The AE minor must comprise at least 15 credit hours, of which at least 9 credit hours are upper-division coursework (numbered 3000 or above). All courses counting toward the minor must be taken on a letter-grade basis and must be completed with a grade of C or higher.

Minor Program of Study & Guidelines (http://catalog.gatech.edu/academics/minors)

AE website Minor Information (http://www.ae.gatech.edu)

The AE minor must comprise at least 15 credit hours, of which at least 9 credit hours are upper-division coursework (numbered 3000 or above). All courses counting toward the minor must be taken on a letter-grade basis and must be completed with a grade of C or higher.

### Program of Study

#### Required Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>AE 2010</td>
<td>Thermodynamics Fundamentals</td>
<td>4</td>
</tr>
<tr>
<td>AE 3030</td>
<td>Aerodynamics</td>
<td>4</td>
</tr>
<tr>
<td>AE 3330</td>
<td>Intro AE Vehicle Performance</td>
<td>3</td>
</tr>
</tbody>
</table>

#### Elective Courses

Select elective AE courses to fulfill 15 credit hour requirement

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>AE 3330</td>
<td>Intro AE Vehicle Performance</td>
</tr>
<tr>
<td>AE 3330</td>
<td>Intro AE Vehicle Performance</td>
</tr>
<tr>
<td>AE 3330</td>
<td>Intro AE Vehicle Performance</td>
</tr>
</tbody>
</table>

Total Credit Hours 15

### Guidelines and Exceptions

A. A maximum of 3 credit hours of AE 3355/AE 4355 may be applied to satisfy the Minor.

B. Maximum of 1 credit hour of research credit (AE 2699/AE 4699) may be used.

C. No more than 6 credit hours of Special Topics courses may be included.

D. If one credit hour research is taken, then only 5 credit hours of Special Topics is allowed.

E. No Special Problems or Internship coursework may be used.

F. Students may not use AE 3515 to satisfy their Minor requirements if they use ME 3015 or ECE 3085 to satisfy their Major requirements.

G. A maximum of 3 semester hours of transfer credit may be used to satisfy the course requirements for a minor. This includes courses taken at another institution or credit earned through the AP or IB program, assuming the scores meet Georgia Tech minimum standards.

H. It is the major advisor’s responsibility to verify that students are using only courses from the designated block(s) from the student’s major field of study that are allowed to satisfy a minor program, that they are not using any Core Area A-E courses (including humanities and social sciences), and that they are not using any courses for more than one minor or certificate. Any free elective course used to satisfy the course requirements of the student’s major degree program may also be used to satisfy the course requirements for a minor.

### Minor in Architectural History

**The College of Design is no longer accepting students into this minor. Please contact the academic department for questions.**

The College of Design offers certificate programs in Architectural and Design History, City and Regional Planning, and Music, as well as undergraduate minor programs in Architectural History, Music, and a multidisciplinary minor in Design/Arts History. Academic advisors in the relevant programs should be consulted for details.

### Undergraduate Minor in Multidisciplinary Design/Arts History

The College of Design offers a minor for students in all disciplines at Georgia Tech. The program, which is separate from the minor in Architectural History offered by the School of Architecture, requires completion of one of three available core survey sequences in the history of design (ARCH 2111 and 2112 or ARCH 4105 and 4106) or COA 2241
and 2242 or ID 2202) in addition to four courses from at least three lists of courses in: history of architecture, the history of industrial design, the history of the city/landscape/garden, history of art and foreign study, and music history. Architecture and Industrial Design program students must select a core survey sequence outside their major, or select two additional electives from approved lists. Interested students should consult with your academic advisor for more details.

The Architectural History minor must comprise at least 18 semester hours, of which at least 12 semester hours are upper-division coursework (numbered 3000 or above).

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARCH 2111</td>
<td>History of Arch I</td>
<td>3</td>
</tr>
<tr>
<td>ARCH 2112</td>
<td>History of Arch II</td>
<td>3</td>
</tr>
<tr>
<td>OR</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCH 4105</td>
<td>History of Arch I</td>
<td>3</td>
</tr>
<tr>
<td>ARCH 4106</td>
<td>History of Arch II</td>
<td>3</td>
</tr>
<tr>
<td>Select four courses from the following:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCH 2115</td>
<td>Modern Arch &amp; Art</td>
<td>3</td>
</tr>
<tr>
<td>ARCH 4113</td>
<td>Renaissance&amp;Manner Arch</td>
<td>3</td>
</tr>
<tr>
<td>ARCH 4114</td>
<td>Medieval Architecture</td>
<td>3</td>
</tr>
<tr>
<td>ARCH 4117</td>
<td>Arts and Crafts Arch</td>
<td>3</td>
</tr>
<tr>
<td>ARCH 4118</td>
<td>American Academic Arch</td>
<td>3</td>
</tr>
<tr>
<td>ARCH 4119</td>
<td>Arch-Frank Lloyd Wright</td>
<td>3</td>
</tr>
<tr>
<td>ARCH 4120</td>
<td>Atlanta Architecture</td>
<td>3</td>
</tr>
<tr>
<td>ARCH 4123</td>
<td>European Modernism</td>
<td>3</td>
</tr>
<tr>
<td>ARCH 4124</td>
<td>Hist of Arch in the U.S.</td>
<td>3</td>
</tr>
<tr>
<td>ARCH 4125</td>
<td>French Arch</td>
<td>3</td>
</tr>
<tr>
<td>ARCH 4821</td>
<td>Spec Top-Hist,Theor&amp;Crit</td>
<td>3</td>
</tr>
<tr>
<td>ARCH 4822</td>
<td>Spec Top-Hist,Theor&amp;Crit</td>
<td>3</td>
</tr>
<tr>
<td>ARCH 4823</td>
<td>Spec Top-Hist,Theor&amp;Crit</td>
<td>3</td>
</tr>
<tr>
<td>COA 3115</td>
<td>Art &amp; Arch in Italy I</td>
<td>3</td>
</tr>
<tr>
<td>COA 3116</td>
<td>Art &amp; Arch in Italy II</td>
<td>3</td>
</tr>
</tbody>
</table>

• Cross registration course work in architectural history from other Atlanta universities may be considered on a case by case basis.

• This minor requires an overall GPA of 2.5 and all courses must be satisfied with grade of ‘C’ or higher.

• A maximum of 6 semester hours of Special Topics courses may be included in a minor program or the student may complete 3 semester hours of Special Topics and 3 semester hours of Undergraduate Research. Students may not use 6 semester hours of Undergraduate Research for a minor.

• It is the major advisor’s responsibility to verify that students are using only courses from the designated block(s) from the student’s major field of study that are allowed to satisfy a minor program, that they are not using any Core Area A-E courses (including humanities and social sciences), and that they are not using any courses for more than one minor or certificate. Any free elective course used to satisfy the course requirements of the student’s major degree program may also be used to satisfy the course requirements for a minor.

• A maximum of 3 semester hours of transfer credit may be used to satisfy the course requirements for a minor. This includes courses taken at another institution or credit earned through the AP or IB program, assuming the scores meet Georgia Tech minimum standards.

Minor in Architecture

The School of Architecture offers an undergraduate minor in Architecture for students in all disciplines at Georgia Tech. Students in the minor will learn to produce models for concrete solutions to "real-world sustainability problems" (social and ecological) and ones for handling complex, multidisciplinary collaboration. The minor requires completion of 15 credit hours, including ARCH 3115 and ARCH 4515.

Interested students should see the Minors Guidelines (p. 107) and consult with an academic advisor for more details.

Program of Study

<table>
<thead>
<tr>
<th>Program</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARCH 3115</td>
<td>Modern Arch &amp; Art Wkshp 3</td>
</tr>
<tr>
<td>or ARCH 2111</td>
<td>History of Arch II 3</td>
</tr>
<tr>
<td>ARCH 2111</td>
<td>History of Arch I 3</td>
</tr>
<tr>
<td>ARCH 3231</td>
<td>Environmental Systems I 3</td>
</tr>
<tr>
<td>or ARCH 2211</td>
<td>Construction Tech I 3</td>
</tr>
<tr>
<td>ARCH 4515</td>
<td>Collaborative Design 3</td>
</tr>
<tr>
<td>Electives</td>
<td>Advisor-Approved Elective 3</td>
</tr>
<tr>
<td>Total Credit Hours</td>
<td>15</td>
</tr>
</tbody>
</table>

• A maximum of 3 credit hours of transfer credit may be used to satisfy the course requirements for a minor. This includes courses taken at another institution or credit earned through the AP or IB program, assuming the scores meet Georgia Tech minimum standards.

• All courses counting toward the minor must be taken on a letter-grade basis and must be completed with a grade of C (2.00) or better.

• It is the major advisor’s responsibility to verify that students are using only courses from the designated block(s) from the student’s major field of study that are allowed to satisfy a minor program, that they are not using any Core Area A-E courses (including humanities and social sciences), and that they are not using any courses for more than one minor or certificate. Any free elective course used to satisfy the course requirements of the student’s major degree program may also be used to satisfy the course requirements for a minor.

Minor in Biochemistry

The School of Chemistry and Biochemistry provides many courses that are of interest to students from the Schools of Biology, Chemical and Biomolecular Engineering, Materials Science and Engineering, and Biomedical Engineering, and students pursuing pre-health tracks. These students develop greater interest in chemistry while taking these courses and the proposed minor provides a means to enhance their knowledge in a structured and documented manner. Given the multi-disciplinary nature of science and engineering today, the option to pursue more in-depth study outside of the major in a manner documented on their transcripts will benefit graduates as they enter a competitive, global, and diverse workforce.

The minor is likely to be highly attractive to students who intend to apply to medical, pharmacy, dental and graduate schools.
Program of Study

Required Courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 4511</td>
<td>Biochemistry I</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 4512</td>
<td>Biochemistry II</td>
<td>3</td>
</tr>
</tbody>
</table>

Electives

Select 9 credit hours of electives, at least 6 which are upper-division. 1, 2

Total Credit Hours 15

1. Numbered 3000 or above.
2. Nine credit hours may be of any combination (3 credit hours each): CHEM 2312 (this course is pre-requisite to CHEM 4511), CHEM 3411 (this course is a pre-requisite to CHEM 4521), CHEM 4521, CHEM 4581, CHEM 4582, CHEM 4699, CHEM 4765, CHEM 4803 (with approval of the associate chair for undergraduate programs or their designate), CHEM 6500-level courses, CHEM 8500-level courses.

- A maximum of 3 credit hours of Special Topics (in biochemistry) courses may be included in the minimum 15 credit hours of a minor program and a maximum of 3 credit hours of CHEM 4699 (Independent Research) may be used toward the minor.
- A maximum of 3 credit hours of transfer credit may be used to satisfy the course requirements for a minor. This includes courses taken at another institution or credit earned through the AP or IB program, assuming the scores meet Georgia Tech minimum standards.
- All courses counting toward the minor must be taken on a letter-grade basis and must be completed with a grade of C (2.00) or better.

It is the major advisor’s responsibility to verify that students are using only courses from the designated block(s) from the student’s major field of study that are allowed to satisfy a minor program, that they are not using any Core Area A-E courses (including humanities and social sciences), and that they are not using any courses for more than one minor or certificate. Any free elective course used to satisfy the course requirements of the student’s major degree program may also be used to satisfy the course requirements for a minor.

Minor Program of Study & Guidelines (p. 107)

Minor in Biology

A minor in biology is available to all non-biology majors. The minor program provides a concentration in modern biological sciences and is especially valuable for students considering biomedical or environmental fields. The basic requirement is fifteen semester hours in biology, of which nine hours must be at the 3000 level or higher. Further information is available from the School’s undergraduate coordinator.

Minor Program of Study & Guidelines (http://catalog.gatech.edu/academics/minors)

Program of Study

Select 15 hours of Biology electives 1

Total Credit Hours 15

1. Nine credit hours must be 3000-level or higher

A maximum of 6 credit hours of Special Topics courses may be included in a minor program or the student may complete 3 credit hours of Special Topics and 3 credit hours of either Special Problems or Undergraduate Research. Students may not use 6 credit hours of either Special Problems or Undergraduate Research for a minor.

- A maximum of 3 credit hours of transfer credit may be used to satisfy the course requirements for a minor. This includes courses taken at another institution or credit earned through the AP or IB program, assuming the scores meet Georgia Tech minimum standards.
- All courses counting toward the minor must be taken on a letter-grade basis and must be completed with a grade of C (2.00) or better.

It is the major advisor’s responsibility to verify that students are using only courses from the designated block(s) from the student’s major field of study that are allowed to satisfy a minor program, that they are not using any Core Area A-E courses (including humanities and social sciences), and that they are not using any courses for more than one minor or certificate. Any free elective course used to satisfy the course requirements of the student’s major degree program may also be used to satisfy the course requirements for a minor.

Minor in Biomedical Engineering

The goal of the minor program is to educate students in how to apply engineering fundamentals to solve problems in biology and medicine. The program should be of particular interest to those students who plan to pursue advanced degrees in biomedical engineering and/or medicine.

Minor Program of Study & Guidelines (http://catalog.gatech.edu/academics/minors)

Program of Study

The Biomedical Engineering minor must comprise at least 15 credit hours, of which at least 9 credit hours are upper-division coursework (numbered 3000 or above).

Required Courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>APPH/BIOL</td>
<td>Anatomy</td>
<td>3</td>
</tr>
<tr>
<td>3753</td>
<td>BMED 31 Systems Physiology</td>
<td></td>
</tr>
<tr>
<td>Biosciences</td>
<td>Select at least one of the following:</td>
<td>3</td>
</tr>
<tr>
<td>APPH 4100</td>
<td>Exercise Physiology</td>
<td></td>
</tr>
<tr>
<td>APPH 4200</td>
<td>Kinesiology</td>
<td></td>
</tr>
<tr>
<td>APPH 4600</td>
<td>Muscle Struct &amp; Plasticity</td>
<td></td>
</tr>
<tr>
<td>BIOL 3755</td>
<td>Human Physiology</td>
<td></td>
</tr>
<tr>
<td>BIOL 1510</td>
<td>Biological Principles</td>
<td></td>
</tr>
<tr>
<td>BIOL 2344</td>
<td>Genetics</td>
<td></td>
</tr>
<tr>
<td>BIOL 4478</td>
<td>Biophysics</td>
<td></td>
</tr>
<tr>
<td>BIOL 4570</td>
<td>Immunology &amp; Immunochem</td>
<td></td>
</tr>
<tr>
<td>BIOL/</td>
<td>Intro Neuroscience</td>
<td></td>
</tr>
<tr>
<td>BMED 4752</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHEM 3511</td>
<td>Survey of Biochemistry</td>
<td></td>
</tr>
<tr>
<td>CHEM 4511</td>
<td>Biochemistry I</td>
<td></td>
</tr>
<tr>
<td>CHEM 4512</td>
<td>Biochemistry II</td>
<td></td>
</tr>
</tbody>
</table>

Biomedical Engineering

Select at least 9 credit hours from the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMED/ME</td>
<td>Biofluid Mechanics</td>
<td>9</td>
</tr>
</tbody>
</table>
The minor is likely to be highly attractive to students to apply to medical, pharmacy, dental schools, and graduate schools.

Minor Program of Study & Guidelines (http://catalog.gatech.edu/academics/minors)

Program of Study

Required Courses

Select 15 credit hours of approved chemistry related courses, at least 9 of which are upper-division.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 2211</td>
<td>Quantitative Analysis</td>
</tr>
<tr>
<td>CHEM 2311</td>
<td>Organic Chemistry I</td>
</tr>
<tr>
<td>CHEM 2312</td>
<td>Organic Chemistry II</td>
</tr>
<tr>
<td>CHEM 2380</td>
<td>Synthesis Lab I</td>
</tr>
<tr>
<td>CHEM 3111</td>
<td>Inorganic Chemistry</td>
</tr>
<tr>
<td>CHEM 3211</td>
<td>Analytical Chemistry</td>
</tr>
<tr>
<td>CHEM 3380</td>
<td>Synthesis Lab II</td>
</tr>
<tr>
<td>CHEM 3411</td>
<td>Physical Chemistry I</td>
</tr>
<tr>
<td>CHEM 3412</td>
<td>Physical Chemistry II</td>
</tr>
<tr>
<td>CHEM 3481</td>
<td>Physical Chem Lab I</td>
</tr>
<tr>
<td>CHEM 3511</td>
<td>Survey of Biochemistry</td>
</tr>
<tr>
<td>CHEM 3700</td>
<td>Alternative Energy</td>
</tr>
<tr>
<td>CHEM 4113</td>
<td>Inorg Energy Conversion</td>
</tr>
<tr>
<td>CHEM 4311</td>
<td>Adv Organic Chem</td>
</tr>
<tr>
<td>CHEM 4452</td>
<td>Applied Spectroscopy</td>
</tr>
<tr>
<td>CHEM 4699</td>
<td>Undergraduate Research</td>
</tr>
<tr>
<td>CHEM 4740</td>
<td>Atmospheric Chemistry</td>
</tr>
<tr>
<td>CHEM 4776</td>
<td>Polymer Science &amp; Engr</td>
</tr>
<tr>
<td>CHEM 4803</td>
<td>Special Topics in Chemistry</td>
</tr>
</tbody>
</table>

Total Credit Hours 15

• A maximum of 3 credit hours of transfer credit may be used to satisfy the course requirements for a minor. This includes courses taken at another institution or credit earned through the AP or IB program, assuming the scores meet Georgia Tech minimum standards.

• All courses counting toward the minor must be taken on a letter-grade basis and must be completed with a grade of C (2.00) or better.

• It is the major advisor’s responsibility to verify that students are using only courses from the designated block(s) from the student’s major field of study that are allowed to satisfy a minor program, that they are not using any Core Area A-E courses (including humanities and social sciences), and that they are not using any courses for more than one minor or certificate. Any free elective course used to satisfy the course requirements of the student’s major degree program may also be used to satisfy the course requirements for a minor.

Minor in Chemistry

The School of Chemistry and Biochemistry provides many courses that are of interest to students from the Schools of Biology, Chemical and Biomolecular Engineering, Materials Science and Engineering, and Biomedical Engineering, and students pursuing pre-health tracks. These students develop greater interest in chemistry while taking these courses and the proposed minor provides a means to enhance their knowledge in a structured and documented manner. Given the multi-disciplinary nature of science and engineering today, the option to pursue more in-depth study outside of the major in a manner documented on their transcripts will benefit graduates as they enter a competitive, global, and diverse workforce.

1 numbered 3000 or above

• A maximum of 3 credit hours of transfer credit may be used to satisfy the course requirements for a minor. This includes courses taken at another institution or credit earned through the AP or IB program, assuming the scores meet Georgia Tech minimum standards.

• All courses counting toward the minor must be taken on a letter-grade basis and must be completed with a grade of C (2.00) or better.

• It is the major advisor’s responsibility to verify that students are using only courses from the designated block(s) from the student’s major field of study that are allowed to satisfy a minor program, that they are not using any Core Area A-E courses (including humanities and social sciences), and that they are not using any courses for more than one minor or certificate. Any free elective course used to satisfy the course requirements of the student’s major degree program may also be used to satisfy the course requirements for a minor.
Minor in Chinese

The School of Modern Languages offers minors in Chinese, French, German, Japanese, Korean, and Spanish as well as in Russian Studies. This program is designed for students who wish to develop their language skills to at least an intermediate level and to provide themselves with a greater depth than possible with a certificate program.

Students wishing to pursue one or more of these minors should declare the minor by filling out the minor change form (http://www.registrar.gatech.edu/students/formlanding/changeminor.php) with the Director of Undergraduate Studies in Modern Languages

Minor Program of Study & Guidelines (http://www.catalog.gatech.edu/academics/minors)

Modern Language Minor Information (http://www.modlangs.gatech.edu/degrees/minors-certificate)

Program of Study

Select 15 hours of Chinese electives 1,2

Total Credit Hours 15

1 Must be beyond 2001 courses in Chinese.
2 At least nine credit hours must be 3000-level or higher.

- A maximum of 9 credit hours of transfer credit may be used to satisfy the course requirements for a minor. This includes courses taken at another institution or credit earned through the AP or IB program, assuming the scores meet Georgia Tech minimum standards.
- All courses counting toward a minor must be taken on a letter-grade basis, and a grade of C or better must be received in each course.
- A maximum of 6 credit hours of Special Topics courses may be included in a minor program or the student may complete 3 credit hours of Special Topics and 3 credit hours of either Special Problems or CHIN 2699. Students may not use 6 credit hours of either Special Problems or CHIN 2699 for a minor.
- It is the major advisor's responsibility to verify that students are using only courses from the designated block(s) from the student's major field of study that are allowed to satisfy a minor program, that they are not using any Core Area A:E courses (including humanities and social sciences), and that they are not using any courses for more than one minor or certificate. Any free elective course used to satisfy the course requirements of the student's major degree program may also be used to satisfy the course requirements for a minor.

Minor in Computational Data Analysis

The Computational Data Analysis minor will provide students with the necessary mathematical and statistical background to develop and apply various data analysis techniques to real world datasets. The minor has three main objectives related to knowledge, skills, and application:

1. provide students with foundational knowledge of topics such as probability and statistics, algorithms and data structures to solve data analysis problems arising in practical applications,
2. develop students' skill in software development techniques using one or more high level programming languages relevant to data analytics,
3. enable students to effectively apply computational methods to solve exemplar data analysis problems arising in relevant applications.

Minor Program of Study & Guidelines (http://catalog.gatech.edu/academics/minors)

Program of Study

This minor must comprise at least 15 credit hours, of which at least 9 credit hours are upper-division coursework (numbered 3000 or above).

Prerequisite

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 1331</td>
<td>Intro-Object Orient Prog</td>
<td>1</td>
</tr>
</tbody>
</table>

Required Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CX 4240</td>
<td>Computing for Data Analy</td>
<td>3</td>
</tr>
<tr>
<td>CX 4242</td>
<td>Data &amp; Visual Analytics</td>
<td>3</td>
</tr>
</tbody>
</table>

Probability and Statistics

Select one of the following:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 3215</td>
<td>Probability &amp; Statistics</td>
</tr>
<tr>
<td>MATH 3225</td>
<td>Honors Prob &amp; Statistics</td>
</tr>
<tr>
<td>ECE 3077</td>
<td>Prob/Stats for ECE</td>
</tr>
<tr>
<td>ISYE 2027</td>
<td>Probability With Apps</td>
</tr>
</tbody>
</table>

Computational Methods

Select one of the following:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 4010</td>
<td>Computational Prob Solv</td>
</tr>
<tr>
<td>CS 4400</td>
<td>Intr to Database Systems</td>
</tr>
<tr>
<td>CS 4460</td>
<td>Intro Info Visualization</td>
</tr>
</tbody>
</table>

Electives

Select one of the following:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 4150</td>
<td>Genomics &amp; Appl Bioinf</td>
</tr>
<tr>
<td>CEE 3010</td>
<td>Geomatics</td>
</tr>
<tr>
<td>CS 3630</td>
<td>Intro - Perception &amp; Robotic</td>
</tr>
<tr>
<td>CS 4400</td>
<td>Intr to Database Systems</td>
</tr>
<tr>
<td>CS 4460</td>
<td>Intro Info Visualization</td>
</tr>
<tr>
<td>CS 4495</td>
<td>Computer Vision</td>
</tr>
<tr>
<td>CX 4010</td>
<td>Computational Prob Solv</td>
</tr>
<tr>
<td>CS 4803</td>
<td>Special Topics (Computational Sustainability)</td>
</tr>
<tr>
<td>EAS 4430</td>
<td>Remote Sensing &amp; Data Analy</td>
</tr>
<tr>
<td>EAS 4480</td>
<td>Environ Data Analysis</td>
</tr>
<tr>
<td>ECE 4270</td>
<td>Fund-Digital Signal Proc</td>
</tr>
<tr>
<td>ECE 4560</td>
<td>Intro - Automation &amp; Robotic</td>
</tr>
<tr>
<td>ECE 4580</td>
<td>Computer Vision</td>
</tr>
<tr>
<td>ECE 4823</td>
<td>Special Topics (Game Theory and Multi-agent Systems)</td>
</tr>
<tr>
<td>ISYE 4311</td>
<td>Capital Invest Analysis</td>
</tr>
<tr>
<td>ISYE 3232</td>
<td>Stochastic Mfg &amp; Serv Sys</td>
</tr>
<tr>
<td>MGT 4067</td>
<td>Fncl Mkts Trading &amp; Struct</td>
</tr>
<tr>
<td>MGT 4068</td>
<td>Fixed Income</td>
</tr>
<tr>
<td>PSYC 4031</td>
<td>Applied Experimental Psy</td>
</tr>
</tbody>
</table>

Total Credit Hours 15

1 CS 1331 prerequisite for the minor required (this course does NOT count toward the 15 credit hours required for minor) and a grade of A or B is required
Minor in Computing Information Internetworks

Minor in Computing

For those students majoring in disciplines other than computer science who wish to gain a deeper understanding of computing and its applications, the College of Computing offers the minor in computer science. Click here for additional information. (http://www.cc.gatech.edu)

- Computing & Media
- Computing & People
- Computing & Intelligence
- Computing & Devices
- Computing & Information Internetworks
- Computing & Systems and Architecture
- Computing & Theory

Program of Study

Prerequisite

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Prerequisite</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 1331</td>
<td>Intro-Object Orient Prog</td>
<td>1</td>
</tr>
</tbody>
</table>

Required Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 2110</td>
<td>Computer Organiz&amp;Program</td>
<td>4</td>
</tr>
<tr>
<td>CS 2200</td>
<td>Systems and Networks</td>
<td>4</td>
</tr>
</tbody>
</table>

CS Electives

Select 9 credit hours of electives, at least 6 of which are upper-division. 3

Total Credit Hours 17

1. CS 1331 prerequisite for the minor required (this course does NOT count toward the 17 credit hours required for minor) and a grade of C or B is required.

2. ECE students with credit for ECE 2035 and either ECE 2020 or ECE 2030 may substitute one CS 3000/4000 level Information Internetworks Thread course for CS 2110 and complete the minor with 16 credit hours instead of 17.

3. Numbered 3000 or above

- A CS Minor application is required.
- No Special Problems or Internship coursework may be used towards the CS minor.
- All minor courses must be completed with a grade of C or higher.
- A maximum of 6 credit hours of Special Topics courses may be included in a minor.
- A maximum of 3 credit hours of transfer credit may be used to satisfy the course requirements for a minor. This includes courses taken at another institution or credit earned through the AP or IB program, assuming the scores meet Georgia Tech minimum standards.
- It is the major advisor's responsibility to verify that students are using only courses from the designated block(s) from the student's major field of study that are allowed to satisfy a minor program, that they are not using any Core Area A-E courses (including humanities and social sciences), and that they are not using any courses for more than one minor or certificate. Any free elective course used to satisfy the course requirements of the student's major degree program may also be used to satisfy the course requirements for a minor.

Minor in Computing and Business

The Computing and Business Minor is offered by the Colleges of Computing and Business. It is a course of study that enables undergraduate students in Computing and Business to learn one another's language through innovative coursework and interdisciplinary team projects focused on solving real-world problems presented by the Program's Corporate Affiliates.

The curriculum of the Minor in Computing and Business requires the completion of 22 semester credit hours.

Computing students will gain an understanding of market forces and the financial implications of IT investments.

Business students will gain an understanding of the relationships among software infrastructure, business processes, organizational structure, and business strategies to effectively manage IT resources, as well as an understanding of the IT capabilities and constraints.

Both Computing and Business students will:

- learn how to identify and leverage emerging technologies to address market and societal needs.
- demonstrate their skills and ability to work in interdisciplinary teams by solving real business problems in capstone projects that involve a mix of Technology and Business issues.
- learn communication, teamwork, and leadership skills that will prepare them for successful careers in a technology-driven business world.

GPA Requirements

The minimum, cumulative GPA required for applicants to the Denning T&M Program is 3.0 based on a minimum of 12 hours earned at Georgia Tech. In order for accepted students to maintain their eligibility to remain in the T&M Program, they must continue to maintain a minimum, cumulative GPA of 2.9 and maintain a minimum 3.0 GPA for the classes required by the Denning T&M curriculum. All courses used to satisfy the
requirements of the minor must be taken for a letter grade; pass/fail credit is not allowed. and must be completed with the grade of C (2.00) or better.

Program of Study - Business Administration Students Track

Required Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 2316</td>
<td>Data Input/Manipulation</td>
<td>3</td>
</tr>
<tr>
<td>CS 3743</td>
<td>Emerging Technologies</td>
<td>3</td>
</tr>
<tr>
<td>CS 4005</td>
<td>Next Gen Computing Tech</td>
<td>3</td>
</tr>
<tr>
<td>CS 4057</td>
<td>Bus Process Analy&amp;Design</td>
<td>3</td>
</tr>
<tr>
<td>CS 4220</td>
<td>Embedded Systems</td>
<td>3</td>
</tr>
<tr>
<td>CS 4440</td>
<td>Database Technologies</td>
<td></td>
</tr>
<tr>
<td>CS 4741</td>
<td>Int Mgt Dev - Proj Prep</td>
<td>3</td>
</tr>
<tr>
<td>CS 4742</td>
<td>Comp &amp; Mgt Cap Proj</td>
<td>4</td>
</tr>
</tbody>
</table>

Total Credit Hours 22

Application and course descriptions are available at: http://scheller.gatech.edu/centers-initiatives/technology-management-program/index.html

Program of Study - Computer Science and Computational Media Students Track

Required Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MGT 3000</td>
<td>Financ &amp; Managerial Acct</td>
<td>3</td>
</tr>
<tr>
<td>MGT 3078</td>
<td>Finance &amp; Investments</td>
<td>3</td>
</tr>
<tr>
<td>or MGT 306 Financial Management</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MGT 3300</td>
<td>Marketing Management I</td>
<td>3</td>
</tr>
<tr>
<td>MGT 3743</td>
<td>Emerging Technologies</td>
<td>3</td>
</tr>
<tr>
<td>MGT 4057</td>
<td>Bus Process Analy&amp;Design</td>
<td>3</td>
</tr>
<tr>
<td>MGT 4741</td>
<td>Int Mgt Dev - Proj Prep</td>
<td>3</td>
</tr>
<tr>
<td>MGT 4742</td>
<td>Tech &amp; Mgt Cap Proj</td>
<td>4</td>
</tr>
</tbody>
</table>

Total Credit Hours 22

Prerequisite

CS 1331 Intro-Object Orient Prog

Required Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 2110</td>
<td>Computer Organiz&amp;Program</td>
<td>4</td>
</tr>
<tr>
<td>CS 2200</td>
<td>Systems and Networks</td>
<td>4</td>
</tr>
<tr>
<td>CS 3251</td>
<td>Computer Networking</td>
<td>3</td>
</tr>
<tr>
<td>CS 3651</td>
<td>Prototyping Intell Appl (and one CS course</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>from Devices in the Real World)</td>
<td></td>
</tr>
</tbody>
</table>

One CS 3000/4000 level course from one of the elective categories in the Devices Thread.

Total Credit Hours 17

1. CS 1331 prerequisite for the minor required (this course does NOT count toward the 17 credit hours required for minor) and a grade of A or B is required
2. ECE students with credit for ECE 2035 and either ECE 2020 or ECE 2030 may substitute one CS 3000/4000 level Intelligence Thread course for CS 2110 and complete the minor with 16 hours instead of 17.
3. Numbered 3000 or above.

- No Special Problems or Internship coursework may be used towards the CS minor.
- A grade of A or B is required for CS 1301/CS 1315/CS 1371 and CS 1331. All other minor courses must be completed with a grade of C or higher.
- Only CS courses are included in the minor.
- A maximum of 3 credit hours of transfer credit may be used to satisfy the course requirements for a minor. This includes courses taken at another institution or credit earned through the AP or IB program, assuming the scores meet Georgia Tech minimum standards.
- It is the major advisor's responsibility to verify that students are not using any courses required by name and number for their major, that they are not using any core area A-E courses (including humanities and social sciences), and that they are not using any courses for more than one minor or certificate. Free electives may be used towards minors.

Minor in Computing and Devices

Minor in Computing

For those students majoring in disciplines other than computer science who wish to gain a deeper understanding of computing and its applications, the College of Computing offers the minor in computer science. Click here for additional information. (http://www.cc.gatech.edu)

- Computing & Media
- Computing & People
- Computing & Intelligence
- Computing & Devices
- Computing & Information Internetworks
- Computing & Systems and Architecture
- Computing & Theory

Minor Program of Study & Guidelines (p. 107)
Minor in Computing and Media

Minor in Computing

For those students majoring in disciplines other than computer science who wish to gain a deeper understanding of computing and its applications, the College of Computing offers the minor in computer science. Click here for additional information. (http://www.cc.gatech.edu)

- Computing & Information Internetworks
- Computing & Systems and Architecture
- Computing & Theory

Minor Program of Study & Guidelines (p. 107)

Program of Study

The Computer Science – Intelligence track minor must comprise at least 16 semester hours of computer science coursework of which at least 9 hours must be at the 3000 level or higher.

Prerequisite

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 1331</td>
<td>Intro-Object Orient Prog ¹</td>
<td>3</td>
</tr>
</tbody>
</table>

Required Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 1332</td>
<td>Data Struct &amp; Algorithms</td>
<td>3</td>
</tr>
<tr>
<td>CS 2110</td>
<td>Computer Organiz&amp;Program</td>
<td>4</td>
</tr>
<tr>
<td>CS 3600</td>
<td>Intro-Artificial Intell</td>
<td>3</td>
</tr>
<tr>
<td>Select one CS course each from the following:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Embodied Intelligence</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Approaches to Intelligence</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

Total Credit Hours 16

¹ Prerequisite must be taken but is not included in the required 16 hours.

- CS Minor application is required.
- ECE students with credit for ECE 2035 and either ECE 2020 or ECE 2030 may substitute one CS 3000/4000 level Intelligence Thread course for CS 2110 and complete the minor with 15 hours instead of 16.
- No Special Problems or Internship coursework may be used towards the CS minor.
- A grade of A or B is required for CS 1301/CS 1315/CS 1371 and CS 1331. All other minor courses must be completed with a grade of C or higher.
- Only CS courses are included in the minor.
- It is the major advisor's responsibility to verify that students are not using any courses required by name and number for their major, that they are not using any core area A-E courses (including humanities and social sciences), and that they are not using any courses for more than one minor or certificate. Free electives may be used towards minors.
- A maximum of 3 semester hours of transfer credit may be used to satisfy the course requirements for a minor. This includes courses taken at another institution or credit earned through the AP or IB program, assuming the scores meet Georgia Tech minimum standards.

Minor in Computing and People

Minor in Computing

For those students majoring in disciplines other than computer science who wish to gain a deeper understanding of computing and its applications, the College of Computing offers the minor in computer science. Click here for additional information. (http://www.cc.gatech.edu)

- Computing & Media
- Computing & People
Program of Study

The Computing: People minor must comprise at least 15 credit hours of computer science coursework of which at least 9 credit hours must be at the 3000 level or higher.

Prerequisite

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 1331</td>
<td>Intro-Object Orient Prog</td>
<td>1</td>
</tr>
</tbody>
</table>

Required Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 1332</td>
<td>Data Struct &amp; Algorithms</td>
<td>3</td>
</tr>
<tr>
<td>CS 2340</td>
<td>Objects and Design</td>
<td>3</td>
</tr>
<tr>
<td>CS 3750</td>
<td>User Interface Design</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Select two CS courses from Human-Centered Technology.</td>
<td>6</td>
</tr>
</tbody>
</table>

Total Credit Hours: 15

1. CS 1331 prerequisite for the minor required (this course does NOT count toward the 15 credit hours required for minor) and a grade of A or B is required.

- A CS Minor application is required.
- No Special Problems or Internship coursework may be used towards the CS minor.
- A grade of A or B is required for CS 1301/CS 1315/CS 1371 and CS 1331. All other minor courses must be completed with a grade of C or higher.
- Only CS courses are included in the minor.
- A maximum of 3 credit hours of transfer credit may be used to satisfy the course requirements for a minor. This includes courses taken at another institution or credit earned through the AP or IB program, assuming the scores meet Georgia Tech minimum standards.
- It is the major advisor’s responsibility to verify that students are using only courses from the designated block(s) from the student’s major field of study that are allowed to satisfy a minor program, that they are not using any Core Area A-E courses (including humanities and social sciences), and that they are not using any courses for more than one minor or certificate. Any free elective course used to satisfy the course requirements of the student’s major degree program may also be used to satisfy the course requirements for a minor.

Minor Program of Study & Guidelines (p. 107)

Program of Study

The Computing: Systems and Architecture minor must comprise at least 17 credit hours of computer science coursework of which at least 9 hours must be at the 3000 level or higher.

Prerequisite

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 1331</td>
<td>Intro-Object Orient Prog</td>
<td>1</td>
</tr>
</tbody>
</table>

Required Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 2110</td>
<td>Computer Organiz&amp;Program</td>
<td>4</td>
</tr>
<tr>
<td>CS 2200</td>
<td>Systems and Networks</td>
<td>4</td>
</tr>
<tr>
<td>CS 3210</td>
<td>Design-Operating Systems</td>
<td>3</td>
</tr>
<tr>
<td>CS 3220</td>
<td>Processor Design</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Select one 3000-level or higher course from the following:</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Systems Software Tools</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Advanced Systems &amp; Architecture</td>
<td></td>
</tr>
</tbody>
</table>

Total Credit Hours: 17

1. CS 1331 prerequisite for the minor required (this course does NOT count toward the 17 credit hours required for minor) and a grade of A or B is required.

2. ECE students with credit for ECE 2035 and either ECE 2020 or ECE 2030 may substitute one CS 3000/4000 level Information Internetworks Thread course for CS 2110 and complete the minor with 16 credit hours instead of 17.

- A CS Minor application is required.
- No Special Problems or Internship coursework may be used towards the CS minor.
- A grade of A or B is required for CS 1301/CS 1315/CS 1371 and CS 1331. All other minor courses must be completed with a grade of C or higher.
- Only CS courses are included in the minor.
- It is the major advisor’s responsibility to verify that students are using only courses from the designated block(s) from the student’s major field of study that are allowed to satisfy a minor program, that they are not using any Core Area A-E courses (including humanities and social sciences), and that they are not using any courses for more than one minor or certificate. Any free elective course used to satisfy the course requirements of the student’s major degree program may also be used to satisfy the course requirements for a minor.
- A maximum of 3 credit hours of transfer credit may be used to satisfy the course requirements for a minor. This includes courses taken at another institution or credit earned through the AP or IB program, assuming the scores meet Georgia Tech minimum standards.
Minor in Computing and Theory

Minor in Computing

For those students majoring in disciplines other than computer science who wish to gain a deeper understanding of computing and its applications, the College of Computing offers the minor in computer science. Click here for additional information. (http://www.cc.gatech.edu)

- Computing & Media
- Computing & People
- Computing & Intelligence
- Computing & Devices
- Computing & Information Internetworks
- Computing & Systems and Architecture
- Computing & Theory

Minor Program of Study & Guidelines (p. 107)

Program of Study

The Computing: Theory minor must comprise at least 15 credit hours of computer science coursework of which at least 9 hours must be at the 3000 level or higher.

Prerequisite

CS 1331 Intro-Object Orient Prog

Required Courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 1332</td>
<td>Data Struct &amp; Algorithms</td>
<td>3</td>
</tr>
<tr>
<td>CS 2050</td>
<td>Intro Discrete Math CS</td>
<td>3</td>
</tr>
<tr>
<td>or CS 2051</td>
<td>Honors Discrete Math CS</td>
<td>3</td>
</tr>
<tr>
<td>CS 3510</td>
<td>Dsgn&amp;Analysis-Algorithms</td>
<td>3</td>
</tr>
<tr>
<td>or CS 3511</td>
<td>Algorithms Honors</td>
<td>3</td>
</tr>
<tr>
<td>CS 4510</td>
<td>Automata and Complexity</td>
<td>3</td>
</tr>
<tr>
<td>CS 4540</td>
<td>Advanced Algs</td>
<td>3</td>
</tr>
</tbody>
</table>

Total Credit Hours 15

1 CS 1331 prerequisite for the minor required (this course does NOT count toward the 15 credit hours required for minor) and a grade of A or B is required

- A CS Minor application is required.
- No Special Problems or Internship coursework may be used towards the CS minor.
- A grade of A or B is required for CS 1301/CS 1315/CS 1371 and CS 1331. All other minor courses must be completed with a grade of C or higher.
- Only CS courses are included in the minor.
- A maximum of 3 credit hours of transfer credit may be used to satisfy the course requirements for a minor. This includes courses taken at another institution or credit earned through the AP or IB program, assuming the scores meet Georgia Tech minimum standards.
- It is the major advisor's responsibility to verify that students are using only courses from the designated block(s) from the student's major field of study that are allowed to satisfy a minor program, that they are not using any Core Area A-E courses (including humanities and social sciences), and that they are not using any courses for more than one minor or certificate. Any free elective course used to satisfy the course requirements of the student's major degree program may also be used to satisfy the course requirements for a minor.

Minor in Earth and Atmospheric Sciences

The School of Earth and Atmospheric Sciences offers a minor with seven different tracks. These specific tracks are designed to give non-majors a background in the environmental and global change issues that face the world. This background both allows a broader exposure and gives a strategic background for many careers. The seven tracks are:

- Climate Change
- Earth System Physics
- Environmental Chemistry
- Environmental Science
- Geophysics
- Meteorology
- Ocean Sciences

Minor Program of Study & Guidelines (p. 107)

EAS Minor Information (http://www.eas.gatech.edu/academics/minor)

Program of Study - Climate Change Track

The EAS minor with a Climate Change track is for students in majors outside of EAS who have an interest in understanding Climate Change and Issues surrounding it. Prerequisites required for some of the classes listed below. This minor must comprise at least 15 credit hours, of which at least 9 credit hours are upper-division coursework (numbered 3000 or above).

Required Courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>EAS 2750</td>
<td>Physics of the Weather</td>
<td>3</td>
</tr>
<tr>
<td>EAS 4410</td>
<td>Climate &amp; Global Change</td>
<td>3</td>
</tr>
</tbody>
</table>

Electives

Select three electives with a minimum of 3 credit hours from each of the following areas:

EAS Electives

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>EAS 3110</td>
<td>Energy, Environ, Society</td>
<td>3</td>
</tr>
<tr>
<td>EAS 3620</td>
<td>Geochemistry</td>
<td>4</td>
</tr>
<tr>
<td>EAS 4350</td>
<td>Paleoclimate &amp; Paleocean</td>
<td>3</td>
</tr>
<tr>
<td>EAS 4655</td>
<td>Atmospheric Dynamics</td>
<td>3</td>
</tr>
<tr>
<td>EAS 4656</td>
<td>Atmos Dynamics Practicum</td>
<td>1</td>
</tr>
<tr>
<td>EAS 4670</td>
<td>Atmospheric Dynamics II</td>
<td>3</td>
</tr>
<tr>
<td>EAS 4699</td>
<td>Undergraduate Research</td>
<td>3</td>
</tr>
<tr>
<td>EAS 4740</td>
<td>Atmospheric Chemistry</td>
<td>3</td>
</tr>
</tbody>
</table>

1 A maximum of 3 credit hours of EAS 4699 may be included in the EAS minor program.

Approved Electives

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECON 2101</td>
<td>The Global Economy</td>
<td>3</td>
</tr>
</tbody>
</table>
## Program of Study - Earth System Physics

The EAS minor with an Earth System Physics track is for students in majors outside of EAS interested in applying physical and mathematical principles to environmental problems. Prerequisites required for some of the classes listed below. **This minor must comprise at least 15 semester hours, of which at least 9 semester hours are upper-division coursework (numbered 3000 or above).**

### Required Courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EAS 3610</td>
<td>Intro Geophysics</td>
<td>3</td>
</tr>
<tr>
<td>EAS 4655</td>
<td>Atmospheric Dynamics</td>
<td>3</td>
</tr>
</tbody>
</table>

### Electives

Select three of the following: 9

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>EAS 2750</td>
<td>Physics of the Weather</td>
</tr>
<tr>
<td>EAS 3603</td>
<td>Thermodynamics-Earth Sys</td>
</tr>
<tr>
<td>EAS 4312</td>
<td>Geodynamics</td>
</tr>
<tr>
<td>EAS 4331</td>
<td>Physical Volcanology</td>
</tr>
<tr>
<td>EAS 4360</td>
<td>Space Physics &amp; Instrum.</td>
</tr>
<tr>
<td>EAS 4370</td>
<td>Physics of Planets</td>
</tr>
<tr>
<td>EAS 4410</td>
<td>Climate &amp; Global Change</td>
</tr>
<tr>
<td>EAS 4450</td>
<td>Synoptic Meteorology</td>
</tr>
<tr>
<td>EAS 4470</td>
<td>Large-Scale Atmos Circ</td>
</tr>
<tr>
<td>EAS 4699</td>
<td>Undergraduate Research</td>
</tr>
</tbody>
</table>

### Total Credit Hours

15

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1 A maximum of 3 credit hours of EAS 4699 may be included in the EAS minor program.

## Program of Study - Environmental Chemistry

The EAS minor with an Environmental Chemistry track is for students in majors outside of EAS that seek to understand and address environmental problems within the context of chemical systems. Prerequisites required for some of the classes listed below. **This minor must comprise at least 15 credit hours, of which at least 9 credit hours are upper-division coursework (numbered 3000 or above).**

### Required Courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EAS 3620</td>
<td>Geochemistry</td>
<td>4</td>
</tr>
<tr>
<td>EAS 4740</td>
<td>Atmospheric Chemistry</td>
<td>3</td>
</tr>
</tbody>
</table>

### Electives

Select 11 credit hours from the following: 11

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>EAS 2600</td>
<td>Earth Processes</td>
</tr>
<tr>
<td>EAS 2750</td>
<td>Physics of the Weather</td>
</tr>
<tr>
<td>EAS 3110</td>
<td>Energy, Environ, Society</td>
</tr>
<tr>
<td>EAS 3620</td>
<td>Geochemistry</td>
</tr>
<tr>
<td>EAS 4410</td>
<td>Climate &amp; Global Change</td>
</tr>
<tr>
<td>EAS 4420</td>
<td>Environmental Field Meth</td>
</tr>
<tr>
<td>EAS 4300</td>
<td>Oceanography</td>
</tr>
<tr>
<td>EAS 4350</td>
<td>Paleoclimate &amp; Paleocene</td>
</tr>
<tr>
<td>EAS 4699</td>
<td>Undergraduate Research</td>
</tr>
<tr>
<td>EAS 4740</td>
<td>Atmospheric Chemistry</td>
</tr>
</tbody>
</table>

### Total Credit Hours

15

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1 A maximum of 3 credit hours of EAS 4699 may be included in the EAS minor program.

## Program of Study - Environmental Science

The EAS minor with an Environmental Science track is for students in majors outside of EAS who have an interest in understanding the Environment and Issues surrounding it. Prerequisites required for some of the classes listed below. **This minor must comprise at least 15 credit hours, of which at least 9 credit hours are upper-division coursework (numbered 3000 or above).**

### Required Course

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EAS 1600</td>
<td>Intro-Environmental Sci or EAS 1601 Habitable Planet</td>
<td>4</td>
</tr>
</tbody>
</table>

### Electives

Select 11 credit hours from the following: 11

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>EAS 2600</td>
<td>Earth Processes</td>
</tr>
<tr>
<td>EAS 2750</td>
<td>Physics of the Weather</td>
</tr>
<tr>
<td>EAS 3110</td>
<td>Energy, Environ, Society</td>
</tr>
<tr>
<td>EAS 3620</td>
<td>Geochemistry</td>
</tr>
<tr>
<td>EAS 4410</td>
<td>Climate &amp; Global Change</td>
</tr>
<tr>
<td>EAS 4420</td>
<td>Environmental Field Meth</td>
</tr>
<tr>
<td>EAS 4300</td>
<td>Oceanography</td>
</tr>
<tr>
<td>EAS 4350</td>
<td>Paleoclimate &amp; Paleocene</td>
</tr>
<tr>
<td>EAS 4699</td>
<td>Undergraduate Research</td>
</tr>
<tr>
<td>EAS 4740</td>
<td>Atmospheric Chemistry</td>
</tr>
</tbody>
</table>

### Total Credit Hours

15

## Program of Study - Geophysics

The EAS minor with a Geophysics track is for students in majors outside of EAS majoring in science and engineering. Prerequisites required for some of the classes listed below. **This minor must comprise at least 15 credit hours, of which at least 9 credit hours are upper-division coursework (numbered 3000 or above).**

### Required Courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EAS 2600</td>
<td>Earth Processes</td>
<td>4</td>
</tr>
<tr>
<td>EAS 3610</td>
<td>Intro Geophysics</td>
<td>3</td>
</tr>
</tbody>
</table>

### Electives

Select 8 credit hours from the following: 8

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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</thead>
<tbody>
<tr>
<td>EAS 3110</td>
<td>Energy, Environ, Society</td>
</tr>
<tr>
<td>EAS 4420</td>
<td>Environmental Field Meth</td>
</tr>
<tr>
<td>EAS 4602</td>
<td>Biogeochemical Cycles</td>
</tr>
<tr>
<td>EAS 4610</td>
<td>Earth System Modeling</td>
</tr>
<tr>
<td>EAS 4699</td>
<td>Undergraduate Research</td>
</tr>
<tr>
<td>EAS 4795</td>
<td>Groundwater Hydrology</td>
</tr>
</tbody>
</table>

### Total Credit Hours

15

---

1 A maximum of 3 credit hours of EAS 4699 may be included in the EAS minor program.
Program of Study - Meteorology

The EAS minor with a Meteorology track is for students in majors outside of EAS majoring in science and engineering. Prerequisites required for some of the classes listed below. This minor must comprise at least 15 credit hours, of which at least 9 credit hours are upper-division coursework (numbered 3000 or above).

Required Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>EAS 2551</td>
<td>Intro Met Analysis</td>
<td>1</td>
</tr>
<tr>
<td>EAS 2750</td>
<td>Physics of the Weather</td>
<td>3</td>
</tr>
<tr>
<td>EAS 4655</td>
<td>Atmospheric Dynamics</td>
<td>3</td>
</tr>
</tbody>
</table>

Electives

Select 8 credit hours from the following:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>EAS 3603</td>
<td>Thermodynamics-Earth Sys</td>
<td>3</td>
</tr>
<tr>
<td>EAS 4410</td>
<td>Climate &amp; Global Change</td>
<td>3</td>
</tr>
<tr>
<td>EAS 4450</td>
<td>Synoptic Meteorology</td>
<td>3</td>
</tr>
<tr>
<td>EAS 4460</td>
<td>Satellite &amp; Radar Met</td>
<td>1</td>
</tr>
<tr>
<td>EAS 4470</td>
<td>Large-Scale Atmos Circ</td>
<td>1</td>
</tr>
<tr>
<td>EAS 4480</td>
<td>Environ Data Analysis</td>
<td>1</td>
</tr>
<tr>
<td>EAS 4610</td>
<td>Earth System Modeling</td>
<td>1</td>
</tr>
<tr>
<td>EAS 4656</td>
<td>Atmos Dynamics Practicum</td>
<td>1</td>
</tr>
<tr>
<td>EAS 4670</td>
<td>Atmospheric Dynamics II</td>
<td>1</td>
</tr>
<tr>
<td>EAS 4699</td>
<td>Undergraduate Research</td>
<td>1</td>
</tr>
</tbody>
</table>

Total Credit Hours 15

A maximum of 3 credit hours of EAS 4699 may be included in the EAS minor program.

Program of Study - Ocean Sciences

The EAS minor with an Ocean Sciences track is for students in majors outside of EAS majoring in Biology, Civil and Environmental Engineering, Chemistry and Biochemistry, and Chemical and Biomolecular Engineering. Prerequisites required for some of the classes listed below. This minor must comprise at least 15 credit hours, of which at least 9 credit hours are upper-division coursework (numbered 3000 or above).

Required Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>EAS 4300</td>
<td>Oceanography</td>
<td>3</td>
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</tbody>
</table>

Select one of the following:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>EAS 1600</td>
<td>Intro-Environmental Sci</td>
<td>1</td>
</tr>
<tr>
<td>EAS 1601</td>
<td>Habitable Planet</td>
<td>1</td>
</tr>
<tr>
<td>EAS 2600</td>
<td>Earth Processes</td>
<td>1</td>
</tr>
</tbody>
</table>

Electives

Select 8 credit hours from the following:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>EAS 3620</td>
<td>Geochemistry</td>
<td>3</td>
</tr>
<tr>
<td>EAS 4350</td>
<td>Paleoclim &amp; Paleoccean</td>
<td>3</td>
</tr>
<tr>
<td>EAS 4410</td>
<td>Climate &amp; Global Change</td>
<td>3</td>
</tr>
<tr>
<td>EAS 4420</td>
<td>Environmental Field Meth</td>
<td>3</td>
</tr>
<tr>
<td>EAS 4480</td>
<td>Environ Data Analysis</td>
<td>3</td>
</tr>
<tr>
<td>EAS 4610</td>
<td>Earth System Modeling</td>
<td>3</td>
</tr>
<tr>
<td>EAS 4655</td>
<td>Atmospheric Dynamics</td>
<td>3</td>
</tr>
<tr>
<td>EAS 4699</td>
<td>Undergraduate Research</td>
<td>1</td>
</tr>
</tbody>
</table>

Total Credit Hours 15

A maximum of 3 credit hours of EAS 4699 may be included in the EAS minor program.

Minor in East Asian Studies

The Minor in East Asian Studies is comprised of courses in history, political science, economics, languages, media, cinema, and literature. The interdisciplinary Ivan Allen College East Asian Studies minor connects study of China, Japan, and Korea and of Southeast Asia. East Asia plays a significant role in world politics and the global economy, and study of the region should be an integral part of a contemporary education. Through interdisciplinary study of history, politics, economics, literature, media, and languages in the regions of East Asia, and to a lesser extent Southeast Asia, students engage in comparative study of societies and values. This minor (jointly administered by Modern Languages and Literature, Media, and Communication) is designed for undergraduates who will enter a wide range of careers (engineering, science, business, public service, law, teaching, research, etc.).

Minor Program of Study & Guidelines (http://catalog.gatech.edu/academics/minors)

Program of Study

Required Courses

Select 12 credit hours from the approved list. 12

Select at least one CHIN/JAPN/KOR course from the approved list. 3

Total Credit Hours 15

Approved Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
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<td>Traditional Asia</td>
<td>3</td>
</tr>
<tr>
<td>HTS 2062</td>
<td>Asia in the Modern World</td>
<td>3</td>
</tr>
<tr>
<td>HTS 3061</td>
<td>Modern China</td>
<td>3</td>
</tr>
<tr>
<td>HTS 3062</td>
<td>Modern Japan</td>
<td>3</td>
</tr>
<tr>
<td>HTS 4061</td>
<td>Seminar in Asian History</td>
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</tr>
<tr>
<td>INTA 2100</td>
<td>Great Power Relations</td>
<td>3</td>
</tr>
<tr>
<td>INTA 2230</td>
<td>Govt &amp; Politics of Asia</td>
<td>3</td>
</tr>
<tr>
<td>INTA 3101</td>
<td>Int'l Institutions (Asia)</td>
<td>3</td>
</tr>
<tr>
<td>INTA 3130</td>
<td>Foreign Policy of China</td>
<td>3</td>
</tr>
<tr>
<td>Course Code</td>
<td>Course Title</td>
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</tr>
<tr>
<td>-------------</td>
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</tr>
<tr>
<td>INTA 3131</td>
<td>Pacific Security Issues</td>
<td></td>
</tr>
<tr>
<td>INTA 3230</td>
<td>Gov’t &amp; Politics-China</td>
<td></td>
</tr>
<tr>
<td>INTA 3231</td>
<td>Gov’t &amp; Politics-Japan</td>
<td></td>
</tr>
<tr>
<td>INTA 3330</td>
<td>Political Economy-China</td>
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<td>INTA 3331</td>
<td>Political Economy-Japan</td>
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<tr>
<td>INTA 4050</td>
<td>Int’l Affair&amp;Tech Policy (Asia)</td>
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<tr>
<td>INTA 4101</td>
<td>Vietnam War Politics</td>
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<tr>
<td>INTA 4330</td>
<td>Chinese Economic Reform (co-taught)</td>
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<tr>
<td>INTA 4332</td>
<td>Chinese Institutions (co-taught)</td>
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<tr>
<td>INTA 4333</td>
<td>Korean Security Policy</td>
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</tr>
<tr>
<td>INTA 4743</td>
<td>Japan Society &amp; Politics</td>
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</tr>
<tr>
<td>INTA 4500</td>
<td>INTA Pro-Seminar</td>
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</tr>
<tr>
<td>LMC 3256</td>
<td>Major Filmmakers</td>
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<tr>
<td>LMC 3257</td>
<td>Global Cinema</td>
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<tr>
<td>CHIN 3004</td>
<td>Advanced Chinese I</td>
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<tr>
<td>CHIN 3021</td>
<td>Chin Society &amp; Culture I</td>
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<tr>
<td>CHIN 3022</td>
<td>Chin Society &amp; Culture II</td>
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<td>CHIN 3691</td>
<td>Chinese Current Events</td>
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<tr>
<td>CHIN 3692</td>
<td>Business Chinese</td>
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<tr>
<td>CHIN 3696</td>
<td>Eco Dev &amp; Sustainability</td>
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<tr>
<td>CHIN 4003</td>
<td>Advanced Chinese II</td>
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</tr>
<tr>
<td>CHIN 4004</td>
<td>Advanced Chinese III</td>
<td></td>
</tr>
<tr>
<td>CHIN 4006</td>
<td>Intercultural Communictn</td>
<td></td>
</tr>
<tr>
<td>CHIN 4021</td>
<td>Adv Lang Music &amp; Culture</td>
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</tr>
<tr>
<td>CHIN 4022</td>
<td>Kungfu Fiction/Pop Cul</td>
<td></td>
</tr>
<tr>
<td>CHIN 4031</td>
<td>Chin-Language Cinema</td>
<td></td>
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<tr>
<td>CHIN 4500</td>
<td>Intercultural Seminar</td>
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<tr>
<td>JAPN 3691</td>
<td>Tech &amp; Scientific Jap</td>
<td></td>
</tr>
<tr>
<td>JAPN 3692</td>
<td>Business Japanese</td>
<td></td>
</tr>
<tr>
<td>JAPN 3693</td>
<td>Japan Today</td>
<td></td>
</tr>
<tr>
<td>JAPN 4113</td>
<td>Adv Reading &amp; Listening</td>
<td></td>
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<tr>
<td>JAPN 4123</td>
<td>Tech&amp;Bus Jpn Translation</td>
<td></td>
</tr>
<tr>
<td>JAPN 4163</td>
<td>Jpn Literature Culture</td>
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<tr>
<td>JAPN 4165</td>
<td>Crit Rdgs Jpn Cult/Arts</td>
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<tr>
<td>JAPN 4173</td>
<td>Anime: Culture&amp;Society</td>
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<tr>
<td>JAPN 4185</td>
<td>JAPN Cul/Soc Thru Songs</td>
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</tr>
<tr>
<td>JAPN 4500</td>
<td>Intercultural Seminar</td>
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<tr>
<td>JAPN 4743</td>
<td>Japan Society &amp; Politics</td>
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<tr>
<td>JAPN 4750</td>
<td>Jpn Discourse &amp; Grammar</td>
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<td>KOR 3693</td>
<td>Exploring Modern Korea</td>
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<td>KOR 4001</td>
<td>Contemporary Korean</td>
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</tr>
<tr>
<td>KOR 4002</td>
<td>Select Rdngs Of Mod Kor</td>
<td></td>
</tr>
</tbody>
</table>

1 Only Asia-focused versions of INTA 3101, INTA 3131, and INTA 4050 (i.e. sections taught in the INTA Southeast Asia Study Abroad Program) will count towards the East Asian Studies minor.

2 Only these versions of LMC 3256 and LMC 3257 (East Asian Auteurs and Chinese Martial Arts Cinema) can be presented for minor credit.

• The multidisciplinary East Asian Studies minor must consist of 15 credit hours of which at least 9 credit hours are upper-division coursework (numbered 3000 or above) from the approved list on the following page.

• Courses must be taken from at least two schools in the Ivan Allen College. At least one course presented for the minor must be a Chinese, Japanese, or Korean course offered by the School of Modern Languages from the list provided below or approved by a co-coordinator. With the approval of a co-coordinator, a student may count one course taken outside Ivan Allen College of Liberal Arts toward the minor; if approved by a co-coordinator, this course may be taken at another university.

• A multidisciplinary or other minor may contain courses in a student’s major field of study. A maximum of 6 credit hours of such courses may be used to satisfy the course requirements for the minor, provided these courses are not also used to satisfy any course requirement in the student’s major degree program.

• A maximum of 6 credit hours of Special Topics courses may be included in a minor program or the student may complete 3 credit hours of Special Topics and 3 credit hours of either Special Problems or Undergraduate Research. Students may not use 6 credit hours of either Special Problems or Undergraduate Research for a minor.

• A maximum of 3 credit hours of transfer credit may be used to satisfy the course requirements for a minor. This includes courses taken at another institution or credit earned through the AP or IB program, assuming the scores meet Georgia Tech minimum standards.

• All courses counting toward the minor must be taken on a letter-grade basis and must be completed with a grade of C (2.00) or better.

• It is the major advisor’s responsibility to verify that students are using only courses from the designated block(s) from the student’s major field of study that are allowed to satisfy a minor program, that they are not using any Core Area A-E courses (including humanities and social sciences), and that they are not using any courses for more than one minor or certificate. Any free elective course used to satisfy the course requirements of the student’s major degree program may also be used to satisfy the course requirements for a minor.

**Minor in Economics**

The School of Economics offers a Minor in Economics for students in all disciplines at Georgia Tech. The minor program provides a general acquaintance with economic thought and is especially valuable for students considering graduate work in law or management. It should also be attractive to students who wish to broaden their education and to understand the forces that shape the modern world.

Minor Program of Study & Guidelines (http://catalog.gatech.edu/academics/minors)

**Program of Study**

Select 15 credit hours of Economics courses 1

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>JAPN 4500</td>
<td>Intercultural Seminar</td>
</tr>
<tr>
<td>JAPN 4743</td>
<td>Japan Society &amp; Politics</td>
</tr>
<tr>
<td>JAPN 4750</td>
<td>Jpn Discourse &amp; Grammar</td>
</tr>
<tr>
<td>KOR 3693</td>
<td>Exploring Modern Korea</td>
</tr>
<tr>
<td>KOR 4001</td>
<td>Contemporary Korean</td>
</tr>
<tr>
<td>KOR 4002</td>
<td>Select Rdngs Of Mod Kor</td>
</tr>
</tbody>
</table>

1 Nine credit hours must be upper-division coursework (numbered 3000 or above).

• A maximum of 4 credit hours of Special Topics may be included in the Economics minor. Special Problems may not be included in the Economics minor.

• A maximum of 3 credit hours of transfer credit may be used to satisfy the course requirements for a minor. This includes courses taken at another institution or credit earned through the AP or IB program, assuming the scores meet Georgia Tech minimum standards.
• All courses counting toward the minor must be taken on a letter-grade basis and must be completed with a grade of C (2.00) or better.
• It is the major advisor’s responsibility to verify that students are using only courses from the designated block(s) from the student’s major field of study that are allowed to satisfy a minor program, that they are not using any Core Area A-E courses (including humanities and social sciences), and that they are not using any courses for more than one minor or certificate. Any free elective course used to satisfy the course requirements of the student’s major degree program may also be used to satisfy the course requirements for a minor.

Minor in Energy Systems

The Energy Systems Minor provides students a 15-hour multidisciplinary educational opportunity to study energy systems. The minor includes courses which provide depth in an area relevant to energy that is within the scope of the student’s chosen program. Depth course options available to students may vary depending on the program. Appropriate courses are selected by program faculty to meet the needs of their students. The minor also includes requirements for courses which cut across disciplines. These courses are intended to add breadth of knowledge in areas outside the student’s major but important to energy systems. A terminal “capstone” or project course provides an opportunity for students from multiple disciplines to work together in multidisciplinary teams on a significant project in the energy area. Appropriate projects are either solicited from industry or faculty experts.

The minor is open to all Georgia Tech undergraduate students whose majors have approved the minor. The breadth courses and the capstone project course, courses taken by all students completing the minor, require one or more pre-requisites; specifically, basic economics, mathematics, and lab science courses.

Minor Program of Study & Guidelines (http://catalog.gatech.edu/academics/minors)

The minor includes requirements for courses which cut across disciplines. These courses are intended to add breadth of knowledge in areas outside the student’s major but important to energy systems. A terminal “capstone” or project course provides an opportunity for students from multiple disciplines to work together in multidisciplinary teams on a significant project in the energy area.

The breadth courses and the capstone project course, courses taken by all students completing the minor, require one or more pre-requisites; specifically, basic economics, mathematics, and lab science courses. The minor must consist of at least 15 credit hours and all courses in the minor also must be 3000 level and above.

A multidisciplinary or other minor may contain courses in a student’s major field of study. A maximum of 6 credit hours of such courses may be used to satisfy the course requirements for the minor, provided these courses are not also used to satisfy any course requirement in the student’s major degree program.

All courses counting toward the minor must be taken on a letter-grade basis and completed with an overall grade-point average of at least 2.00.

All courses in the minor also must be 3000 level and above.

Program of Study - Track for Aerospace Engineering Students

Prerequisite Courses

Students ordinarily pursue the minor upon completion of the needed prerequisites. However, the depth course requirements may be taken as soon as students have met the relevant prerequisites.

The prerequisites needed for one or more of the courses required for the minor (breadth courses and the capstone project course) are (all existing courses):

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 1551</td>
<td>Differential Calculus</td>
<td>2</td>
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<tr>
<td>MATH 1553</td>
<td>Intro to Linear Algebra</td>
<td>2</td>
</tr>
<tr>
<td>MATH 1552</td>
<td>Integral Calculus</td>
<td>4</td>
</tr>
<tr>
<td>MATH 2551</td>
<td>Multivariable Calculus</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 2211</td>
<td>Intro Physics I</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 2212</td>
<td>Intro Physics II</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 1310</td>
<td>General Chemistry</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 1211K</td>
<td>Chemical Principles I</td>
<td></td>
</tr>
<tr>
<td>ECON 2100</td>
<td>Economics and Policy</td>
<td>3-6</td>
</tr>
<tr>
<td>ECON 2105</td>
<td>Prin of Macroeconomics</td>
<td></td>
</tr>
<tr>
<td>ECON 2111</td>
<td>Prin of Microeconomics</td>
<td></td>
</tr>
</tbody>
</table>

Requirements

Depth Courses

Select 6 credit hours related to energy systems: 1 6

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit</th>
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</thead>
<tbody>
<tr>
<td>AE 4701</td>
<td>Wind Engineering</td>
<td></td>
</tr>
<tr>
<td>AE 4370</td>
<td>Life Cycle Cost Analysis</td>
<td></td>
</tr>
<tr>
<td>NRE 3208</td>
<td>Nuclear Reactor Phys I</td>
<td></td>
</tr>
<tr>
<td>NRE 3301</td>
<td>Radiation Physics</td>
<td></td>
</tr>
<tr>
<td>AE 4461</td>
<td>Intro to Combustion</td>
<td></td>
</tr>
</tbody>
</table>

Breadth Courses

Select two of the following: 2 6

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECON 3300</td>
<td>Intl Energy Markets</td>
<td></td>
</tr>
<tr>
<td>PUBP 3350</td>
<td>Energy Policy</td>
<td></td>
</tr>
<tr>
<td>CHEM 3700</td>
<td>Alternative Energy</td>
<td></td>
</tr>
</tbody>
</table>

Capstone Course

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>GT 4813</td>
<td>Proj In Energy Systems</td>
<td>3</td>
</tr>
</tbody>
</table>

Total Credit Hours 15
• The Depth Courses may have additional prerequisites; please check the current prerequisites (p. 72).
• A list of acceptable courses which meet the depth requirement is provided by each major approving the minor. Depth courses may be taken in the student’s major to ensure the depth in that major needed to peruse a multidisciplinary minor. All acceptable depth courses must be consistent with the goals of the minor. Examples of acceptable courses include engineering courses covering a specific energy technology like solar or relevant engineering science.

2 Students should strive to complete the necessary prerequisites and the depth courses prior to enrolling in the breadth courses. However, depth courses may be taken concurrently with the courses taken to meet the breadth requirement.
• Breadth courses may ordinarily serve as technical or free electives in the student’s program of study. However, courses required by name and number and/or used to satisfy Core Areas A through E cannot be used to satisfy the requirements of a minor.

3 Ordinarily, students must complete all minor requirements before they can register for the Project in Energy Systems course.

Program of Study - Track for Chemical and Biomolecular Engineering Students

Prerequisite Courses

Students ordinarily pursue the minor upon completion of the needed prerequisites. However, the depth course requirements may be taken as soon as students have met the relevant prerequisites.

The prerequisites needed for one or more of the courses required for the minor (breadth courses and the capstone project course) are (all existing courses):

Mathematics

MATH 1551 Differential Calculus 2
MATH 1553 Intro to Linear Algebra 2
or MATH 1552 Linear Algebra
MATH 1552 Integral Calculus 4
MATH 2551 Multivariable Calculus 4

Physics

PHYS 2211 Intro Physics I 4
PHYS 2212 Intro Physics II 4

Chemistry

CHEM 1310 General Chemistry 4
or CHEM 12 Chemical Principles I

Economics

Select one of the following: 3-6
ECON 2100 Economics and Policy
or ECON 2105 Prin of Macroeconomics
& ECON 2106 Prin of Microeconomics

Requirements

Depth Courses

Select 6 credit hours related to energy systems: 1
CHBE 4020 Chem Eng-Nanoscale Sys
CHBE 4310 Bioprocess Engineering
CHBE 4760 Biocatalysis

Program of Study - Track for Civil and Environmental Engineering Students

Prerequisite Courses

Students ordinarily pursue the minor upon completion of the needed prerequisites. However, the depth course requirements may be taken as soon as students have met the relevant prerequisites.

The prerequisites needed for one or more of the courses required for the minor (breadth courses and the capstone project course) are (all existing courses):

Mathematics

MATH 1551 Differential Calculus 2
MATH 1553 Intro to Linear Algebra 2
or MATH 1552 Linear Algebra
MATH 1552 Integral Calculus 4
MATH 2551 Multivariable Calculus 4

Physics

PHYS 2211 Intro Physics I 4
PHYS 2212 Intro Physics II 4

Chemistry

CHEM 1310 General Chemistry 4
or CHEM 12 Chemical Principles I

Economics

Select one of the following: 3-6
ECON 2100 Economics and Policy
or ECON 2105 Prin of Macroeconomics
& ECON 2106 Prin of Microeconomics
Requirements

Depth Courses
Select 6 credit hours related to energy systems: 1 6
AE 4370 Life Cycle Cost Analysis 3
CEE 3430 Intro to Environmental Science 3
CEE 4450 Renewable Energy & Resources Management 3
CEE 4803 Energy Systems Analysis 3
EAS 3100 Energy, Environment, and Society 3
EAS 4410 Climate Change and Global Change 3

Breadth Courses
Select two of the following: 2 6
ECON 3300 Energy Policy
CHEM 3700 Alternative Energy

Capstone Course
GT 4813 Proj in Energy Systems 3 3

Total Credit Hours 30

1 The Depth Courses may have additional prerequisites; please check the current prerequisites (p. 72).
2 A list of acceptable courses which meet the depth requirement is provided by each major approving the minor. Depth courses may be taken in the student's major to ensure the depth in that major needed to pursue a multidisciplinary minor. All acceptable depth courses must be consistent with the goals of the minor. Examples of acceptable courses include engineering courses covering a specific energy technology like solar or relevant engineering science.

2 Students should strive to complete the necessary prerequisites and the depth courses prior to enrolling in the breadth courses. However, depth courses may be taken concurrently with the courses taken to meet the breadth requirement.

3 Breadth courses may ordinarily serve as technical or free electives in the student's program of study. However, courses required by name and number and/or approved by each major approving the minor. Depth courses may be taken in the student's major to ensure the depth in that major needed to pursue a multidisciplinary minor. All acceptable depth courses must be consistent with the goals of the minor. Examples of acceptable courses include engineering courses covering a specific energy technology like solar or relevant engineering science.

Ordinarily, students must complete all minor requirements before they can register for the Project in Energy Systems course.

Program of Study - Track for Electrical and Computer Engineering Students
Prerequisite Courses
Students ordinarily pursue the minor upon completion of the needed prerequisites. However, the depth course requirements may be taken as soon as students have met the relevant prerequisites.

The prerequisites needed for one or more of the courses required for the minor (breadth courses and the capstone project course) are (all existing courses):

Mathematics
MATH 1551 Differential Calculus 2
MATH 1553 Intro to Linear Algebra 2
or MATH 155 Linear Algebra
MATH 1552 Integral Calculus 4
MATH 2551 Multivariable Calculus 4
Physics
PHYS 2211 Intro Physics I 4
PHYS 2212 Intro Physics II 4
Chemistry
CHEM 1310 General Chemistry 4
or CHEM 120 Chemical Principles I
Economics
Select one of the following: 3-6
ECON 2100 Economics and Policy
or ECON 2100 Global Economy
ECON 2105 and Prin of Microeconomics

Requirements

Depth Courses
Select 6 credit hours of depth courses related to energy systems: 1 6
ECE 3070 Elec Energy Conversion 2
ECE 3071 Electric Energy Systems 2
ECE 4320 Power Sys Analy & Control
ECE 4321 Power System Engineering
ECE 4325 Electric Power Quality
ECE 4330 Power Electronics
ECE 4335 Elec Machinery Analysis
NRE 3208 Nuclear Reactor Phys I
NRE 3301 Radiation Physics

Breadth Courses
Select two of the following: 3 6
ECON 3300 Int'l Energy Markets
PUBP 3350 Energy Policy
CHEM 3700 Alternative Energy

Capstone Course
GT 4813 Proj in Energy Systems 4 3

Total Credit Hours 15

1 The Depth Courses may have additional prerequisites; please check the current prerequisites (p. 72).
2 A list of acceptable courses which meet the depth requirement is provided by each major approving the minor. Depth courses may be taken in the student's major to ensure the depth in that major needed to pursue a multidisciplinary minor. All acceptable depth courses must be consistent with the goals of the minor. Examples of acceptable courses include engineering courses covering a specific energy technology like solar or relevant engineering science.

Ordinarily, students must complete all minor requirements before they can register for the Project in Energy Systems course.

2 If used for EE Breadth credit, ECE 3070 and ECE 3071 cannot be used for this minor.

3 Students should strive to complete the necessary prerequisites and the depth courses prior to enrolling in the breadth courses. However, depth courses may be taken concurrently with the courses taken to meet the breadth requirement.

• Breadth courses may ordinarily serve as technical or free electives in the student's program of study. However, courses required by name and number and/or approved by each major approving the minor. Depth courses may be taken in the student's major to ensure the depth in that major needed to pursue a multidisciplinary minor. All acceptable depth courses must be consistent with the goals of the minor. Examples of acceptable courses include engineering courses covering a specific energy technology like solar or relevant engineering science.

• Any course on this list that is taken for ECE elective, engineering elective, or approved elective credit can count for this minor.
Ordinarily, students must complete all minor requirements before they can register for the Project in Energy Systems course.

Program of Study - Track for Industrial and Systems Engineering Students

Prerequisite Courses

Students ordinarily pursue the minor upon completion of the needed prerequisites. However, the depth course requirements may be taken as soon as students have met the relevant prerequisites.

The prerequisites needed for one or more of the courses required for the minor (breadth courses and the capstone project course) are (all existing courses):

<table>
<thead>
<tr>
<th>Mathematics</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 1551</td>
<td>Differential Calculus 2</td>
</tr>
<tr>
<td>MATH 1553</td>
<td>Intro to Linear Algebra 2</td>
</tr>
<tr>
<td>or MATH 1554</td>
<td>Linear Algebra</td>
</tr>
<tr>
<td>MATH 1552</td>
<td>Integral Calculus 4</td>
</tr>
<tr>
<td>MATH 2551</td>
<td>Multivariable Calculus 4</td>
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<table>
<thead>
<tr>
<th>Physics</th>
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</thead>
<tbody>
<tr>
<td>PHYS 2211</td>
<td>Intro Physics I 4</td>
</tr>
<tr>
<td>PHYS 2212</td>
<td>Intro Physics II 4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chemistry</th>
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</thead>
<tbody>
<tr>
<td>CHEM 1310</td>
<td>General Chemistry 4</td>
</tr>
<tr>
<td>or CHEM 121</td>
<td>Chemical Principles I</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Economics</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Select one of the following: 3-6</td>
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</tr>
<tr>
<td>ECON 2100</td>
<td>Economics and Policy</td>
</tr>
<tr>
<td>or ECON 211</td>
<td>Global Economy</td>
</tr>
<tr>
<td>ECON 2105</td>
<td>Prin of Macroeconomics</td>
</tr>
<tr>
<td>&amp; ECON 211</td>
<td>Cand Prin of Microeconomics</td>
</tr>
</tbody>
</table>

Requirements

Depth Courses

Select 6 credit hours of depth courses related to energy systems: 1

| AE/ME 4701 | Wind Engineering |
| ECE 3072   | Elec Energy Systems |
| ISYE 4803  | Special Topics (Energy and Environment) |
| ME 4011    | IC Engines |
| ME 4325    | Intro Fuel Cell Systems |
| ME 4823    | Special Topics (Mechatronic sys in Hybrid-electric power trains) |
| ME 4171    | Environmental Dsgn & Mfg |
| ME 4172    | Dsgn Sustainable Eng Sys |
| ME 4803    | Special Topics-Mech Engr (Thermal Systems Engineering) |
| NRE 4610   | Plasma Phys& Fusion Engr |

Breadth Courses

Select two of the following: 2

| CHEM 3700   | Alternative Energy |
| EAS 4410    | Climate & Global Change |
| ECON 2100   | Economics and Policy |
| or ECON 211 | Global Economy |

Program of Study - Track for Mechanical Engineering Students

Prerequisite Courses

Students ordinarily pursue the minor upon completion of the needed prerequisites. However, the depth course requirements may be taken as soon as students have met the relevant prerequisites.

The prerequisites needed for one or more of the courses required for the minor (breadth courses and the capstone project course) are (all existing courses):

<table>
<thead>
<tr>
<th>Mathematics</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 1551</td>
<td>Differential Calculus 2</td>
</tr>
<tr>
<td>MATH 1553</td>
<td>Intro to Linear Algebra 2</td>
</tr>
<tr>
<td>or MATH 1554</td>
<td>Linear Algebra</td>
</tr>
<tr>
<td>MATH 1552</td>
<td>Integral Calculus 4</td>
</tr>
<tr>
<td>MATH 2551</td>
<td>Multivariable Calculus 4</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Physics</th>
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</thead>
<tbody>
<tr>
<td>PHYS 2211</td>
<td>Intro Physics I 4</td>
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<tr>
<td>PHYS 2212</td>
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</thead>
<tbody>
<tr>
<td>CHEM 1310</td>
<td>General Chemistry 4</td>
</tr>
<tr>
<td>or CHEM 121</td>
<td>Chemical Principles I</td>
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<table>
<thead>
<tr>
<th>Economics</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Select one of the following: 3-6</td>
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</tr>
<tr>
<td>ECON 2100</td>
<td>Economics and Policy</td>
</tr>
<tr>
<td>or ECON 211</td>
<td>Global Economy</td>
</tr>
</tbody>
</table>
Requirements

Depth Courses
Select 6 credit hours related to energy systems: \(^1\)
- ME 4011 IC Engines
- ME 4315 Energy Systems Analy&Dgn
- ME 4325 Intro Fuel Cell Systems
- ME 4321 Refrigeration & Air Cond
- ME 4823 Special Topics (Mechatronic Systems in Hybrid-Electric Powertrains)
- ME 4823 Special Topics (Renewable Energy Systems)
- ME 4171 Environmental Dsgn & Mfg
- ME 4172 Dsgn Sustainable Eng Sys
- ME 4701 Wind Engineering
- ECE 3071 Electric Energy Systems
- NRE 3208 Nuclear Reactor Phys I
- NRE 4214 Reactor Engineering
- NRE 4610 Plasma Phys& Fusion Engr

Breadth Courses \(^2\)
- CHEM 3700 Alternative Energy
- ECON 3300 Intl Energy Markets
- or PUBP 33 Energy Policy

Capstone Course
- GT 4813 Proj In Energy Systems \(^3\)

Total Credit Hours 15

\(^1\) The Depth Courses may have additional prerequisites; please check the current prerequisites (p. 72).

\(^2\) Students should strive to complete the necessary prerequisites and the depth courses prior to enrolling in the breadth courses. However, depth courses may be taken concurrently with the courses taken to meet the breadth requirement.

\(^3\) Ordinarily, students must complete all minor requirements before they can register for the Project in Energy Systems course.

Program of Study - Track for Economics (including EIA, and GEML) Students

Prerequisite Courses
Students ordinarily pursue the minor upon completion of the needed prerequisites. However, the depth course requirements may be taken as soon as students have met the relevant prerequisites.

The prerequisites needed for one or more of the courses required for the minor (breadth courses and the capstone project course) are (all existing courses):

Mathematics
- MATH 1551 Differential Calculus 2
- MATH 1553 Intro to Linear Algebra 
  or MATH 1554 Linear Algebra
- MATH 1552 Integral Calculus 4
- MATH 2551 Multivariable Calculus 4

Physics
- PHYS 2211 Intro Physics I 4
- PHYS 2212 Intro Physics II 4

Chemistry
- CHEM 1310 General Chemistry 4
  or CHEM 12 Chemical Principles I

Economics
Select one of the following: 3-6
- ECON 2100 Economics and Policy
- or ECON 21 Global Economy
- ECON 2105 Prin of Macroeconomics
  & ECON 21and Prin of Microeconomics

Requirements

Depth Courses \(^1\)
- ECON 4440 Economics of Environment 3
- ECON 4340 Industrial Organization 3

Breadth Courses
Select 6 credit hours from the following: \(^2\)
- ME 3700 Intro Energy Systems EGR
- PUBP 3350 Energy Policy
- CHEM 3700Alternative Energy

Capstone Course
- GT 4813 Proj In Energy Systems \(^3\)

Total Credit Hours 15

\(^1\) The Depth Courses may have additional prerequisites; please check the current prerequisites (p. 72).

\(^2\) A list of acceptable courses which meet the depth requirement is provided by each major approving the minor. Depth courses may be taken in the student's major to ensure the depth in that major needed to perform a multidisciplinary minor. All acceptable depth courses must be consistent with the goals of the minor. Examples of acceptable courses include engineering courses covering a specific energy technology like solar or relevant engineering science.

\(^3\) Ordinarily, students must complete all minor requirements before they can register for the Project in Energy Systems course.
Program of Study - Track for Public Policy Students

Prerequisite Courses

Students ordinarily pursue the minor upon completion of the needed prerequisites. However, the depth course requirements may be taken as soon as students have met the relevant prerequisites.

The prerequisites needed for one or more of the courses required for the minor (breadth courses and the capstone project course) are (all existing courses):

Mathematics
- MATH 1551 Differential Calculus 2
- MATH 1553 Intro to Linear Algebra 2
- or MATH 1554 Linear Algebra
- MATH 1552 Integral Calculus 4
- MATH 2551 Multivariable Calculus 4

Physics
- PHYS 2211 Intro Physics I 4
- PHYS 2212 Intro Physics II 4

Chemistry
- CHEM 1310 General Chemistry 4
- or CHEM 1211K Chemical Principles I

Economics
Select one of the following: 3-6
- ECON 2100 Economics and Policy
- or ECON 2110 Global Economy
- ECON 2105 Prin of Macroeconomics
  & ECON 2120 Prin of Microeconomics

Requirements

Depth Courses
Select 6 credit hours of depth courses related to energy systems: 1
- PUBP 3315 Environ Policy & Politics
- PUBP 3600 Sustain, Tech & Policy
- PHIL 4176 Environmental Ethics
- PUBP 4440 Sci Tech & Regulation

Breadth Courses
Select 6 credit hours from the following: 2
- ME 3700 Intro Energy Systems EGR
- ECON 3300 Intl Energy Markets
- CHEM 3700 Alternative Energy

Capstone Course
GT 4813 Proj in Energy Systems 3

Total Credit Hours 15

2 Students should strive to complete the necessary prerequisites and the depth courses prior to enrolling in the breadth courses. However, depth courses may be taken concurrently with the courses taken to meet the breadth requirement.
- Breadth courses may ordinarily serve as technical or free electives in the student’s program of study. However, courses required by name and number and/or used to satisfy Core Areas A through E cannot be used to satisfy the requirements of a minor.

Ordinarily, students must complete all minor requirements before they can register for the Project in Energy Systems course.

Program of Study - Track for Biology Students

Prerequisite Courses

Students ordinarily pursue the minor upon completion of the needed prerequisites. However, the depth course requirements may be taken as soon as students have met the relevant prerequisites.

The prerequisites needed for one or more of the courses required for the minor (breadth courses and the capstone project course) are (all existing courses):

Mathematics
- MATH 1551 Differential Calculus 2
- MATH 1553 Intro to Linear Algebra 2
- or MATH 1554 Linear Algebra
- MATH 1552 Integral Calculus 4
- MATH 2551 Multivariable Calculus 4

Physics
- PHYS 2211 Intro Physics I 4
- PHYS 2212 Intro Physics II 4

Chemistry
- CHEM 1310 General Chemistry 4
- or CHEM 1211K Chemical Principles I

Economics
Select one of the following: 3-6
- ECON 2100 Economics and Policy
- or ECON 2110 Global Economy
- ECON 2105 Prin of Macroeconomics
  & ECON 2120 Prin of Microeconomics

Requirements

Depth Courses
Select 6 credit hours of depth courses related to energy systems: 1
- BIOL 4221 Biological Oceanography
- BIOL 4410 Microbial Ecology
- BIOL 4418 Microbial Physiology
- BIOL 4440 Plant Physiology
- CHEM 3511 Survey of Biochemistry
- CHEM 4511 Biochemistry I
- CHEM 4512 Biochemistry II
- EAS 4410 Climate & Global Change
- EAS 3110 Energy, Environ, Society

Breadth Courses

1 The Depth Courses may have additional prerequisites; please check the current prerequisites (p. 72).
- A list of acceptable courses which meet the depth requirement is provided by each major approving the minor. Depth courses may be taken in the student’s major to ensure the depth in that major needed to pursue a multidisciplinary minor. All acceptable depth courses must be consistent with the goals of the minor. Examples of acceptable courses include economics courses covering economic analysis of complex systems.
Select 6 credit hours from the following: $^2$ 6

- ME 3700 Intro Energy Systems EGR
- ECON 3300 Intl Energy Markets
- PUBP 3350 Energy Policy

**Capstone Course**

GT 4813 Proj In Energy Systems $^3$ 3

**Total Credit Hours** 15

1. The Depth Courses may have additional prerequisites; please check the current prerequisites (p. 72).
2. A list of acceptable courses which meet the depth requirement is provided by each major approving the minor. Depth courses may be taken in the student's major to ensure the depth in that major needed to pursue a multidisciplinary minor. All acceptable depth courses must be consistent with the goals of the minor. Examples of acceptable courses include science courses which cover energy science like biomass or other relevant basic science.

2. Students should strive to complete the necessary prerequisites and the depth courses prior to enrolling in the breadth courses. However, depth courses may be taken concurrently with the courses taken to meet the breadth requirement.

3. Ordinarily, students must complete all minor requirements before they can register for the Project in Energy Systems course.

**Program of Study - Track for Chemistry and Biochemistry Students**

1. Courses at the 1000 level may NOT be used toward the minor.
2. A maximum of 3 credit hours of Special Topics (in biochemistry) courses may be included in the minimum 15 credit hours of a minor program.
3. A maximum of 3 credit hours of CHEM 4699 may be used toward the minor.
4. All courses counting toward the minor must be completed with an overall average GPA of at least 2.0.
5. All courses counting toward the minor must be completed with a letter grade basis.
6. A maximum of 3 credit hours of transfer credit may be used to satisfy the course requirements for a minor. This includes courses taken at another institution or credit earned through the AP or IB program, assuming the scores meet Georgia Tech minimum standards.
7. It is the major advisor's responsibility to verify that students are using only courses from the designated block(s) from the student's major field of study that are allowed to satisfy a minor program, that they are not using any Core Area A-E courses (including humanities and social sciences), and that they are not using any courses for more than one minor or certificate. Any free elective course used to satisfy the course requirements of the student's major degree program may also be used to satisfy the course requirements for a minor.

**Prerequisite Courses**

Students ordinarily pursue the minor upon completion of the needed prerequisites. However, the depth course requirements may be taken as soon as students have met the relevant prerequisites.

The prerequisites needed for one or more of the courses required for the minor (breadth courses and the capstone project course) are (all existing courses):

**Mathematics**

- MATH 1551 Differential Calculus 2
- MATH 1553 Intro to Linear Algebra or MATH 1551 Linear Algebra 2
- MATH 1552 Integral Calculus 4
- MATH 2551 Multivariable Calculus 4

**Physics**

- PHYS 2211 Intro Physics I 4
- PHYS 2212 Intro Physics II 4

**Chemistry**

- CHEM 1310 General Chemistry 4
- or CHEM 120 Chemical Principles I

**Economics**

Select one of the following: 3-6

- ECON 2100 Economics and Policy
- or ECON 2105 Global Economy
- ECON 2105 Prin of Macroeconomics
- & ECON 2105 Prin of Microeconomics

**Requirements**

**Depth Courses**

Select 6 credit hours of depth courses related to energy systems: $^1$ 6

- CHEM 3511 Survey of Biochemistry
- CHEM 4113 Intro Energy Conversion
- CHEM 4XXX Chemistry Elective
- or CHEM E301 Analytical Chem
- CHEM 4XXX Chemistry Elective
- or CHEM Chem-Electronic Material

**Breadth Courses**

Select 6 credit hours from the following: $^2$ 6

- ME 3700 Intro Energy Systems EGR
- ECON 3300 Intl Energy Markets
- PUBP 3350 Energy Policy

**Capstone Course**

GT 4813 Proj In Energy Systems $^3$ 3

**Total Credit Hours** 15

1. The Depth Courses may have additional prerequisites; please check the current prerequisites (p. 72).
2. A list of acceptable courses which meet the depth requirement is provided by each major approving the minor. Depth courses may be taken in the student's major to ensure the depth in that major needed to pursue a multidisciplinary minor. All acceptable depth courses must be consistent with the goals of the minor. Examples of acceptable courses include science courses which cover energy science like biomass or other relevant basic science.

2. Students should strive to complete the necessary prerequisites and the depth courses prior to enrolling in the breadth courses. However, depth courses may be taken concurrently with the courses taken to meet the breadth requirement.

3. Ordinarily, students must complete all minor requirements before they can register for the Project in Energy Systems course.
Program of Study - Track for Earth and Atmospheric Sciences Students

Prerequisite Courses

Students ordinarily pursue the minor upon completion of the needed prerequisites. However, the depth course requirements may be taken as soon as students have met the relevant prerequisites.

The prerequisites needed for one or more of the courses required for the minor (breadth courses and the capstone project course) are (all existing courses):

Mathematics

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
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<td>MATH 1551</td>
<td>Differential Calculus</td>
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<tr>
<td>MATH 1553</td>
<td>Intro to Linear Algebra</td>
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<td>or MATH 1554</td>
<td>Linear Algebra</td>
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<tr>
<td>MATH 1552</td>
<td>Integral Calculus</td>
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<td>MATH 2551</td>
<td>Multivariable Calculus</td>
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Physics

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<tr>
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<th>Hours</th>
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</thead>
<tbody>
<tr>
<td>PHYS 2211</td>
<td>Intro Physics I</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 2212</td>
<td>Intro Physics II</td>
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Chemistry

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<tr>
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<td>CHEM 1310</td>
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<tr>
<td>or CHEM 1200</td>
<td>Chemical Principles I</td>
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</table>

Economics

Select one of the following: 3-6

- ECON 2100 Economics and Policy
- or ECON 2105 Prin of Macroeconomics
- & ECON 2106 Prin of Microeconomics

Requirements

Depth Courses

<table>
<thead>
<tr>
<th>Course</th>
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<th>Hours</th>
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<tbody>
<tr>
<td>EAS 4410</td>
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<td>3</td>
</tr>
<tr>
<td>EAS 3110</td>
<td>Energy, Environ, Society</td>
<td>3</td>
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</tbody>
</table>

Breadth Courses

Select 6 credit hours from the following: 2

- ME 3700  Intro Energy Systems EGR
- ECON 3300 Intl Energy Markets
- PUBP 3350 Energy Policy

Capstone Course

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>GT 4813</td>
<td>Proj in Energy Systems</td>
<td>3</td>
</tr>
</tbody>
</table>

Total Credit Hours 15

2

- Students should strive to complete the necessary prerequisites and the depth courses prior to enrolling in the breadth courses. However, depth courses may be taken concurrently with the courses taken to meet the breadth requirement.
- Breadth courses may ordinarily serve as technical or free electives in the student's program of study. However, courses required by name and number and/or used to satisfy Core Areas A through E cannot be used to satisfy the requirements of a minor. All courses in the minor also must be 3000 level and above.

3

Ordinarily, students must complete all minor requirements before they can register for the Project in Energy Systems course.

Additional Guidelines

- A maximum of 6 credit hours of Special Topics courses may be included in a minor program or the student may complete 3 credit hours of Special Topics and 3 credit hours of either Special Problems or Undergraduate Research.
- A maximum of 3 credit hours of transfer credit may be used to satisfy the course requirements for a minor. This includes courses taken at another institution or credit earned through the AP or IB program, assuming the scores meet Georgia Tech minimum standards.
- It is the major advisor's responsibility to verify that students are using only courses from the designated block(s) from the student's major field of study that are allowed to satisfy a minor program, that they are not using any Core Area A-E courses (including humanities and social sciences), and that they are not using any courses for more than one minor or certificate. Any free elective course used to satisfy the course requirements of the student's major degree program may also be used to satisfy the course requirements for a minor.

Minor in Engineering and Business

The Engineering and Business Minor is offered by the Colleges of Engineering and Business. It is a course of study that enables undergraduate students in Engineering and Business to learn one another's language through innovative coursework and interdisciplinary team projects focused on solving real-world problems presented by the Program's Corporate Affiliates.

The curriculum of the Minor in Engineering and Business requires the completion of 22 semester credit hours.

Minor Program of Study & Guidelines (http://catalog.gatech.edu/academics/minors)

Program of Study - Track for Business Administration Students

Required Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
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</thead>
<tbody>
<tr>
<td>COE 3002</td>
<td>Micro/Nano Revolution</td>
<td>3</td>
</tr>
<tr>
<td>ME 2110</td>
<td>Creative Decisions&amp;Dsgn</td>
<td>3</td>
</tr>
<tr>
<td>ME 3141</td>
<td>Cutting-Edge Eng Seminar</td>
<td>3</td>
</tr>
<tr>
<td>ME 3743</td>
<td>Emerging Technologies</td>
<td>3</td>
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<tr>
<td>ME 3744</td>
<td>Mangn Prod Serv Tech Dev</td>
<td>3</td>
</tr>
<tr>
<td>ME 4741</td>
<td>Int Mgt Dev-Proj Prep</td>
<td>3</td>
</tr>
<tr>
<td>ME 4742</td>
<td>Tech &amp; Mgt Cap Proj</td>
<td>4</td>
</tr>
</tbody>
</table>

Total Credit Hours 22

- Students who are admitted to the T&M Program must satisfy the requirements for a bachelor's degree in their major.
Minor in Film and Media Studies

LCM provides minors in Film and Media Studies, Performance Studies, Science Fiction Studies, and Technical Communication. The school also co-sponsors minors in East Asian Studies, Health, Medicine, and Society; Science, Technology, and Society; and Women, Science, and Technology.

Students wishing to pursue any of these minors should consult LMC director or associate director of undergraduate studies for detailed information concerning requirements. Courses for all minors are selected from "Courses of Instruction."

LCM also sponsors a series of certificate programs in American Literature and Culture, Film Studies, and Literary and Cultural Studies. Students should consult the LMC director or associate director of undergraduate studies for detailed information on requirements. The courses for these certificates are among those listed in "Courses of Instruction." and all fulfill humanities requirements.

LCM and the School of History and Sociology also cooperate in providing a certificate in African American Studies. Students should consult either school for detailed information concerning requirements. Courses for this certificate are selected from among those listed in "Courses of Instruction."

Film and Media Studies Minor

The School of Literature, Media, and Communication (LMC) sponsors the Film and Media Studies minor, which offers students in any major the opportunity to gain an in-depth knowledge of film and media through concentrated study in courses offered by LMC and the Schools of History and Sociology (HSOC) and Modern Languages (ML). The Film and Media Minor is largely concentrated on the rhetoric, history, theory, and broad cultural context of its subject. While it is aimed at developing skills in film or media production, those interested in gaining background in this area may take a course in video production as part of the minor.

Minor Program of Study & Guidelines (http://catalog.gatech.edu/academics/minors)

Program of Study

The Film and Media Studies minor is comprised of 18 credit hours, of which at least 12 credit hours must be upper-division coursework (numbered 3000 or above).

Required Courses

Select one of the following sequences: 6

- LMC 2500 Intro to Film & LMC 3254and Film History
- LMC 2400 Intro to Media Studies & LMC 3254and Film History

Select three of the following: 9

- LMC 3206 Communication & Culture
- LMC 3252 Film and Television
- LMC 3256 Major Filmmakers
- LMC 3257 Global Cinema
- LMC 3258 Documentary Film
- LMC 3259 Experimental Film
- LMC 3314 Tech of Representation
- LMC 3352 Film Technology
- LMC 3406 Video Production

Program of Study - Track for College of Engineering Students

<table>
<thead>
<tr>
<th>Course Code</th>
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<tr>
<td>MGT 3000</td>
<td>Financ &amp; Managerial Acct</td>
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<tr>
<td>MGT 3078</td>
<td>Finance &amp; Investments</td>
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<tr>
<td>or MGT 306</td>
<td>Financial Management</td>
<td></td>
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<tr>
<td>MGT 3300</td>
<td>Marketing Management I</td>
<td>3</td>
</tr>
<tr>
<td>MGT 3743</td>
<td>Emerging Technologies</td>
<td>3</td>
</tr>
<tr>
<td>MGT 3744</td>
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<td>MGT 4742</td>
<td>Tech &amp; Mgt Cap Proj</td>
<td>4</td>
</tr>
</tbody>
</table>

Total Credit Hours 22

- Students who are admitted to the T&M Program must satisfy the requirements for a bachelor's degree in their major.
- The minimum, cumulative GPA required for applicants to the Denning T&M Program is 3.0 based on a minimum of 12 hours earned at Georgia Tech. In order for accepted students to maintain their eligibility to remain in the T&M Program, they must maintain a minimum 3.0 GPA for the classes required by the Denning T&M curriculum. All courses used to satisfy the requirements of the minor must be taken for a letter grade and must be completed with the grade of C (2.00) or better.
- A maximum of 3 credit hours of transfer credit may be used to satisfy the course requirements for a minor. This includes courses taken at another institution or credit earned through the AP or IB program, assuming the scores meet Georgia Tech minimum standards.
- It is the major advisor's responsibility to verify that students are using only courses from the designated block(s) from the student's major field of study that are allowed to satisfy a minor program, that they are not using any Core Area A-E courses (including humanities and social sciences), and that they are not using any courses for more than one minor or certificate. Any free elective course used to satisfy the course requirements of the student's major degree program may also be used to satisfy the course requirements for a minor.

- The Film and Media Studies minor is largely concentrated on the rhetoric, history, theory, and broad cultural context of its subject. While it is aimed at developing skills in film or media production, those interested in gaining background in this area may take a course in video production as part of the minor.
- Students who are admitted to the T&M Program must satisfy the requirements for a bachelor's degree in their major.
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- It is the major advisor's responsibility to verify that students are using only courses from the designated block(s) from the student's major field of study that are allowed to satisfy a minor program, that they are not using any Core Area A-E courses (including humanities and social sciences), and that they are not using any courses for more than one minor or certificate. Any free elective course used to satisfy the course requirements of the student's major degree program may also be used to satisfy the course requirements for a minor.
Minor in French

The School of Modern Languages offers minors in Chinese, French, German, Japanese, Korean, and Spanish as well as in Russian Studies. This program is designed for students who wish to develop their language skills to at least an intermediate level and to provide themselves with a greater depth than possible with a certificate program.

Students wishing to pursue one or more of these minors should declare the minor by filling out the minor change form (http://www.registrar.gatech.edu/students/formlanding/changeminor.php) with the Director of Undergraduate Studies in Modern Languages.

Minor Program of Study & Guidelines (p. 107)

Modern Language Minor Information (http://www.modlangs.gatech.edu/degrees/minors-certificates)

Program of Study

Select 15 hours of French electives \(^1\) \(^2\) 15

Total Credit Hours 15

1. Must be beyond 2002 courses in French.
2. At least nine credit hours must be 3000-level or higher.

- A maximum of 9 credit hours of transfer credit may be used to satisfy the course requirements for a minor. This includes courses taken at another institution or credit earned through the AP or IB program, assuming the scores meet Georgia Tech minimum standards.
- All courses counting toward a minor must be taken on a letter-grade basis, and a grade of C or better must be received in each course.
- A maximum of 6 credit hours of Special Topics courses may be included in a minor program or the student may complete 3 credit hours of Special Topics and 3 credit hours of either Special Problems or FREN 2699 FREN 2699. Students may not use 6 credit hours of either Special Problems or FREN 2699 for a minor.
- It is the major advisor's responsibility to verify that students are using only courses from the designated block(s) from the student's major field of study that are allowed to satisfy a minor program, that they are not using any Core Area A-E courses (including humanities and social sciences), and that they are not using any courses for more than one minor or certificate. Any free elective course used to satisfy the course requirements of the student's major degree program may also be used to satisfy the course requirements for a minor.

Minor in German

The School of Modern Languages offers minors in Chinese, French, German, Japanese, Korean, and Spanish as well as in Russian Studies. This program is designed for students who wish to develop their language skills to at least an intermediate level and to provide themselves with a greater depth than possible with a certificate program.

Students wishing to pursue one or more of these minors should declare the minor by filling out the minor change form (http://www.registrar.gatech.edu/students/formlanding/changeminor.php) with the Director of Undergraduate Studies in Modern Languages.

Minor Program of Study & Guidelines (p. 107)

Modern Language Minor Information (http://www.modlangs.gatech.edu/degrees/minors-certificates)

Program of Study

Select 15 hours of German electives \(^1\) \(^2\) 15

Total Credit Hours 15

1. Must be beyond 2002 courses in German.
2. At least nine credit hours must be 3000-level or higher.

- A maximum of 9 credit hours of transfer credit may be used to satisfy the course requirements for a minor. This includes courses taken at another institution or credit earned through the AP or IB program, assuming the scores meet Georgia Tech minimum standards.
- All courses counting toward a minor must be taken on a letter-grade basis, and a grade of C or better must be received in each course.
- A maximum of 6 credit hours of Special Topics courses may be included in a minor program or the student may complete 3 credit hours of Special Topics and 3 credit hours of either Special Problems or FREN 2699 FREN 2699. Students may not use 6 credit hours of either Special Problems or FREN 2699 for a minor.
- It is the major advisor's responsibility to verify that students are using only courses from the designated block(s) from the student's major field of study that are allowed to satisfy a minor program, that they are not using any Core Area A-E courses (including humanities and social sciences), and that they are not using any courses for more than one minor or certificate. Any free elective course used to satisfy the course requirements of the student's major degree program may also be used to satisfy the course requirements for a minor.
hours of Special Topics and 3 credit hours of either Special Problems or GRMN 2699 GRMN 2699. Students may not use 6 credit hours of either Special Problems or GRMN 2699 for a minor.

- It is the major advisor’s responsibility to verify that students are using only courses from the designated block(s) from the student’s major field of study that are allowed to satisfy a minor program, that they are not using any Core Area A-E courses (including humanities and social sciences), and that they are not using any courses for more than one minor or certificate. Any free elective course used to satisfy the course requirements of the student’s major degree program may also be used to satisfy the course requirements for a minor.

Minor in Global Development

The minor covers topics and fosters skills that are essential for all scientists, engineers, businesspeople, and policymakers who are involved with and need to understand how politics, economics, culture, and engineering interact to affect the outcome of different types of science and technology projects in the developing world. The Global Development minor teaches the concepts, theories, applications, and tools necessary for graduates to enter into such projects and work constructively with others in the Global Development community. The Global Development minor requires 15 credit hours.

Minor Program of Study & Guidelines (p. 107)

Program of Study

Required Course
INTA 2050 Intro to Global Developmt 3

Electives
Select three of the following: 9
CEE 4803 Special Topics
CP 4020 Intro-Urban&Region Plan
CP 4190 Intro Climate Chng Plan
CP 4210 Envir Plan&Impact Assess
CP 4310 Urban Transportation
CS 4911 Design Capstone Project
ECON 2101 The Global Economy
ECON 3300 Intl Energy Markets
ECON 4311 Global Enterprise
ECON 4350 International Economics
ECON 4351 Intl Financial Econ
ECON 4355 Global Financial Econ
ECON 4411 Economic Development
ECON 4415 Confli&Secur in DevCountr
HTS 3055 Globalization Modern Era
HTS 3064 Sociology of Development
INTA 3773 Global Issues&Leadership
INTA 3031 Human Rights
INTA 3240 Gov’t & Politics-Africa
INTA 3241 Latin American Politics
INTA 3301 Int’l Political Econ
INTA 3303 Pol Economy-Development
INTA 4803 Special Topics (Computers, Communication and International Development)

MINOR IN GLOBAL DEVELOPMENT
INTA 4803 Special Topics (Evaluating International Development Projects)
INTA 4803 Special Topics (Modernization and Development)
ME 2803 Special Topics (Engineering and Global Development)
MGT 4194 Social Entrepreneurship
PUBP 4260 Econ Dev Policy & Plan

Capstone Course
INTA/ME Global Develop Capstone 15
4744

- All courses must be completed with grade of ‘C’ or higher
- A maximum of 6 credit hours of Special Topics courses may be included in a minor program or the student may complete 3 credit hours of Special Topics and 3 credit hours of either Special Problems or Undergraduate Research. Students may not use 6 credit hours of either Special Problems or Undergraduate Research for a minor.
- A maximum of 3 credit hours of transfer credit may be used to satisfy the course requirements for a minor. This includes courses taken at another institution or credit earned through the AP or IB program, assuming the scores meet Georgia Tech minimum standards.
- It is the major advisor’s responsibility to verify that students are using only courses from the designated block(s) from the student’s major field of study that are allowed to satisfy a minor program, that they are not using any Core Area A-E courses (including humanities and social sciences), and that they are not using any courses for more than one minor or certificate. Any free elective course used to satisfy the course requirements of the student’s major degree program may also be used to satisfy the course requirements for a minor.

Minor in Health and Medical Sciences

The Health & Medical Sciences Minor is primarily geared towards students interested in pre-professional health programs or careers in medical research. The purpose of the Health & Medical Sciences Minor is to allow students with interests in a variety of fields, including medicine, exercise science, dentistry, optometry, health-related research, veterinary medicine, health informatics, pharmacy, nursing, and other allied health sciences to gain basic knowledge of the science surrounding health that will prepare them for future careers.

The Health & Medical Sciences Minor is designed to provide students with flexibility to pursue their interests while ensuring that students are exposed to a diversity of subject areas. Therefore, to complete the 15 credit Health & Medical Sciences Minor, students will be required to take a minimum of 9 credits of classes from at least two schools other than their home school (i.e., classes with School designators--APPH, BIOL, CHEM, PHYS, PSYC--other than their major School designator) and a maximum of 6 credits from their home unit. All classes used to fulfill the Health & Medical Sciences Minor must be chosen from the approved list of health-related courses.

In addition, as is the case for all GT minors, the Health & Medical Sciences Minor must include at least 9 semester hours of courses numbered 3000 or above, courses used to satisfy Core Areas A through E in a student’s major degree program cannot also be used to satisfy the course requirements for the minor, a maximum of 6 semester hours of approved Special Topics courses may be included in the Health &
Medical Sciences Minor or the student may complete 3 semester hours of Special Topics and 3 semester hours of either Special Problems or Undergraduate Research (which would need to be pre-approved as appropriately health-related by the minor adviser), a maximum of 3 semester hours of transfer credit may be used to satisfy the requirements for the minor, and all courses counting toward the minor must be taken on a letter-grade basis.

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<th>Credit Hours</th>
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<td>BIOL 4699</td>
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<td>Chemical Principles I</td>
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<td>CHEM 1212K</td>
<td>Chemical Principles II</td>
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<td>CHEM 1310</td>
<td>General Chemistry</td>
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<td>CHEM 1315</td>
<td>Survey of Organic Chem</td>
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<td>CHEM 2311</td>
<td>Organic Chemistry I</td>
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<td>CHEM 2312</td>
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<td>Undergraduate Research</td>
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<tr>
<td>CHEM 4760</td>
<td>Biocatalysis</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 4765</td>
<td>Drug Design,Devlpmnt&amp;Delivery</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 4699</td>
<td>Undergraduate Research</td>
<td>1-12</td>
</tr>
<tr>
<td>PHYS 2211</td>
<td>Intro Physics I</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 2212</td>
<td>Intro Physics II</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 2213</td>
<td>Intro to Modern Physics</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 2231</td>
<td>Honors Physics I</td>
<td>5</td>
</tr>
<tr>
<td>PHYS 2232</td>
<td>Honors Physics II</td>
<td>5</td>
</tr>
<tr>
<td>PHYS 2699</td>
<td>Undergraduate Research</td>
<td>1-12</td>
</tr>
<tr>
<td>PHYS 4251</td>
<td>Biophysics</td>
<td>3</td>
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<tr>
<td>PHYS 4699</td>
<td>Undergraduate Research</td>
<td>1-12</td>
</tr>
<tr>
<td>PSYC 1101</td>
<td>General Psychology</td>
<td>3</td>
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<tr>
<td>PSYC 2103</td>
<td>Human Development</td>
<td>3</td>
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<tr>
<td>PSYC 2210</td>
<td>Social Psychology</td>
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<tr>
<td>PSYC 2699</td>
<td>Undergraduate Research</td>
<td>1-12</td>
</tr>
<tr>
<td>PSYC 2760</td>
<td>Human Language Process</td>
<td>3</td>
</tr>
<tr>
<td>PSYC 3012</td>
<td>Intro Cognitive Psycc</td>
<td>3</td>
</tr>
<tr>
<td>PSYC 3020</td>
<td>Biopsychology</td>
<td>3</td>
</tr>
<tr>
<td>PSYC 3040</td>
<td>Sensation &amp; Perception</td>
<td>3</td>
</tr>
<tr>
<td>PSYC 3790</td>
<td>Intro-Cognitive Science</td>
<td>3</td>
</tr>
<tr>
<td>PSYC 4010</td>
<td>Human Abilities</td>
<td>3</td>
</tr>
<tr>
<td>PSYC 4090</td>
<td>Cognitive Neuroscience</td>
<td>3</td>
</tr>
<tr>
<td>PSYC 4100</td>
<td>Behavioral Pharmacology</td>
<td>3</td>
</tr>
<tr>
<td>PSYC 4260</td>
<td>Psychology of Aging</td>
<td>3</td>
</tr>
<tr>
<td>PSYC 4699</td>
<td>Undergraduate Research</td>
<td>1-12</td>
</tr>
</tbody>
</table>

### Minor in Health, Medicine, and Society

The Health, Medicine, and Society minor is a program of study for undergraduate students who are interested in the health and medical professions. Humanities and social science perspectives on health and medicine equip students to address important topics, such as the ethics of biomedical research, the nature of medical discovery, the relationships among race, health, and gender, the global impact of public health, and the cost of health care delivery. Understanding these and related issues is essential to developing informed, thoughtful, and ethically enlightened leaders in the fields of health and medicine.
Program of Study

The multi-disciplinary Health, Medicine, and Society minor must comprise at least 15 credit hours, of which at least 9 credit hours are upper-division coursework (numbered 3000 or above).

A multidisciplinary minor may contain courses in a student’s major field of study. A maximum of 6 credit hours of such courses may be used to satisfy the course requirements for the minor, provided these courses are not also used to satisfy any course requirement in the student’s major degree program.

Required Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>HTS 2080</td>
<td>Intro Hist Disease &amp; Med</td>
<td>3</td>
</tr>
<tr>
<td>LMC 2300</td>
<td>Intro Biomedicine &amp; Cult</td>
<td>3</td>
</tr>
</tbody>
</table>

Electives

Select three of the following: 9

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECON 4510</td>
<td>Health Economics</td>
</tr>
<tr>
<td>HTS 3086</td>
<td>Soc of Medicine &amp; Health</td>
</tr>
<tr>
<td>HTS 3087</td>
<td>History of Medicine</td>
</tr>
<tr>
<td>HTS 4086</td>
<td>Sem Health Med &amp; Society</td>
</tr>
<tr>
<td>LMC 3219</td>
<td>Literature &amp; Medicine</td>
</tr>
<tr>
<td>LMC 3318</td>
<td>Biomedicine &amp; Culture</td>
</tr>
<tr>
<td>LMC 4300</td>
<td>Seminar Biomed &amp; Culture</td>
</tr>
<tr>
<td>HTS 3803</td>
<td>Special Topics (Race, Science, and Medicine)</td>
</tr>
<tr>
<td>PUBP 4813</td>
<td>Special Topics (Stem Cell Science, Ethics and Policy)</td>
</tr>
<tr>
<td>PUBP 4843</td>
<td>Special Topics (Health Care Law, Policy, and Ethics)</td>
</tr>
</tbody>
</table>

Total Credit Hours 15

- All courses counting toward the minor must be taken on a letter-grade basis and must be completed with a grade of C (2.00) or better.
- A maximum of 6 credit hours of Special Topics courses may be included in a minor program or the student may complete 3 credit hours of Special Topics and 3 credit hours of either Special Problems or Undergraduate Research. Students may not use 6 credit hours of either Special Problems or Undergraduate Research for a minor.
- A maximum of 3 credit hours of transfer credit may be used to satisfy the course requirements for a minor. This includes courses taken at another institution or credit earned through the AP or IB program, assuming the scores meet Georgia Tech minimum standards.
- It is the major advisor’s responsibility to verify that students are using only courses from the designated block(s) from the student’s major field of study that are allowed to satisfy a minor program, that they are not using any Core Area A-E courses (including humanities and social sciences), and that they are not using any courses for more than one minor or certificate. Any free elective course used to satisfy the course requirements of the student’s major degree program may also be used to satisfy the course requirements for a minor.

Minor Program of Study & Guidelines (p. 107)

Program of Study

Select 15 credits hours of History courses. 1,2,3

<table>
<thead>
<tr>
<th>Total Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
</tr>
</tbody>
</table>

1. Nine of the 15 credit hours required must be 3000-level or higher.
2. Three credit hours taken outside of history may be counted toward the minor, with the approval of the school.
3. Students majoring in HTS may not minor in History.

Minor in Industrial Design

The minor in Industrial Design will expose students to the field of industrial design, allowing them to better work on multidisciplinary teams where design is a central element. This minor will provide interested students from other disciplines at Georgia Tech accelerated access to both the undergraduate and graduate programs in Industrial Design. The minor has three main objectives related to knowledge, skills, and application:

1. provide students with foundational knowledge of industrial design,
2. develop students’ skill in working on multidisciplinary design teams, and
3. enable students to effectively apply design methods to complete exemplary design projects arising in design across disciplines.

In addition, the College of Design offers a separate undergraduate minor in Multidisciplinary Design/Arts History for students in all disciplines at Georgia Tech. The minor requires completion of one of three available core survey sequences in the history of design, in addition to four courses from at least three lists of courses in: history of architecture, the history of industrial design, the history of the city/landscape/garden, history of art and foreign study, and music history. Architecture and industrial design program students must select a core-survey sequence outside their major, or select two additional electives from approved lists.

Interested students should see the Undergraduate Minors (http://catalog.gatech.edu/academics/minors) page and consult with an academic advisor for more details.

Minor in History

For students who want to broaden their educations, the study of history provides a context for understanding the world and develops analytical abilities, verbal and written communications skills, and the critical thinking that is the bedrock of active citizenship. It is also good preparation for a broad array of careers, including business, education, government, and law.
• Minor in Industrial Design (http://www.id.gatech.edu/minor-id)
• Minor Program of Study & Guidelines (p. 107)

Program of Study

This minor must comprise at least 15 credit hours, of which at least 9 credit hours are upper-division coursework (numbered 3000 or above).

Required Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ID 2320</td>
<td>Human Factors in Design</td>
<td>3</td>
</tr>
<tr>
<td>ID 2401</td>
<td>Visual Design Thinking</td>
<td>3</td>
</tr>
<tr>
<td>ID 3320</td>
<td>Design Methods</td>
<td>3</td>
</tr>
<tr>
<td>ID 4833</td>
<td>Spec Top: Collaborative</td>
<td>3</td>
</tr>
</tbody>
</table>

Electives

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ID 3301</td>
<td>Materials I</td>
</tr>
<tr>
<td>ID 3302</td>
<td>Materials II</td>
</tr>
<tr>
<td>ID 3510</td>
<td>Interactive Products</td>
</tr>
<tr>
<td>ID 3520</td>
<td>Tangible Interaction</td>
</tr>
<tr>
<td>ID 4106</td>
<td>Parametric Product Model</td>
</tr>
<tr>
<td>ID 4201</td>
<td>Design/Research Methods</td>
</tr>
<tr>
<td>ID 4206</td>
<td>Culture of Objects</td>
</tr>
<tr>
<td>ID 4210</td>
<td>Intro Universal Design</td>
</tr>
<tr>
<td>ID 4320</td>
<td>Prototyping Interaction</td>
</tr>
</tbody>
</table>

Total Credit Hours 15

• All courses must be taken on a letter-grade basis and must be completed with a grade of C (2.00) or better.
• A maximum of 6 credit hours of Special Topics courses may be included in a minor program or the student may complete 3 credit hours of Special Topics and 3 credit hours of either Special Problems or Undergraduate Research. Students may not use 6 credit hours of either Special Problems or Undergraduate Research for a minor.
• A maximum of 3 credit hours of transfer credit may be used to satisfy the course requirements for a minor. This includes courses taken at another institution or credit earned through the AP or IB program, assuming the scores meet Georgia Tech minimum standards.
• It is the major advisor’s responsibility to verify that students are using only courses from the designated block(s) from the student’s major field of study that are allowed to satisfy a minor program, that they are not using any Core Area A-E courses (including humanities and social sciences), and that they are not using any courses for more than one minor or certificate. Any free elective course used to satisfy the course requirements of the student’s major degree program may also be used to satisfy the course requirements for a minor.

Minor in International Business, Language, and Culture

The School of Modern Languages and the Scheller College of Business offer an interdisciplinary minor in “International Business, Language, and Culture” (ILBC) housed in the School of Modern Languages. Two key objectives of the Institute’s strategic plan are to “prepare students for global leadership” and “innovate to amplify social responsibility and economic impact.” In order to achieve these objectives students need to understand the fundamentals of business and also be able to communicate across different languages. This minor meets both of these objectives.

Students who wish to pursue this minor should declare the minor by completing the minor change form (https://registrar.gatech.edu/info/changeaddition-undergraduate-minors) with the Student Advisor in Modern Languages.
Minor Program of Study & Guidelines (http://catalog.gatech.edu/academics/minors)

Modern Language Minor Information (https://modlangs.gatech.edu/degrees/minors-and-certificates)

**Program of Study for Business Majors**

**Business Majors Requirements**

Select two of the following courses:  6

- MGT 3118 Cross-Cultural Mgt
- MGT 3606 Intl Business Law
- MGT 3661 Adv Concepts-Intl Bus
- MGT 4030 International Accounting
- MGT 4070 International Finance
- MGT 4116 Gend, Race, Ethn Org Behav
- MGT 4335 International Marketing
- MGT 4803 Special Topics-Global Strategy

Select three 3000/4000-level courses in the same language.  9

At least one must come from the list below.

- CHIN 3021 Chin Society & Culture I
- CHIN 3022 Chin Society& Culture II
- CHIN 3692 Business Chinese
- CHIN 3696 Eco Dev & Sustainability
- FREN 3011 France Today I
- FREN 3012 France Today II
- FREN 3014 Intro To Contemp France
- FREN 3061 Adv Business French I
- FREN 3062 Adv Business French II
- FREN 3551 Fren for Professions I
- FREN 3691 French LBAT I
- FREN 3692 French LBAT II
- FREN 3693 French LBAT III
- FREN 3694 LBAT French Sem Abroad
- FREN 4300 France and Globalization
- GRMN 3011Germany Today
- GRMN 3071Intro-Business German I
- GRMN 3695Structure,Commun&Corr
- GRMN 3696Current Issues
- GRMN 4061Adv Business German I
- GRMN 4699Ind Transf Grmn Soc/Econ
- JAPN 3692 Business Japanese
- JAPN 3693 Japan Today
- JAPN 4123 Tech&Bus Jpn Translation
- KOR 3691 Business Korean
- KOR 3692 Issues & Tech In Korea
- RUSS 3691 Intensive Adv Russian
- RUSS 3692 Read&Comp.Bus,Sci & Tech
- RUSS 4340 Business Discourse 1990-
- SPAN 3211 Spain Today
- SPAN 3235 Latin America Today
- SPAN 3590 Issues in Andean Devmt
- SPAN 3592 Andean Culture Commerce
- SPAN 3690 Commerce Sustain Commun

- SPAN 3691 Bus Comm& Correspondence
- SPAN 3692 Business And Culture
- SPAN 3693 Science And Technology
- SPAN 4251 Hispanic Internship
- SPAN 4693 Sustainability in Span

Special Topics

- CHIN/ FREN/ GRMN/ JAPN/ KOR/ RUSS/ SPAN

or

CHIN 4695 Chinese Internship
or FREN French Internship
or GRMNGerman Internship
or JAPN Japanese Internship
or RUSS Russian Internship
or SPAN 4695 Spanish Internship

Total Credit Hours 15

1 Study Abroad course

General Notes:

• All courses must be taken on a letter-grade basis and a grade of 'C' or higher must be received in each course.
• No more than three hours of coursework can be complete at another university, and this must be approved by the advisor.

Program of Study for Non-Business Majors

Non-Business Majors Requirements

Required Courses:

MGT 3000 Financ & Managerial Acct 3
MGT 3660 International Business 3

Select one of the following courses: 3

MGT 2200 Information Technology
MGT 3078 Finance & Investments
MGT 3300 Marketing Management I
MGT 3150 Prin of Management
MGT 3661 Adv Concepts-Intl Bus
MGT 3606 Intl Business Law

Select two 3000/4000-level courses in the same language. At least one must come from the list below. 6

CHIN 3021 Chin Society & Culture I
CHIN 3022 Chin Society & Culture II
CHIN 3692 Business Chinese
CHIN 3696 Eco Dev & Sustainability 1
FREN 3011 France Today I
FREN 3012 France Today II
FREN 3014 Intro To Contemp France 1
FREN 3061 Adv Business French I
FREN 3062 Adv Business French II
FREN 3551 Fren for Professions I
FREN 3691 French LBAT I 1
FREN 3692 French LBAT II 1
FREN 3693 French LBAT III 1
FREN 3694 LBAT French Sem Abroad 1
FREN 4300 France and Globalization
GRMN 3011 Germany Today
GRMN 3071 Intro-Business German I
GRMN 3691 Structure,Commun&Corr 1
GRMN 3696 Current Issues 1
GRMN 4061 Adv Business German I
GRMN 4693nd Transf Grmn Soc/Econ 1
JAPN 3692 Business Japanese 1
JAPN 3693 Japan Today 1
JAPN 4123 Tech&Bus Jpn Translation
KOR 3691 Business Korean 1
KOR 3692 Issues & Tech In Korea 1
RUSS 3691 Intensive Adv Russian 1

1 RUSS 3692 Read&Comp:Bus,Sci & Tech 1
1 RUSS 4340 Business Discourse 1990-
1 SPAN 3211 Spain Today
1 SPAN 3235 Latin America Today
1 SPAN 3590 Issues in Andean Devmt 1
1 SPAN 3592 Andean Culture Commerce 1
1 SPAN 3690 Commerce Sustain Commun 1
1 SPAN 3691 Bus Comm& Correspondence 1
1 SPAN 3692 Business And Culture 1
1 SPAN 3693 Science And Technology 1
1 SPAN 4251 Hispanic Internship
1 SPAN 4693 Sustainability in Span

CHIN/
FREN/
GRMN/
JAPN/
KOR/
RUSS/
SPAN
3813/
CHIN 3823/
FREN/
GRMN/
JAPN/
KOR/
RUSS/
SPAN
3823/
CHIN 3833/
FREN/
GRMN/
JAPN/
KOR/
RUSS/
SPAN
4813/
CHIN 4823/
FREN/
GRMN/
JAPN/
KOR/
RUSS/
SPAN
4823/
CHIN 4833/
FREN/
GRMN/
JAPN/
KOR/
RUSS/
SPAN
4833
CHIN 4695  Chinese Internship
or FREN 4695  French Internship
or GRMN 4695  German Internship
or JAPN 4695  Japanese Internship
or RUSS 4695  Russian Internship
or SPAN 4695  Spanish Internship

<table>
<thead>
<tr>
<th>Total Credit Hours</th>
<th>15</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study Abroad course</td>
<td></td>
</tr>
</tbody>
</table>

General Notes:

- All courses must be taken on a letter-grade basis and a grade of 'C' or higher must be received in each course.
- No more than three hours of coursework can be complete at another university, and this must be approved by the advisor.

## Minor in Japanese

The School of Modern Languages offers minors in Chinese, French, German, Japanese, Korean, and Spanish as well as in Russian Studies. This program is designed for students who wish to develop their language skills to at least an intermediate level and to provide themselves with a greater depth than possible with a certificate program.

Students wishing to pursue one or more of these minors should declare the minor by filling out the minor change form (http://www.registrar.gatech.edu/students/formlanding/changeminor.php) with the Director of Undergraduate Studies in Modern Languages

Minor Program of Study & Guidelines (http://catalog.gatech.edu/academics/minors)

Modern Language Minor Information (http://www.modlangs.gatech.edu/degrees/minors-certificates)

### Program of Study

Select 15 hours of Japanese electives

<table>
<thead>
<tr>
<th>Total Credit Hours</th>
<th>15</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

1. Must be beyond 2001 courses in Japanese.
2. At least nine credit hours must be 3000-level or higher.

- A maximum of 9 credit hours of transfer credit may be used to satisfy the course requirements for a minor. This includes courses taken at another institution or credit earned through the AP or IB program, assuming the scores meet Georgia Tech minimum standards.
- All courses counting toward a minor must be taken on a letter-grade basis, and a grade of C or better must be received in each course.
- A maximum of 6 credit hours of Special Topics courses may be included in a minor program or the student may complete 3 credit hours of Special Topics and 3 credit hours of either Special Problems or KOR 2699 KOR 2699 . Students may not use 6 credit hours of either Special Problems or KOR 2699 for a minor.
- It is the major advisor's responsibility to verify that students are using only courses from the designated block(s) from the student's major field of study that are allowed to satisfy a minor program, that they are not using any Core Area A-E courses (including humanities and social sciences), and that they are not using any courses for more than one minor or certificate. Any free elective course used to satisfy the course requirements of the student's major degree program may also be used to satisfy the course requirements for a minor

## Minor in Korean

The School of Modern Languages offers minors in Chinese, French, German, Japanese, Korean, and Spanish as well as in Russian Studies. This program is designed for students who wish to develop their language skills to at least an intermediate level and to provide themselves with a greater depth than possible with a certificate program.

Students wishing to pursue one or more of these minors should declare the minor by filling out the minor change form (http://www.registrar.gatech.edu/students/formlanding/changeminor.php) with the Director of Undergraduate Studies in Modern Languages

Minor Program of Study & Guidelines (http://catalog.gatech.edu/academics/minors)

Modern Language Minor Information (http://www.modlangs.gatech.edu/degrees/minors-certificates)

### Program of Study

Select 15 hours of Korean electives

<table>
<thead>
<tr>
<th>Total Credit Hours</th>
<th>15</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

1. Must be beyond 2001 courses in Korean.
2. At least nine credit hours must be 3000-level or higher.

- A maximum of 9 credit hours of transfer credit may be used to satisfy the course requirements for a minor. This includes courses taken at another institution or credit earned through the AP or IB program, assuming the scores meet Georgia Tech minimum standards.
- All courses counting toward a minor must be taken on a letter-grade basis, and a grade of C or better must be received in each course.
- A maximum of 6 credit hours of Special Topics courses may be included in a minor program or the student may complete 3 credit hours of Special Topics and 3 credit hours of either Special Problems or KOR 2699 KOR 2699 . Students may not use 6 credit hours of either Special Problems or KOR 2699 for a minor.
- It is the major advisor's responsibility to verify that students are using only courses from the designated block(s) from the student's major field of study that are allowed to satisfy a minor program, that they are not using any Core Area A-E courses (including humanities and social sciences), and that they are not using any courses for more than one minor or certificate. Any free elective course used to satisfy the course requirements of the student's major degree program may also be used to satisfy the course requirements for a minor

## Minor in Law, Science, and Technology

The School of Public Policy is home to Georgia Tech's Law, Science, and Technology/Pre-Law Program. This program offers a wide range of curricular opportunities as well as pre-law advising and support services for students considering law school and careers in law.

The program introduces students to selected areas of law that they are likely to study in law school. Students will begin to develop the skills that they will need to succeed in law school and in law practice. Some
of the courses are taught by full-time faculty, while others are taught by attorneys from the Atlanta area, thereby exposing students to academic and practical perspectives on the practice of law.

The program welcomes students from every college and major. Students majoring in the sciences and engineering may be surprised to learn that their undergraduate background gives them a strong start toward specializations such as intellectual property law, products liability law, and construction law. The pre-law program can supplement a student’s scientific or engineering background by developing the reading and writing skills that are fundamental to a successful legal career.

Pre-law Certificate - Program of Study

Required Courses
Select one of the following:  

- PUBP 3000 US Constitutional Issues  
- PUBP 3016 Judicial Process  
- PUBP 3610 Pre-Law Seminar  
- PUBP 4609 Legal Practice

Electives
Select elective PUBP courses to fulfill 12 credit hour requirement.  

Total Credit Hours  

1 Numbered 3000 or above.

For additional curricular requirements or any other information, see the pre-law section of the website www.prelaw.gatech.edu (http://www.prelaw.gatech.edu); or contact the pre-law program director (contact information listed at website).

Minor Program of Study & Guidelines (p. 107)

Program of Study

Required Courses
Select one of the following:  

- PUBP 3000 US Constitutional Issues  
- PUBP 3016 Judicial Process  
- PUBP 3610 Pre-Law Seminar  
- PUBP 4609 Legal Practice

Electives
Select elective PUBP courses to fulfill 15 credit hour requirement.  

Total Credit Hours  

1 Numbered 3000 or above.

- All courses must be taken on letter-grade basis and completed with a grade of C (2.00) or better.
- No more than 9 credit hours of Special Topics courses may be included in a minor program.
- Students who began the LST minor prior to Fall 2003, may apply under an earlier set of guidelines. Please see Professor Robert Pikowsky, Director of the Pre-Law Program, for details.
- A maximum of 3 credit hours of transfer credit may be used to satisfy the course requirements for a minor. This includes courses taken at another institution or credit earned through the AP or IB program, assuming the scores meet Georgia Tech minimum standards.

- It is the major advisor’s responsibility to verify that students are using only courses from the designated block(s) from the student’s major field of study that are allowed to satisfy a minor program, that they are not using any Core Area A-E courses (including humanities and social sciences), and that they are not using any courses for more than one minor or certificate. Any free elective course used to satisfy the course requirements of the student’s major degree program may also be used to satisfy the course requirements for a minor.

Minor in Leadership Studies

The Minor in Leadership Studies has as its primary objective the goal of providing students with an in-depth knowledge of leadership theory, skills, experience, and application through a rigorous program of study that is multi-disciplinary in nature. The minor is comprised of three tracks: Global Engineering, Public Policy and Business, offered through the School of Civil and Environmental Engineering, School of Public Policy and the ILE respectively. Students apply for a specific track, are accepted, and enter the program to begin a prescribed 15 credit hour course of study while satisfying requirements for a bachelor’s degree in their major.

Application and course descriptions are available at: http://leadership.gatech.edu

Application and course descriptions are available in the Minor Program of Study & Guidelines (p. 107) section of this catalog.

GPA Requirement

In order for a student to be enrolled in this minor, they must have at least thirty credit hours with a cumulative GPA of 2.5 or greater, have applied for admission, and been formally admitted. Each course counting toward the minor must be completed with a grade of C or above, with the overall required GPA in the courses counting toward the minor being a 2.75 or better.

Program of Study - Business Track

Required Courses

Select at least 3 of the following from the Business Track:  

- PUBP 4140 Foundations Leadership  
- MGT 3103 Leadersip-Changing Env  
- MGT 3662 Mgt in Healthcare Sector  
- MGT 4072 Entrepreneurial Finance  
- MGT 4116 Gend, Race, Ethn Org Behav  
- MGT 4117 Global Workforce Mgt  
- MGT 4193 Serv Lead Values Systems  
- MGT 4194 Social Entrepreneurship  
- MGT 4670 Entrepreneurship  
- MGT 4803 Special Topics  
- MGT 3101 Organizational Behavior  
- MGT 4191 Entrepreneurship Forum  
- MGT 4192 Entrepreneurship Forum  

Internship

- MGT 4611 Integrative Mgt Analysis  

Total Credit Hours  

1 Numbers 3000 or above.

1 See below list of approved Special Topic courses.
### Approved Special Topics Courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MGT 4803</td>
<td>Corporate Governance - pre-requisite</td>
<td>3</td>
</tr>
<tr>
<td>MGT 4803</td>
<td>Business Fundamentals for Social Entrepreneurs</td>
<td>3</td>
</tr>
<tr>
<td>MGT 4803</td>
<td>Motivation and Rewards - Pre-requisite MGT 3101</td>
<td>3</td>
</tr>
</tbody>
</table>

- A maximum of 6 credit hours of Special Topics courses may be included in a minor program or the student may complete 3 credit hours of Special Topics and 3 credit hours of either Special Problems or Undergraduate Research. Students may not use 6 credit hours of either Special Problems or Undergraduate Research for a minor.
- A maximum of 3 credit hours of transfer credit may be used to satisfy the course requirements for a minor. This includes courses taken at another institution or credit earned through the AP or IB program, assuming the scores meet Georgia Tech minimum standards.
- It is the major advisor's responsibility to verify that students are using only courses from the designated block(s) from the student's major field of study that are allowed to satisfy a minor program, that they are not using any Core Area A-E courses (including humanities and social sciences), and that they are not using any courses for more than one minor or certificate. Any free elective course used to satisfy the course requirements of the student's major degree program may also be used to satisfy the course requirements for a minor.

### Program of Study - Global Engineering Track

#### Required Courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>PUBP 4140</td>
<td>Foundations Leadership</td>
<td>3</td>
</tr>
<tr>
<td>CEE 4803</td>
<td>Special Topics (Global Engineering Leadership &amp; Management)</td>
<td>3</td>
</tr>
</tbody>
</table>

Select at least 3 of the following from the Engineering Track: 1

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CEE 4803</td>
<td>Special Topics (Environmental Quality in Developing Countries)</td>
<td>9</td>
</tr>
<tr>
<td>CEE 4803</td>
<td>Special Topics (Construction Management and Megaprojects)</td>
<td>3</td>
</tr>
<tr>
<td>CEE 4803</td>
<td>Special Topics (Transportation, Cities &amp; Sustainable Development)</td>
<td>3</td>
</tr>
<tr>
<td>CEE 4803</td>
<td>Special Topics (International Disaster Reconnaissance Studies)</td>
<td>3</td>
</tr>
<tr>
<td>CEE 4803</td>
<td>Special Topics (Sustainable Subsurface Infrastructure)</td>
<td>3</td>
</tr>
<tr>
<td>CEE 4803</td>
<td>Special Topics (Energy-Focused Civil Engineering)</td>
<td>3</td>
</tr>
</tbody>
</table>

#### Internship

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTN 3011</td>
<td>Work Abroad Semester (Work Abroad Semester)</td>
<td>3</td>
</tr>
</tbody>
</table>

Total Credit Hours 15

1 See below list of approved Special Topic courses. Students may use up to 12 hours of Special Topics courses from approved list.

### Approved Special Topics Courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CEE 4803</td>
<td>Special Topics (Environmental Quality in Developing Countries)</td>
<td>3</td>
</tr>
<tr>
<td>CEE 4803</td>
<td>Special Topics (Construction Management and Megaprojects)</td>
<td>3</td>
</tr>
<tr>
<td>CEE 4803</td>
<td>Special Topics (Transportation, Cities &amp; Sustainable Development)</td>
<td>3</td>
</tr>
<tr>
<td>CEE 4803</td>
<td>Special Topics (International Disaster Reconnaissance Studies)</td>
<td>3</td>
</tr>
<tr>
<td>CEE 4803</td>
<td>Special Topics (Sustainable Subsurface Infrastructure)</td>
<td>3</td>
</tr>
<tr>
<td>CEE 4803</td>
<td>Special Topics (Energy-Focused Civil Engineering)</td>
<td>3</td>
</tr>
</tbody>
</table>

A maximum of 3 semester hours of transfer credit may be used to satisfy the course requirements for a minor. This includes courses taken at another institution or credit earned through the AP or IB program, assuming the scores meet Georgia Tech minimum standards.

A maximum of 3 semester hours of Special Topics courses may be included in a minor program or the student may complete 3 semester hours of Special Topics and 3 semester hours of either Special Problems or Undergraduate Research. Students may not use 6 semester hours of either Special Problems or Undergraduate Research for a minor.

Students may also select a Global Engineering Leadership Development Internship.

### Program of Study - Policy Track

#### Required Courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>PUBP 4140</td>
<td>Foundations Leadership</td>
<td>3</td>
</tr>
</tbody>
</table>

Select at least 3 courses from the Policy Track: 9

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHIL 3050</td>
<td>Political Philosophy</td>
<td>3</td>
</tr>
<tr>
<td>PUBP 2010</td>
<td>Political Processes</td>
<td>3</td>
</tr>
<tr>
<td>PUBP 2030</td>
<td>Organizations and Policy</td>
<td>3</td>
</tr>
<tr>
<td>PUBP 4803</td>
<td>Special Topics</td>
<td>3</td>
</tr>
</tbody>
</table>

#### Internship

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>PUBP 4651</td>
<td>Public Policy Internship</td>
<td>3</td>
</tr>
</tbody>
</table>

Total Credit Hours 15

1 See below list of approved Special Topic courses. Students may use up to 12 hours of Special Topics courses from approved list.

### Approved Special Topics Courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>PUBP 4803</td>
<td>Ethical Responsibility in Leadership</td>
<td>3</td>
</tr>
<tr>
<td>PUBP 4813</td>
<td>Managerial and Leadership Skill Building</td>
<td>3</td>
</tr>
<tr>
<td>PSYC 4803</td>
<td>Exploring Multicultural Identities</td>
<td>3</td>
</tr>
</tbody>
</table>

- A maximum of 6 semester hours of Special Topics courses may be included in a minor program or the student may complete 3 semester hours of Special Topics and 3 semester hours of either Special Problems or Undergraduate Research. Students may not use 6 semester hours of either Special Problems or Undergraduate Research for a minor.
- A maximum of 3 semester hours of transfer credit may be used to satisfy the course requirements for a minor.
IB program, assuming the scores meet Georgia Tech minimum standards.

- It is the major advisor's responsibility to verify that students are using only courses from the designated block(s) from the student's major field of study that are allowed to satisfy a minor program, that they are not using any Core Area A-E courses (including humanities and social sciences), and that they are not using any courses for more than one minor or certificate. Any free elective course used to satisfy the course requirements of the student's major degree program may also be used to satisfy the course requirements for a minor.

Minor in Linguistics

The Schools of Modern Languages, Psychology, and Computer Science offer an interdisciplinary minor in Linguistics, housed in the School of Modern Languages. While the students are advised by the Linguistics advisor (Modern Languages), the is delivered by faculty in Modern Languages, Psychology and Computer Science. The minor connects studies of the physical structures and mental processes involved in human language; the psychological, neurobiological, and social/societal factors that enable humans to acquire, use, comprehend and produce language; and the application of computer science to the analysis and synthesis of language and speech. This minor is designed for undergraduates who will enter a wide range of careers, especially, language education, educational design, programming, human/computer interaction, etc.

Students wishing to pursue this minor should declare the minor by filling out the minor change form (http://www.registrar.gatech.edu/students/formlanding/changeminor.php) with the Student Advisor in Modern Languages.

Minor Program of Study & Guidelines (http://www.modlangs.gatech.edu/academics/minors)

Modern Language Minor Information (http://www.modlangs.gatech.edu/degrees/minors-certificates)

Program of Study

Required Course

LING 2100 Intro to Linguistics 3
Select one of the following courses:
LING 3100 Apps of Linguistics 3
PSYC 2760 Human Language Process
PSYC 3012 Intro Cognitive Psyc
PSYC/CS Intro-Cognitive Science 3790
PSYC 4011 Cognitive Psychology
PSYC 4200 Adv Topics-Cognitive Psy
PSYC 4090 Cognitive Neuroscience

Select 9 hours from the following:
FREN 3030 French Phonetics 3
JAPN 4750 Jpn Discourse & Grammar
JAPN 4780 Jpn Applied Linguistics
SPAN 4165 Bilingualism-Span World
SPAN 4170 Span Applied Linguistics
LING 3100 Apps of Linguistics
PSYC 2760 Human Language Process

PSYC 3012 Intro Cognitive Psyc or PSYC 4200 Cognitive Science or CS 3790 Intro-Cognitive Science or PSYC 4090 Cognitive Psychology

Total Credit Hours 15

1 PSYC 4200: given the variety of topics, only when previously approved by Linguistics advisor.

General notes:

- All courses for this minor must be taken on a letter-grade basis and a grade of C or better must be received in each course.
- Nine of the fifteen hours must be at the 3000 level or above.
- Other new courses offered in ML at 3000/4000 may count toward the Minor with approval from the advisor.
- No more than six hours of special topic courses from any discipline or department (CHIN, FREN, JAPN, LING, SPAN, PSYC, or CS) can be counted for the minor, and these courses must be approved by the advisor.
- No more than three hours of coursework can be completed at another university, and this must be approved by the advisor.

Minor in Materials Science and Engineering

The School of Materials Science and Engineering (MSE) offers an undergraduate minor in materials science and engineering for non-MSE majors. The purpose of the minor is to broaden the materials background of non-materials science and engineering students and to introduce them to a materials approach to problem solving that may be different from that provided by their major.

Fifteen hours of MSE courses are required for the minor, of which at least twelve semester hours are upper-division coursework (i.e., courses numbered 3000 or above). The depth of the program of study should ensure that upon completion, the student will have met the educational objectives established for the minor. Many students will be able to complete a considerable portion of the minor requirements by scheduling MSE courses as electives required by their major.

Non-MSE undergraduate majors are encouraged to participate in this program provided they have the appropriate prerequisites and approval of their home school academic advisor. To participate or for additional information, contact the associate chair for Undergraduate Programs in the School of Materials Science and Engineering.

Minor Program of Study & Guidelines (p. 107)

Materials Science Minor Information (http://www.mse.gatech.edu/Academics/Undergraduate/Minor/minor.html)

Program of Study

Select 15 credit hours of MSE coursework 1

Total Credit Hours 15

1 Twelve hours must be 3000-level or higher courses.
Minor in Mathematics

The Mathematics minor consists of 15 semester hours chosen from MATH 2106 and Mathematics courses 3000 level or higher.

For further information, consult the departmental advisor.

Minor Program of Study & Guidelines (p. 107)
Math: Minor Information (http://www.math.gatech.edu/academics/undergraduate/minors)

Program of Study
Mathematics minor requirements
MATH 2106, MATH 3000-level or higher 1 15

1 MATH 2106 is not required but may be used toward the required 15 hours.

General Notes:

- All courses counting toward the minor must be taken on a letter-grade basis and all courses used to satisfy the course requirements for a minor must be completed with a grade of C (2.00) or better.
- A maximum of 3 credit hours of Special Topics courses may be included in a minor program.
- A maximum of 3 credit hours of transfer credit may be used to satisfy the course requirements for a minor. This includes courses taken at another institution or credit earned through the AP or IB program, assuming the scores meet Georgia Tech minimum standards.
- It is the major advisor’s responsibility to verify that students are using only courses from the designated block(s) from the student’s major field of study that are allowed to satisfy a minor program, that they are not using any Core Area A-E courses (including humanities and social sciences), and that they are not using any courses for more than one minor or certificate. Any free elective course used to satisfy the course requirements of the student’s major degree program may also be used to satisfy the course requirements for a minor.

A maximum of 3 semester hours of credit earned by an Advanced Standing Examination can be used to satisfy the course requirements for a minor.

At most one of MATH 3215, MATH 3225, and MATH 3670 can be included in the minor. At most one of MATH 3406 and MATH 4305 can be included in the minor.

Institute undergraduate minor guidelines must be satisfied.

Minor in Middle Eastern and North African Studies

The Schools of History and Sociology, International Affairs, and Modern Languages offer a minor in Middle Eastern and North African Studies. This interdisciplinary minor connects studies of the regions and countries in the Middle East—their languages, their cultures, and their peoples, both concurrently in their national and international relationships as well as longitudinally over the course of history. This minor is designed for undergraduates who will enter a wide range of careers that can lead directly or indirectly to interactions with the people, the social organizations and businesses, and governments of the Middle East and North Africa, both abroad and here in the U.S., especially in terms of the critical technological, social, and policy decisions facing the world today.

Students wishing to pursue this minor should declare the minor by filling out the minor change form (http://www.registrar.gatech.edu/students/formlanding/changeminor.php) with the Student Advisor in Modern Languages.

Minor Program of Study & Guidelines (http://catalog.gatech.edu/degrees/minors-certificates)
Modern Language Minor Information (http://www.modlangs.gatech.edu/undergraduate/minors-certificates)

Program of Study
Select 6 credit hours from the following:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARBC 1501</td>
<td>Understand Arab Culture</td>
</tr>
<tr>
<td>ARBC 2001</td>
<td>Intermediate Arabic I</td>
</tr>
<tr>
<td>&amp; ARBC 2002</td>
<td>Intermediate Arabic II</td>
</tr>
<tr>
<td>ARBC 2813/2823</td>
<td>Special Topics</td>
</tr>
<tr>
<td>PERS courses</td>
<td>Persian Courses</td>
</tr>
<tr>
<td>HTS 2040</td>
<td>Hist Islamic Societies</td>
</tr>
<tr>
<td>HTS 2041</td>
<td>Hist-Modern Middle East</td>
</tr>
<tr>
<td>INTA 2260</td>
<td>Govt Pol Soc-Middle East</td>
</tr>
<tr>
<td>Select 9 credit hours from the following:</td>
<td></td>
</tr>
<tr>
<td>ARBC 3001</td>
<td>Advanced Arabic I</td>
</tr>
<tr>
<td>ARBC 3002/4813</td>
<td>Advanced Arabic II</td>
</tr>
<tr>
<td>ARBC 3813/4813</td>
<td>Special Topics</td>
</tr>
<tr>
<td>HTS 3051</td>
<td>Women &amp; Gender-Middle East</td>
</tr>
<tr>
<td>INTA 3260</td>
<td>Middle East Relations</td>
</tr>
<tr>
<td>HTS 4061</td>
<td>Seminar in Asian History</td>
</tr>
<tr>
<td>HTS 4091</td>
<td>Seminar Global Issues</td>
</tr>
<tr>
<td>INTA</td>
<td>Specil Topics</td>
</tr>
</tbody>
</table>

572  Minor in Mathematics
Notes:

1) All students need to show competency in Arabic or Persian equivalent to having successfully passed ARBC 2002 or PERS 2XXX.

2) A maximum of 6 hours of Special Topics is allowed

3) All courses must be taken on a letter-grade basis and a grade of C or better must be received in each course.

4) No more than three hours of coursework can be completed at another university, and the advisor must approve this.

5) It is the major advisor’s responsibility to verify that students are using only courses from the designated block(s) from the student’s major field of study that are allowed to satisfy a minor program, that they are not using any Core Area A-E courses (including humanities and social sciences), and that they are not using any courses for more than one minor or certificate. Any free elective course selected to satisfy the course requirements of the student’s major degree program may also be used to satisfy the course requirements for a minor.

Minor in Multidisciplinary Design/Arts History

**The College of Design is no longer accepting students into this minor.**

Please contact the academic department for questions.

The College of Design offers a minor for students in all disciplines at Georgia Tech. The program, which is separate from the minor in Architectural History (http://catalog.gatech.edu/academics/minors) offered by the School of Architecture, requires completion of one of three available core survey sequences in the history of design (ARCH 2111 and ARCH 2112 or ARCH 4105 (History of Arch I) and ARCH 4106 (History of Arch II)) or COA 2241 and COA 2242 or ID 2202) in addition to four courses from at least three lists of courses in: history of architecture, the history of industrial design, the history of the city/landscape/garden, history of art and foreign study, and music history. Architecture and Industrial Design program students must select a core survey sequence outside their major, or select two additional electives from approved lists. Interested students should consult with your academic advisor for more information.

In addition, the College of Design offers a separate undergraduate minor in Multidisciplinary Design/Arts History for students in all disciplines at Georgia Tech. The minor requires completion of the following:

**Non-Architecture and Industrial Design Program Students**

Select one core survey sequence from the following: 1 6

<table>
<thead>
<tr>
<th>ID</th>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARCH 2111</td>
<td>History of Arch I &amp; Arch 2112</td>
<td>History of Arch II</td>
</tr>
<tr>
<td>ARCH 4105 or 4106</td>
<td>History or Arch I or History of Arch II</td>
<td></td>
</tr>
<tr>
<td>COA 2241 &amp; COA 2242</td>
<td>History of Art I &amp; History of Art II</td>
<td></td>
</tr>
</tbody>
</table>

ID 2011 & ID 2012: Intro to Design I and Intro to Design II

Select four courses from at least three of the following lists: 1 12

<table>
<thead>
<tr>
<th>List</th>
<th>Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>History of Architecture</td>
<td>ARCH 2111 History of Arch I &amp; ARCH 2112 History of Arch II</td>
</tr>
<tr>
<td>History of Industrial Design</td>
<td>ARCH 4105 History of Arch I &amp; ARCH 4106 History of Arch II</td>
</tr>
<tr>
<td>History of the City/Landscape/Garden</td>
<td>ARCH 4114 Medieval Architecture</td>
</tr>
<tr>
<td>History of Art and Foreign Study</td>
<td>ARCH 4117 Arts and Crafts Arch</td>
</tr>
<tr>
<td>Music History</td>
<td>ARCH 4151 History of Urban Form</td>
</tr>
</tbody>
</table>

Total Credit Hours: 18

1. Architecture and industrial design program students must select a core survey sequence outside their major, or select two additional electives from approved lists.

**History of Architecture**

<table>
<thead>
<tr>
<th>ID</th>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARCH 2111</td>
<td>History of Arch I</td>
<td>3</td>
</tr>
<tr>
<td>ARCH 2112</td>
<td>History of Arch II</td>
<td>3</td>
</tr>
<tr>
<td>ARCH 4105</td>
<td>History of Arch I</td>
<td>3</td>
</tr>
<tr>
<td>ARCH 4106</td>
<td>History of Arch II</td>
<td>3</td>
</tr>
<tr>
<td>ARCH 4114</td>
<td>Medieval Architecture</td>
<td>3</td>
</tr>
<tr>
<td>ARCH 4117</td>
<td>Arts and Crafts Arch</td>
<td>3</td>
</tr>
<tr>
<td>ARCH 4151</td>
<td>History of Urban Form</td>
<td>3</td>
</tr>
<tr>
<td>ARCH 4821 Spec Top-Hist,Theor&amp;Crit 2</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>ARCH 4822 Spec Top-Hist,Theor&amp;Crit 2</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>ARCH 4823 Spec Top-Hist,Theor,Crit 2</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

2. With approval

**History of Industrial Design**

<table>
<thead>
<tr>
<th>ID</th>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ID 2202</td>
<td>Hist-Modern Indust Dsgn</td>
<td>3</td>
</tr>
<tr>
<td>ID 3801</td>
<td>Special Topics</td>
<td>3</td>
</tr>
<tr>
<td>ID 3802</td>
<td>Special Topics</td>
<td>3</td>
</tr>
<tr>
<td>ID 4204</td>
<td>Theorizing Design</td>
<td>3</td>
</tr>
<tr>
<td>ID 4205</td>
<td>French Design &amp; Culture</td>
<td>3</td>
</tr>
<tr>
<td>ID 4803</td>
<td>Special Topics-Furniture</td>
<td>3</td>
</tr>
<tr>
<td>ID 4804</td>
<td>Special Topics</td>
<td>3</td>
</tr>
<tr>
<td>ID 4805</td>
<td>Special Topics</td>
<td>3</td>
</tr>
</tbody>
</table>

3. With approval

**History of the City/Landscape/Garden**

<table>
<thead>
<tr>
<th>ID</th>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARCH 4151</td>
<td>History of Urban Form</td>
<td>3</td>
</tr>
<tr>
<td>ARCH 4821 Spec Top-Hist,Theor&amp;Crit 4</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>ARCH 4822 Spec Top-Hist,Theor,Crit 4</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>ARCH 4823 Spec Top-Hist,Theor,Crit 4</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>CP 4010</td>
<td>Found-Urban&amp;Region Devel</td>
<td>3</td>
</tr>
<tr>
<td>CP 4020</td>
<td>Intro-Urban&amp;Region Plan</td>
<td>3</td>
</tr>
<tr>
<td>CP 4040</td>
<td>City in Fiction &amp; Film</td>
<td>3</td>
</tr>
</tbody>
</table>

4. With approval

**History of Art and Foreign Study**

<table>
<thead>
<tr>
<th>ID</th>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARCH 2115</td>
<td>Modern Arch &amp; Art</td>
<td>3</td>
</tr>
<tr>
<td>COA 1060</td>
<td>Intro-Design&amp;Built Env</td>
<td>3</td>
</tr>
<tr>
<td>COA 2215</td>
<td>COA Course</td>
<td>3</td>
</tr>
</tbody>
</table>
Minor in Music (General)

Requirements

• Students seeking admission to one of the Music Minor Degree Programs must be a full-time Georgia Tech student or have transferred from another institution.
• A written application and interview are required if no applied lessons are included in the Minor plan.
• A written application, interview, and formal audition are required if applied lessons are to be approved as part of the plan.
• Curriculum consists of 15 credit hours (6 hours required from Foundation Course Options and 9 credit hours of Music courses approved by Music Minor Coordinator).

Interview/Applied Lesson Audition

Applicants for the Music Minor [General Emphasis] and the Music Technology Minor will complete an interview with the Music Minor Coordinator. If applied lessons are to be included in the Music Minor [General Emphasis] applicants must complete an audition and interview at least one semester prior to admittance to the program. Auditions must be scheduled with the Music Minor Program Coordinator.

Curriculum

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MUSI 3450</td>
<td>Survey-Music Technology</td>
<td>3</td>
</tr>
<tr>
<td>MUSI 3610</td>
<td>Composers 1500-1800</td>
<td>2</td>
</tr>
<tr>
<td>MUSI 3611</td>
<td>Symphony Orchestra</td>
<td>1</td>
</tr>
<tr>
<td>MUSI 3801</td>
<td>Special Topics 5</td>
<td>1</td>
</tr>
<tr>
<td>MUSI 3802</td>
<td>Special Topics 5</td>
<td>2</td>
</tr>
<tr>
<td>MUSI 3803</td>
<td>Special Topics 5</td>
<td>3</td>
</tr>
<tr>
<td>MUSI 4801</td>
<td>Special Topics 5</td>
<td>1</td>
</tr>
<tr>
<td>MUSI 4802</td>
<td>Special Topics 5</td>
<td>2</td>
</tr>
<tr>
<td>MUSI 4803</td>
<td>Special Topics 5</td>
<td>3</td>
</tr>
<tr>
<td>MUSI 4450</td>
<td>Integrat Mus Multimedia</td>
<td>3</td>
</tr>
</tbody>
</table>

With approval

Interested students should see Undergraduate Minor Programs of Study & Guidelines (p. 107) and consult with an academic advisor for more details.

Music History

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MUSI 3410</td>
<td>History of Art I</td>
<td>3</td>
</tr>
<tr>
<td>MUSI 3420</td>
<td>History of Art II</td>
<td>3</td>
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Music Technology

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>MUSI 3450</td>
<td>Survey-Music Technology</td>
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</tr>
<tr>
<td>MUSI 3500</td>
<td>Intro-Computer Music</td>
<td></td>
</tr>
<tr>
<td>MUSI 4450</td>
<td>Integrat Mus Multimedia</td>
<td></td>
</tr>
<tr>
<td>MUSI 4456</td>
<td>Mus Tech Hist&amp;Repertoire</td>
<td></td>
</tr>
<tr>
<td>MUSI 4457</td>
<td>Computational Mus Anly</td>
<td></td>
</tr>
<tr>
<td>MUSI 4458</td>
<td>Comp Music Composition</td>
<td></td>
</tr>
<tr>
<td>MUSI 4459</td>
<td>Dig Signal Process-Music</td>
<td></td>
</tr>
<tr>
<td>MUSI 4630</td>
<td>Music Recording &amp; Mixing</td>
<td></td>
</tr>
<tr>
<td>MUSI 4650</td>
<td>Music &amp; Sound Design</td>
<td></td>
</tr>
<tr>
<td>MUSI 4670</td>
<td>Music Interface Design</td>
<td></td>
</tr>
<tr>
<td>MUSI 4677</td>
<td>Music Percep &amp; Cognition</td>
<td></td>
</tr>
</tbody>
</table>

Research & Special Topics

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MUSI 4699</td>
<td>Undergraduate Research</td>
<td></td>
</tr>
<tr>
<td>MUSI 4803</td>
<td>Special Topics</td>
<td></td>
</tr>
</tbody>
</table>

With approval

• All courses counting toward the minor must be taken on a letter-grade basis.
• All courses used to satisfy the course requirements for a minor must be completed with a grade of C (2.00) or better.
• A maximum of 6 credit hours of Special Topics courses may be included in a minor program or the student may complete 3 credit hours of Special Topics and 3 credit hours of either Special Problems or Undergraduate Research. Students may not use 6 credit hours of either Special Problems or Undergraduate Research for a minor.
• A maximum of 3 credit hours of transfer credit may be used to satisfy the course requirements for a minor. This includes courses taken at...
Written application and formal audition required. Minor in Music (General Emphasis) Program of Study
Written application and formal audition required.

Required Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MUSI 2010</td>
<td>Funds of Musicianship I</td>
<td>3</td>
</tr>
<tr>
<td>MUSI 2011</td>
<td>Funds of Musicianship II</td>
<td>3</td>
</tr>
<tr>
<td>Music Ensemble</td>
<td>Select 3 to 4 credit hours of Music Ensemble at the 3000/4000 level.</td>
<td>3-4</td>
</tr>
<tr>
<td>Music Technology</td>
<td>Select 2 to 5 credit hours from the following:</td>
<td>2-5</td>
</tr>
<tr>
<td>MUSI 3500</td>
<td>Intro-Computer Music</td>
<td>3</td>
</tr>
<tr>
<td>MUSI 4450</td>
<td>Integrat Mus Multimedia</td>
<td>3</td>
</tr>
<tr>
<td>MUSI 4455</td>
<td>Streaming Media</td>
<td>3</td>
</tr>
<tr>
<td>MUSI 4630</td>
<td>Music Recording &amp; Mixing</td>
<td>3</td>
</tr>
<tr>
<td>MUSI 4650</td>
<td>Music &amp; Sound Design</td>
<td>3</td>
</tr>
<tr>
<td>MUSI 4670</td>
<td>Music Interface Design</td>
<td>3</td>
</tr>
</tbody>
</table>

Individual Private Lessons

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MUSI 3710</td>
<td>Ind Applied Instruction</td>
<td>1-5</td>
</tr>
<tr>
<td>MUSI 3720</td>
<td>Ind Applied Instruction</td>
<td>1-5</td>
</tr>
<tr>
<td>MUSI 3730</td>
<td>Ind Applied Instruction</td>
<td>1-5</td>
</tr>
<tr>
<td>MUSI 3740</td>
<td>Ind Applied Instruction</td>
<td>1-5</td>
</tr>
<tr>
<td>MUSI 3750</td>
<td>Ind Applied Instruction</td>
<td>1-5</td>
</tr>
</tbody>
</table>

Total Credit Hours 12-20

- All courses counting toward the minor must be taken on a letter-grade basis.
- All courses used to satisfy the course requirements for a minor must be completed with a grade of C (2.00) or better.
- A maximum of 6 credit hours of Special Topics courses may be included in a minor program or the student may complete 3 credit hours of Special Topics and 3 credit hours of either Special Problems or Undergraduate Research. Students may not use 6 credit hours of either Special Problems or Undergraduate Research for a minor.
- A maximum of 3 credit hours of transfer credit may be used to satisfy the course requirements for a minor. This includes courses taken at another institution or credit earned through the AP or IB program, assuming the scores meet Georgia Tech minimum standards.
- It is the major advisor’s responsibility to verify that students are using only courses from the designated block(s) from the student’s major field of study that are allowed to satisfy a minor program, that they are not using any Core Area A-E courses (including humanities and social sciences), and that they are not using any courses for more than one minor or certificate. Any free elective course used to satisfy the course requirements of the student’s major degree program may also be used to satisfy the course requirements for a minor.

Ensemble Performance
The Music Minor and Music Performance Minors require a minimum of 3 semesters in ONE of the following ensemble tracks and must be completed at the MUSI 3000 level or above. Therefore, a student must be enrolled in the ensemble for three semesters during their junior and senior years. The ensemble tracks include:

- Wind Ensemble and/or Concert Band
- Jazz Ensemble
- Percussion Ensemble
- Orchestra
- Chorale and/or Chamber Choir and/or Men’s Glee Club

Ensemble Clarification
Please note that Instrumental Chamber Ensembles do not apply to the Ensemble Performance course curriculum requirements.

Minor in Music Performance - Program of Study
The Music Performance minor must comprise at least 15 semester hours, of which at least 9 semester hours are upper-division coursework (numbered 3000 or above).

Written application and formal audition required.

Fundamentals of Musicianship

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MUSI 2010</td>
<td>Funds of Musicianship I</td>
<td>3</td>
</tr>
<tr>
<td>MUSI 2011</td>
<td>Funds of Musicianship II</td>
<td>3</td>
</tr>
<tr>
<td>Individual Private Lessons</td>
<td>Select 3 credit hours from the following:</td>
<td>3</td>
</tr>
<tr>
<td>MUSI 3710</td>
<td>Ind Applied Instruction</td>
<td>3</td>
</tr>
<tr>
<td>MUSI 3720</td>
<td>Ind Applied Instruction</td>
<td>3</td>
</tr>
<tr>
<td>MUSI 3730</td>
<td>Ind Applied Instruction</td>
<td>3</td>
</tr>
<tr>
<td>Major Ensemble</td>
<td>Select 4 credit hours at the 3000/4000 level.</td>
<td>4</td>
</tr>
<tr>
<td>Chamber Ensemble</td>
<td>Select 2 credit hours.</td>
<td>2</td>
</tr>
</tbody>
</table>

Total Credit Hours 15

- All courses used to satisfy the course requirements for a minor must be completed with a grade of C (2.00) or better.
• A maximum of 6 credit hours of Special Topics courses may be included in a minor program or the student may complete 3 credit hours of Special Topics and 3 credit hours of either Special Problems or Undergraduate Research. Students may not use 6 credit hours of either Special Problems or Undergraduate Research for a minor.

• A maximum of 3 credit hours of transfer credit may be used to satisfy the course requirements for a minor. This includes courses taken at another institution or credit earned through the AP or IB program, assuming the scores meet Georgia Tech minimum standards.

• It is the major advisor’s responsibility to verify that students are using only courses from the designated block(s) from the student’s major field of study that are allowed to satisfy a minor program, that they are not using any Core Area A-E courses (including humanities and social sciences), and that they are not using any courses for more than one minor or certificate. Any free elective course used to satisfy the course requirements of the student’s major degree program may also be used to satisfy the course requirements for a minor.

Minor in Music Technology

Requirements

• Students seeking admission to one of the Music Minor Degree Programs must be a full-time Georgia Tech student or have transferred from another institution.

• Written application and interview required – no formal audition

• Complete 15 credit hours of course requirements (curriculum below).

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Foundation Course Options</strong></td>
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<tr>
<td></td>
<td>Select two courses from the following:</td>
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</tr>
<tr>
<td>MUSI 2010</td>
<td>Funds of Musicianship I</td>
<td>3</td>
</tr>
<tr>
<td>MUSI 2011</td>
<td>Funds of Musicianship II</td>
<td>3</td>
</tr>
<tr>
<td>MUSI 2525</td>
<td>Intro to Audio Tech I</td>
<td>3</td>
</tr>
<tr>
<td>MUSI 2526</td>
<td>Intro to Audio Tech II</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td><strong>Course Options</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Select three courses from the following:</td>
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</tr>
<tr>
<td>MUSI 3450</td>
<td>Survey-Music Technology</td>
<td></td>
</tr>
<tr>
<td>MUSI 3500</td>
<td>Intro-Computer Music</td>
<td></td>
</tr>
<tr>
<td>MUSI 4450</td>
<td>Integrat Mus Multimedia</td>
<td></td>
</tr>
<tr>
<td>MUSI 4456</td>
<td>Mus Tech Hist&amp;Repertoire</td>
<td></td>
</tr>
<tr>
<td>MUSI 4457</td>
<td>Computational Mus Anly</td>
<td></td>
</tr>
<tr>
<td>MUSI 4458</td>
<td>Comp Music Composition</td>
<td></td>
</tr>
<tr>
<td>MUSI 4459</td>
<td>Dig Signal Process-Music</td>
<td></td>
</tr>
<tr>
<td>MUSI 4630</td>
<td>Music Recording &amp; Mixing</td>
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</tr>
<tr>
<td>MUSI 4650</td>
<td>Music &amp; Sound Design</td>
<td></td>
</tr>
<tr>
<td>MUSI 4670</td>
<td>Music Interface Design</td>
<td></td>
</tr>
<tr>
<td>MUSI 4677</td>
<td>Music Percep &amp; Cognition</td>
<td></td>
</tr>
<tr>
<td>MUSI 4699</td>
<td>Undergraduate Research</td>
<td></td>
</tr>
<tr>
<td>MUSI 4803</td>
<td>Special Topics</td>
<td></td>
</tr>
</tbody>
</table>

Total Credit Hours 18

• All courses counting toward the minor must be taken on a letter-grade basis.

• All courses used to satisfy the course requirements for a minor must be completed with a grade of C (2.00) or better.

• A maximum of 6 credit hours of Special Topics courses may be included in a minor program or the student may complete 3 credit hours of Special Topics and 3 credit hours of either Special Problems or Undergraduate Research. Students may not use 6 credit hours of either Special Problems or Undergraduate Research for a minor.

• A maximum of 3 credit hours of transfer credit may be used to satisfy the course requirements for a minor. This includes courses taken at another institution or credit earned through the AP or IB program, assuming the scores meet Georgia Tech minimum standards.

• It is the major advisor’s responsibility to verify that students are using only courses from the designated block(s) from the student’s major field of study that are allowed to satisfy a minor program, that they are not using any Core Area A-E courses (including humanities and social sciences), and that they are not using any courses for more than one minor or certificate. Any free elective course used to satisfy the course requirements of the student’s major degree program may also be used to satisfy the course requirements for a minor.

For additional information please contact the Music Minor Coordinator, Mr. Benjamin Diden: benjamin.diden@music.gatech.edu (fclark@music.gatech.edu) or 404.894.8944. Alternatively, you can contact the Administrative Coordinator, Corissa Jones at corissa.jones@music.gatech.edu or 404.894.8949.

Minor Program of Study & Guidelines (http://catalog.gatech.edu/academics/minors)


Ensemble Performance

The Music Minor and Music Performance Minors require a minimum of 3 semesters in ONE of the following ensemble tracks and must be completed at the MUSI 3000 level or above. Therefore, a student must be enrolled in the ensemble for three semesters during their junior and senior years. The ensemble tracks include:

• Wind Ensemble and/or Concert Band
• Jazz Ensemble
• Percussion Ensemble
• Orchestra
• Chorale and/or Chamber Choir and/or Men’s Glee Club

Ensemble Clarification

Please note that Instrumental Chamber Ensembles do not apply to the Ensemble Performance course curriculum requirements.

Minor in Music Performance - Plan of Study

Written application and formal audition required.

<table>
<thead>
<tr>
<th>Fundamentals of Musicianship</th>
</tr>
</thead>
<tbody>
<tr>
<td>MUSI 2010</td>
</tr>
<tr>
<td>MUSI 2011</td>
</tr>
</tbody>
</table>

Music Technology

Select 9 credit hours from the following:
Minor in Naval Science

The minor in Naval Science will familiarize the student with basic and advanced concepts of Naval Science with emphasis on naval history, technology, and leadership. The Institute’s motto of “Progress and Service” is embodied in military service. This minor will support the students who plan to serve their country by recognizing their academic achievement outside of their major coursework. The minor will also be used to satisfy the course requirements for a minor. Students who plan to serve their country by recognizing their academic achievement outside of their major coursework. The minor will also be used to satisfy the course requirements for a minor.

Program of Study

Select 15 hours from the following courses:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>NS 1321</td>
<td>Intro to Naval Sciences</td>
<td>3</td>
</tr>
<tr>
<td>NS 1323</td>
<td>Naval History</td>
<td>3</td>
</tr>
<tr>
<td>NS 2321</td>
<td>Naval Leadership I</td>
<td>3</td>
</tr>
<tr>
<td>NS 2323</td>
<td>Navigation</td>
<td>3</td>
</tr>
<tr>
<td>NS 3323</td>
<td>Evolution of Warfare</td>
<td>3</td>
</tr>
<tr>
<td>NS 3325</td>
<td>Naval Weapons Systems</td>
<td>3</td>
</tr>
<tr>
<td>NS 3326</td>
<td>Naval Engineering Sys</td>
<td>3</td>
</tr>
<tr>
<td>NS 4320</td>
<td>Naval Operations</td>
<td>3</td>
</tr>
<tr>
<td>NS 4323</td>
<td>Course NS 4323 Not Found</td>
<td>3</td>
</tr>
<tr>
<td>NS 4322</td>
<td>Naval Leadership II</td>
<td>3</td>
</tr>
</tbody>
</table>

Total Credit Hours 15

A minimum of 9 credit hours of upper-division coursework must constitute the required 15 credit hours of minor coursework. Students may not repeat any course for double credit. Courses may be taken in any order, but students are highly encouraged to complete NS 1321 before enrolling in any other courses.

Minor in Nuclear Radiological Engineering

The Nuclear & Radiological Engineering and Health Physics Program of the Woodruff School offers a certificate and a minor in Nuclear & Radiological Engineering to non-NRE engineering students. These programs provide a general knowledge of Nuclear and Radiological Engineering topics and are valuable for students considering graduate work in Nuclear Engineering or Medical Physics.

Minor Program of Study & Guidelines (p. 107)

Program of Study

The NRE minor must comprise at least 15 credit hours, of which at least 12 credit hours are upper-division coursework (numbered 3000 or above).

Required Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>NRE 3301</td>
<td>Radiation Physics</td>
<td>3</td>
</tr>
<tr>
<td>NRE 3208</td>
<td>Nuclear Reactor Phys I</td>
<td>3</td>
</tr>
<tr>
<td>NRE 3316</td>
<td>Radiation Protection Eng</td>
<td>3</td>
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</table>

Select 6 credit hours from the following:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>NRE 2110</td>
<td>Intro to NRE</td>
<td></td>
</tr>
<tr>
<td>NRE 3112</td>
<td>Radiation Detection</td>
<td></td>
</tr>
<tr>
<td>NRE 4208</td>
<td>Nuclear Reactor Phys II</td>
<td></td>
</tr>
<tr>
<td>NRE 4214</td>
<td>Reactor Engineering</td>
<td></td>
</tr>
<tr>
<td>NRE 4232</td>
<td>NRE Design</td>
<td></td>
</tr>
<tr>
<td>NRE 4234</td>
<td>Nuc Criticality Safe Eng</td>
<td></td>
</tr>
<tr>
<td>NRE 4266</td>
<td>Light Water Reactor Tech</td>
<td></td>
</tr>
<tr>
<td>NRE 4328</td>
<td>Radiation Sources &amp; Appl</td>
<td></td>
</tr>
<tr>
<td>NRE 4404</td>
<td>Rad Assessments&amp;Waste Mgt</td>
<td></td>
</tr>
<tr>
<td>NRE 4610</td>
<td>Plasma Phys &amp; Fusion Engr</td>
<td></td>
</tr>
<tr>
<td>NRE 4750</td>
<td>Diagnostic Imaging Phys</td>
<td></td>
</tr>
<tr>
<td>NRE 4770</td>
<td>Nuclear Chemical Engr</td>
<td></td>
</tr>
</tbody>
</table>

Total Credit Hours 15

• All courses counting toward the minor must be taken on a letter-grade basis.
• Each course used to satisfy the course requirements for a minor must be completed with a grade of C (2.00) or better.
• A maximum of 3 credit hours of transfer credit may be used to satisfy the course requirements for a minor. This includes courses taken at another institution or credit earned through the AP or IB program, assuming the scores meet Georgia Tech minimum standards.
• It is the major advisor’s responsibility to verify that students are using only courses from the designated block(s) from the student’s major field of study that are allowed to satisfy a minor program, that they are not using any Core Area A-E courses (including humanities and social sciences), and that they are not using any courses for more than one minor or certificate. Any free elective course used to satisfy...
the course requirements of the student’s major degree program may also be used to satisfy the course requirements for a minor.

**Minor in Performance Studies**

LMC provides minors in Film and Media Studies, Performance Studies, Science Fiction Studies, and Technical Communication. The School also co-sponsors minors in East Asian Studies; Health, Medicine, and Society; Science, Technology, and Society; and, Women, Science, and Technology.

Students wishing to pursue any of these minors should consult LMC director or associate director of undergraduate studies for detailed information concerning requirements. Courses for all minors are selected from “Courses of Instruction.”

LMC also sponsors a series of certificate programs in American Literature and Culture, Film Studies, and Literary and Cultural Studies. Students should consult the LMC director or associate director of undergraduate studies for detailed information on requirements. The courses for these certificates are among those listed in “Courses of Instruction,” and all fulfill humanities requirements.

LMC and the School of History and Sociology also cooperate in providing a certificate in African American Studies. Students should consult either school for detailed information concerning requirements. Courses for this certificate are selected from among those listed in “Courses of Instruction.”

Minors Program of Study & Guidelines (p. 107)

**Program of Study**

LMC’s minor in Performance Studies minor (PS) entails the study of both the traditional performing arts and of anthropological and sociological conceptions of performance as an intrinsic part of human life. The courses for the PS minor are evenly divided between courses specifically designated as Performance Studies and courses in Film Studies, Media Studies, and Theatre Studies. Students pursuing the minor will receive a solid grounding in Performance Studies as a discipline, the opportunity to explore its connections to related disciplines according to their own interests, and the opportunity for hands-on experience of performance-making.

The Performance Studies minor is comprised of 15 credit hours, of which at least 12 credit hours must be upper-division coursework (numbered 3000 or above).

<table>
<thead>
<tr>
<th>Required Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>LMC 2600 Intro to Perform Studies</td>
</tr>
</tbody>
</table>

**Focused Studies in Performance**

Select one of the following:

| LMC 3262 Performance Studies |
| LMC 3362 Sci, Tech & Performance |
| LMC 3863 Spec Topics-Performance |

<table>
<thead>
<tr>
<th>Seminar</th>
</tr>
</thead>
<tbody>
<tr>
<td>LMC 4600 Seminar Perform Studies</td>
</tr>
</tbody>
</table>

**Theatre, Film, Media Studies, Performance Practicum**

Select two of the following:

| LMC 2400 Intro to Media Studies |
| LMC 2500 Intro to Film |

| Total Credit Hours | 15 |

- All courses counting toward the minor must be taken on a letter-grade basis and completed with a grade of C (2.00) or better.
- This minor is designed to increase the breadth of students’ education. Therefore it is open to all students except those in the CM and LMC majors. CM and LMC majors interested in this topic should consult with their advisors about electing the appropriate degree thread.
- A maximum of 6 credit hours of Special Topics courses may be included in a minor program or the student may complete 3 credit hours of Special Topics and 3 credit hours of either Special Problems or Undergraduate Research. Students may not use 6 credit hours of either Special Problems or Undergraduate Research for a minor.
- A maximum of 3 credit hours of transfer credit may be used to satisfy the course requirements for a minor. This includes courses taken at another institution or credit earned through the AP or IB program, assuming the scores meet Georgia Tech minimum standards.
- It is the major advisor’s responsibility to verify that students are using only courses from the designated block(s) from the student’s major field of study that are allowed to satisfy a minor program, that they are not using any Core Area A-E courses (including humanities and social sciences), and that they are not using any courses for more than one minor or certificate. Any free elective course used to satisfy the course requirements of the student’s major degree program may also be used to satisfy the course requirements for a minor.

**Minor in Philosophy**

Georgia Tech offers undergraduate courses in philosophy with a particular focus on science and technology. The courses are intended to enable Georgia Tech students to reflect on the nature of their disciplines and to focus their understanding on the context of their lives as professionals and citizens. All Philosophy (PHIL) courses can be used to satisfy the distribution requirement in humanities, and some fulfill a variety of ethics requirements.

Certificate and minor programs in philosophy are available for students who wish to concentrate coursework in this field. The certificate program consists of twelve hours of coursework and the minor of fifteen hours.

**Program of Study**

**Required Courses**

| PHIL 3103 Modern Philosophy | 3 |

| Total Credit Hours | 15 |
Minor Program of Study & Guidelines (p. 107)

Program of Study

The physics minor consists of 15 credit hours. At most 3 credit hours of laboratory may be included among the 15 credit hours.

Required Courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS 2213</td>
<td>Intro to Modern Physics</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 3143</td>
<td>Quantum Mechanics I</td>
<td>3</td>
</tr>
</tbody>
</table>

Select one of the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS 3201</td>
<td>Classical Mechanics I</td>
</tr>
<tr>
<td>PHYS 3122</td>
<td>Electro &amp; Magnetostatics</td>
</tr>
<tr>
<td>PHYS 3141</td>
<td>Thermodynamics</td>
</tr>
</tbody>
</table>

Electives

Select elective PHYS courses to fulfill 15 credit hour requirement. 1

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHIL 3050</td>
<td>Philosophy of Science</td>
</tr>
<tr>
<td>PHYS 3141</td>
<td>Classical Mechanics I</td>
</tr>
<tr>
<td>PHYS 3122</td>
<td>Electro &amp; Magnetostatics</td>
</tr>
<tr>
<td>PHYS 3141</td>
<td>Thermodynamics</td>
</tr>
</tbody>
</table>

Total Credit Hours

15

1 3000 and 4000 level courses.

- All courses counting toward the minor must be taken on a letter-grade basis.
- All courses used to satisfy the course requirements for a minor must be completed with a grade of C (2.00) or better.
- A maximum of 6 credit hours of Special Topics courses may be included in a minor program or the student may complete 3 credit hours of Special Topics and 3 credit hours of either Special Problems or Undergraduate Research. Students may not use 6 credit hours of either Special Problems or Undergraduate Research for a minor.
- A maximum of 3 credit hours of transfer credit may be used to satisfy the course requirements for a minor. This includes courses taken at another institution or credit earned through the AP or IB program, assuming the scores meet Georgia Tech minimum standards.
- It is the major advisor’s responsibility to verify that students are using only courses from the designated block(s) from the student’s major field of study that are allowed to satisfy a minor program, that they are not using any Core Area A-E courses (including humanities and social sciences), that they are not using any courses for more than one minor or certificate. Any free elective course used to satisfy the course requirements of the student’s major degree program may also be used to satisfy the course requirements for a minor.

Minor in Physics

A minor in physics is intended to provide an in-depth study of physics to non-physics majors entering into a global and diverse workforce where a multidisciplinary science and engineering background is increasingly common. It will also serve those students who, through elective physics course studies, have developed a greater interest in the discipline, or who plan to enter graduate school in an area where a strong physics background is useful.

The objective of the minor is to strengthen the student’s knowledge of the fundamental physical concepts underlying all of modern science and engineering. The minor will help the student develop analytical problem-solving skills and reinforce their ability to engage in scientific thinking.

 Minor in Physiology

Physiology is a highly integrative and complex discipline that provides the foundation for careers in many areas of scientific research, engineering design, clinical practice and public policy. As such, the School of Applied Physiology within the College of Sciences supports this minor concentration in Physiology. The School of Applied Physiology already offers a certificate; thus, the ability to offer a minor with a modest increase in credit hours is feasible and within the capacity of the host School. The curriculum includes both core courses and electives that are currently offered, and provides fundamental training in the structure and function of the human body (anatomy and physiology) as well as in-depth areas within the discipline (muscle physiology, exercise physiology,
Minor Program of Study & Guidelines (p. 107)

Program of Study

**Required Courses**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>APPH/BIOL 3753</td>
<td>Anatomy</td>
<td>3</td>
</tr>
<tr>
<td>APPH/BIOL 3754</td>
<td>Anatomy Lab</td>
<td>1</td>
</tr>
<tr>
<td>APPH/BIOL 3755</td>
<td>Human Physiology</td>
<td>3</td>
</tr>
<tr>
<td>APPH/BIOL 3756</td>
<td>Physiology Lab</td>
<td>1</td>
</tr>
</tbody>
</table>

**Electives**

Select a minimum of four credit hours from the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>APPH 2500</td>
<td>Intro to Sport Science</td>
<td>3</td>
</tr>
<tr>
<td>APPH 3000</td>
<td>Survey of Medicine</td>
<td>3</td>
</tr>
<tr>
<td>APPH 4100</td>
<td>Exercise Physiology</td>
<td>3</td>
</tr>
<tr>
<td>APPH 4200</td>
<td>Kinesiology</td>
<td>3</td>
</tr>
<tr>
<td>APPH 4400</td>
<td>Human Neuroanatomy</td>
<td>3</td>
</tr>
<tr>
<td>APPH 4600</td>
<td>Muscle Structure &amp; Plasticity</td>
<td>3</td>
</tr>
<tr>
<td>APPH 4699</td>
<td>Undergraduate Research</td>
<td>3</td>
</tr>
</tbody>
</table>

Select one of the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 3450</td>
<td>Cell Molecular Biology</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 3451</td>
<td>Cell Molecular Biology Lab</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 4446</td>
<td>Animal Physiology</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 4464</td>
<td>Developmental Biology</td>
<td>3</td>
</tr>
<tr>
<td>BMED 3100</td>
<td>Systems Physiology</td>
<td>3</td>
</tr>
<tr>
<td>ECE 4781</td>
<td>Biomed Instrumentation</td>
<td>3</td>
</tr>
<tr>
<td>LMC 3318</td>
<td>Biomedicine &amp; Culture</td>
<td>3</td>
</tr>
<tr>
<td>ME 4757</td>
<td>Biofluid Mechanics</td>
<td>3</td>
</tr>
<tr>
<td>ME 4758</td>
<td>Biosolid Mechanics</td>
<td>3</td>
</tr>
<tr>
<td>PSYC 2230</td>
<td>Abnormal Psychology</td>
<td>3</td>
</tr>
<tr>
<td>PSYC 3020</td>
<td>Biopsychology</td>
<td>3</td>
</tr>
<tr>
<td>PSYC 4100</td>
<td>Behavioral Pharmacology</td>
<td>3</td>
</tr>
</tbody>
</table>

Total Credit Hours: 15

- Students must earn 'C' or higher in each minor course (no pass/fail credits)
- A maximum of 6 credit hours of Special Topics courses may be included in a minor program or the student may complete 3 credit hours of Special Topics and 3 credit hours of either Special Problems or Undergraduate Research. Students may not use 6 credit hours of either Special Problems or Undergraduate Research for a minor.
- A maximum of 3 credit hours of transfer credit may be used to satisfy the course requirements for a minor. This includes courses taken at another institution or credit earned through the AP or IB program, assuming the scores meet Georgia Tech minimum standards.
- It is the major advisor's responsibility to verify that students are using only courses from the designated block(s) from the student's major field of study that are allowed to satisfy a minor program, that they are not using any Core Area A-E courses (including humanities and social sciences), and that they are not using any courses for more than one minor or certificate. Any free elective course used to satisfy the course requirements of the student's major degree program may also be used to satisfy the course requirements for a minor.

**Minor in Political Science**

The discipline of political science is included within the Ivan Allen College within the School of Public Policy and the Sam Nunn School of International Affairs. Undergraduate courses in political science are intended to broaden students' perceptions of political processes and governmental institutions. Many of these courses are taught under the PUBP or INTA prefix. Students should consult with the political science faculty concerning course offerings.

Political science courses may be used to satisfy the distribution requirement in social sciences, including the state-mandated requirement on constitutions of the United States and Georgia. This requirement may be satisfied by examination or completion of:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>POL 1101</td>
<td>Government of the U.S.</td>
<td>3</td>
</tr>
<tr>
<td>PUBP 3000</td>
<td>US Constitutional Issues</td>
<td>3</td>
</tr>
<tr>
<td>INTA 1200</td>
<td>American Government</td>
<td>3</td>
</tr>
<tr>
<td>HIST 2111</td>
<td>United States to 1877</td>
<td>3</td>
</tr>
<tr>
<td>HIST 2112</td>
<td>United States since 1877</td>
<td>3</td>
</tr>
</tbody>
</table>

Total Credit Hours: 3

Certificate and minor programs in political science, administered by the School of Public Policy, are available for students who wish to concentrate coursework in this discipline.

**Required Courses**

Select five of the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTA 2210</td>
<td>Pol Phil &amp; Ideologies</td>
<td>3</td>
</tr>
<tr>
<td>POL 2101</td>
<td>State &amp; Local Government</td>
<td>3</td>
</tr>
<tr>
<td>PHIL 3050</td>
<td>Political Philosophy</td>
<td>3</td>
</tr>
<tr>
<td>PUBP 2012</td>
<td>Foundation-Public Policy</td>
<td>3</td>
</tr>
<tr>
<td>PUBP 3000</td>
<td>US Constitutional Issues</td>
<td>3</td>
</tr>
<tr>
<td>PUBP 3016</td>
<td>Judicial Process</td>
<td>3</td>
</tr>
<tr>
<td>PUBP 3201</td>
<td>Intro To Social Policy</td>
<td>3</td>
</tr>
<tr>
<td>PUBP 3214</td>
<td>African-Amer Politics</td>
<td>3</td>
</tr>
<tr>
<td>PUBP 4120</td>
<td>Survey Research Methods</td>
<td>3</td>
</tr>
<tr>
<td>PUBP 4200</td>
<td>Social Policy Issues</td>
<td>3</td>
</tr>
<tr>
<td>PUBP 4212</td>
<td>Women and Public Policy</td>
<td>3</td>
</tr>
<tr>
<td>PUBP 4226</td>
<td>Business and Government</td>
<td>3</td>
</tr>
<tr>
<td>PUBP 4410</td>
<td>Science, Tech &amp; Pub Policy</td>
<td>3</td>
</tr>
<tr>
<td>PUBP 4416</td>
<td>Critical Issues-Sci &amp; Tech</td>
<td>3</td>
</tr>
<tr>
<td>PUBP 4514</td>
<td>Mass Communications Pol</td>
<td>3</td>
</tr>
</tbody>
</table>

Total Credit Hours: 15

1. Select at least 12 credit hours of upper-division coursework (numbered 3000 or above). A student may seek permission from the School of Public Policy to allow 3 credit hours of upper division coursework taught outside the School to count toward the completion of the minor if that coursework is clearly relevant to Political Science.
Certificate in Political Science

The certificate in political science requires twelve hours of coursework (at least nine hours at the 3000 level), chosen in consultation with the faculty coordinator.

Minor Program of Study & Guidelines (p. 107)

Program of Study

The Political Science minor must comprise at least 15 semester hours, of which at least 12 semester hours are upper-division coursework (numbered 3000 or above).

Required Courses

Select five of the following:¹ 15

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTA 2210</td>
<td>Pol Phil &amp; Ideologies</td>
</tr>
<tr>
<td>POL 2101</td>
<td>State &amp; Local Government</td>
</tr>
<tr>
<td>PHIL 3050</td>
<td>Political Philosophy</td>
</tr>
<tr>
<td>PUBP 2012</td>
<td>Foundation-Public Policy</td>
</tr>
<tr>
<td>PUBP 3000</td>
<td>US Constitutional Issues</td>
</tr>
<tr>
<td>PUBP 3016</td>
<td>Judicial Process</td>
</tr>
<tr>
<td>PUBP 3201</td>
<td>Intro To Social Policy</td>
</tr>
<tr>
<td>PUBP 3214</td>
<td>African-Amr Politics</td>
</tr>
<tr>
<td>PUBP 4120</td>
<td>Survey Research Methods</td>
</tr>
<tr>
<td>PUBP 4200</td>
<td>Social Policy Issues</td>
</tr>
<tr>
<td>PUBP 4212</td>
<td>Women and Public Policy</td>
</tr>
<tr>
<td>PUBP 4226</td>
<td>Business and Government</td>
</tr>
<tr>
<td>PUBP 4410</td>
<td>Science,Tech &amp; Pub Policy</td>
</tr>
<tr>
<td>PUBP 4416</td>
<td>Critical Issues-Sci &amp; Tech</td>
</tr>
<tr>
<td>PUBP 4514</td>
<td>Mass Communications Pol</td>
</tr>
</tbody>
</table>

Total Credit Hours 15

¹ Select at least 12 credit hours of upper-division coursework (numbered 3000 or above). A student may seek permission from the School of Public Policy to allow 3 credit hours of upper division coursework taught outside the School to count toward the completion of the minor if that coursework is clearly relevant to Political Science.

• A course may not be used to satisfy the requirements of more than one minor or certificate.
• All courses counting toward the minor must be taken on a letter-grade basis.
• All courses used to satisfy the course requirements for a minor must be completed with a grade of C (2.00) or better.
• A maximum of 6 credit hours of Special Topics courses may be included in a minor program or the student may complete 3 credit hours of Special Topics and 3 credit hours of either Special Problems or Undergraduate Research. Students may not use 6 credit hours of either Special Problems or Undergraduate Research for a minor.
• A maximum of 3 credit hours of transfer credit may be used to satisfy the course requirements for a minor. This includes courses taken at another institution or credit earned through the AP or IB program, assuming the scores meet Georgia Tech minimum standards.
• It is the major advisor’s responsibility to verify that students are using only courses from the designated block(s) from the student’s major field of study that are allowed to satisfy a minor program, that they are not using any Core Area A-E courses (including humanities and social sciences), and that they are not using any courses for more than one minor or certificate. Any free elective course used to satisfy the course requirements of the student’s major degree program may also be used to satisfy the course requirements for a minor.

Minor in Psychology

A minor in psychology is available to all non-psychology majors. The minor program provides a foundation in research methods and statistics and allows the student to take upper level courses in various areas of psychology. This minor is valuable for students who wish to have a background in psychology while pursuing other majors and considering graduate school in psychology or related fields. Further information is available on the School’s web site.

Minor Program of Study & Guidelines (p. 107)

Program of Study

Required Courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSYC 2015</td>
<td>Research Methods¹</td>
<td>4</td>
</tr>
<tr>
<td>PSYC 2020</td>
<td>Psychological Statistics²</td>
<td>4</td>
</tr>
</tbody>
</table>

Electives

Select 15-18 credit hours of electives, at least 12 of which are upper-division. ³

¹ If PSYC 2015 is counted as credit toward another program then it cannot be counted towards the psychology minor. In this case 15 credit hours of Psychology at or above the 3000 level must be taken to complete the psychology minor.
² If PSYC 2020 is not taken (i.e., because some other statistics class has been allowed to replace it), then 15 credit hours of Psychology at or above the 3000 level must be taken to complete the psychology minor.
³ Select at least 12 credit hours of upper-division coursework (numbered 3000 or above).

Excluded Courses

Courses to be excluded from the minor include:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSYC 3031</td>
<td>Exper Analyz of Behavior</td>
<td>4</td>
</tr>
<tr>
<td>PSYC 4031</td>
<td>Applied Experimental Psy</td>
<td>4</td>
</tr>
<tr>
<td>All Special Topics Courses</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All Special Problems Courses</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All Undergraduate Research Courses such as:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PSYC 2699</td>
<td>Undergraduate Research</td>
<td>1-12</td>
</tr>
<tr>
<td>PSYC 4699</td>
<td>Undergraduate Research</td>
<td>1-12</td>
</tr>
</tbody>
</table>

• No more than 6 credit hours of Advanced Standing may be included in a minor program.
• All courses counting toward the minor must be taken on a letter-grade basis.
• All courses used to satisfy the course requirements for a minor must be completed with a grade of C (2.00) or better.
• It is the major advisor’s responsibility to verify that students are using only courses from the designated block(s) from the student’s major field of study that are allowed to satisfy a minor program, that they are not using any Core Area A-E courses (including humanities and social sciences), and that they are not using any courses for more
than one minor or certificate. Any free elective course used to satisfy
the course requirements of the student’s major degree program may
also be used to satisfy the course requirements for a minor.

- The minor will be conferred at the same time the degree is conferred
  and the degree and minor will be recorded on the student’s transcript.
The minor will not appear on the diploma. Minors may not be
conferred retroactively upon students who have graduated.
- A maximum of 3 credit hours of transfer credit may be used to satisfy
  the course requirements for a minor. This includes courses taken at
  another institution or credit earned through the AP or IB program,
  assuming the scores meet Georgia Tech minimum standards.
- A course may not be used to satisfy the requirements of more than
  one minor or certificate.

Minor in Public Policy

There are many interfaces between the realm of public policy and nearly
every program of study at Georgia Tech. Engineering, the sciences,
management, architecture, computing, and the liberal arts are impacted
by – and affect – the decisions made by governments. The minor and
certificate in Public Policy allow Georgia Tech students to develop the
multidisciplinary thinking skills that are needed for strategic decision
making in business and technical professions as well as law and public
policy.

Certificate in Public Policy

The certificate program consists of twelve credit hours of coursework.

Minor Program of Study & Guidelines (p. 107)

Program of Study

Students pursuing the minor should have their program of study
approved in writing by the public policy minor supervisor before enrolling
in a course they intend to count toward the minor. A student may seek
prior permission from the School of Public Policy to allow 3 credit hours
of upper-division coursework in public policy taught outside the School
to count toward the completion of the minor. Contact the School for the
current public policy minor supervisor.

Required Course

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>POL 1101</td>
<td>Government of the U.S.</td>
<td>3</td>
</tr>
</tbody>
</table>

Electives

Select 15 credit hours of PUBP electives, at least 12 of which
are upper-division.

Total Credit Hours 18

1. POL 1101 or equivalent as determined by the administrator of the
   minor program is required in addition to the 15 credit hours for
   the minor.

2. Numbered 3000 or above. A student may seek permission from the
   School of Public Policy to allow 3 credit hours of upper-
   division coursework taught outside the School to count toward the
   completion of the minor if that coursework is clearly relevant to
   Public Policy.

- A course may not be used to satisfy the requirements of more than
  one minor or certificate.
- All courses counting toward the minor must be taken on a letter-
  grade basis.

- All courses used to satisfy the course requirements for a minor must
  be completed with a grade of C (2.00) or better.
- A maximum of 6 credit hours of Special Topics courses may be
  included in a minor program or the student may complete 3 credit
  hours of Special Topics and 3 credit hours of either Special Problems
  or Undergraduate Research. Students may not use 6 credit hours of
  either Special Problems or Undergraduate Research for a minor.
- A maximum of 3 credit hours of transfer credit may be used to satisfy
  the course requirements for a minor. This includes courses taken at
  another institution or credit earned through the AP or IB program,
  assuming the scores meet Georgia Tech minimum standards.
- It is the major advisor’s responsibility to verify that students are using
  only courses from the designated block(s) from the student’s major
  field of study that are allowed to satisfy a minor program, that they
  are not using any Core Area A-E courses (including humanities and
  social sciences), and that they are not using any courses for more
  than one minor or certificate. Any free elective course used to satisfy
  the course requirements of the student’s major degree program may
  also be used to satisfy the course requirements for a minor.

Minor in Robotics

The Schools of Aerospace Engineering, Biomedical Engineering, Electrical
and Computer Engineering, Interactive Computing, and Mechanical
Engineering offer a minor in robotics for students majoring in any
discipline.

The Robotics Minor provides a concentrated experience in the
multidisciplinary field of robotics.

Program of Study

Required Robotics Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 3630</td>
<td>Intro-Perception&amp;Robotic</td>
</tr>
<tr>
<td>ECE 4560</td>
<td>Intro-Automation&amp;Robotic</td>
</tr>
<tr>
<td>ME 4451</td>
<td>Robotics</td>
</tr>
<tr>
<td>ME 4803</td>
<td>Medical Robotics</td>
</tr>
</tbody>
</table>

Elective Courses

Choose at least one course from 2 of the 4 core categories:

Autonomy

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>AE 4552</td>
<td>Intro Humans &amp; Autonomy</td>
</tr>
<tr>
<td>CS 3600</td>
<td>Intro-Artificial Intell</td>
</tr>
<tr>
<td>CS 4641</td>
<td>Machine Learning</td>
</tr>
<tr>
<td>CS 4649</td>
<td>Robot Intelli Planning</td>
</tr>
<tr>
<td>ECE 4555</td>
<td>Embedded&amp;Hybrid Control</td>
</tr>
</tbody>
</table>

Controls

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>AE 3531</td>
<td>Ctrl Sys Analysis&amp;Design</td>
</tr>
<tr>
<td>or ECE 31 Feedback Control Systems</td>
<td></td>
</tr>
<tr>
<td>or ME 44 Control Dynamic Systems</td>
<td></td>
</tr>
<tr>
<td>ECE 4550</td>
<td>Control System Design</td>
</tr>
<tr>
<td>ME 4012</td>
<td>Motion Systems</td>
</tr>
<tr>
<td>ME 4405</td>
<td>Fund of Mechatronics</td>
</tr>
</tbody>
</table>

Mechanics

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>AE 2220</td>
<td>Dynamics</td>
</tr>
<tr>
<td>or CEE 22 Dynamics</td>
<td></td>
</tr>
<tr>
<td>or ME 22 Dynamics of Rigid Bodies</td>
<td></td>
</tr>
</tbody>
</table>
Program of Study

Select 15 hours of Russian coursework  

Total Credit Hours  

1 Students must earn 15 credit hours of language electives in a single language beyond the 2001 course.

2 Students pursuing a minor in Russian Studies should take their electives in at least two different departments/schools (Modern Languages, International Affairs, and/or Literature, Media, and Communication)

3 At least nine credit hours must be taken at the 3000 level or above

- A maximum of 9 credit hours of transfer credit may be used to satisfy the course requirements for a minor. This includes courses taken at another institution or credit earned through the AP or IB program, assuming the scores meet Georgia Tech minimum standards.

- All courses counting toward a minor must be taken on a letter-grade basis, and a grade of C or better must be received in each course.

- A maximum of 6 credit hours of Special Topics courses may be included in a minor program or the student may complete 3 credit hours of Special Topics and 3 credit hours of either Special Problems or RUSS 2699. Students may not use 6 credit hours of either Special Problems or RUSS 2699 for a minor.

- It is the major advisor’s responsibility to verify that students are using only courses from the designated block(s) from the student’s major field of study that are allowed to satisfy a minor program, that they are not using any Core Area A-E courses (including humanities and social sciences), and that they are not using any courses for more than one minor or certificate. Any free elective course used to satisfy the course requirements of the student’s major degree program may also be used to satisfy the course requirements for a minor.

Minor in Science Fiction Studies

LMC provides minors in Film and Media Studies, Performance Studies, Science Fiction Studies, and Technical Communication. The School also co-sponsors minors in East Asian Studies; Health, Medicine, and Society; Science, Technology, and Society; and, Women, Science, and Technology.

Students wishing to pursue any of these minors should consult the LMC director or associate director of undergraduate studies for detailed information concerning requirements. Courses for all minors are selected from "Courses of Instruction."

LMC also sponsors a series of certificate programs in American Literature and Culture, Film Studies, and Literary and Cultural Studies. Students should consult the LMC director or associate director of undergraduate studies for detailed information on requirements. The courses for these certificates are among those listed in "Courses of Instruction," and all fulfill humanities requirements.

LMC and the School of History and Sociology also cooperate in providing a certificate in African American Studies. Students should consult either school for detailed information concerning requirements. Courses for this certificate are selected from among those listed in "Courses of Instruction."

The minor in Science Fiction Studies (SFS) is for students who are interested in learning how people communicate the experience of science and technology across centuries, continents, and cultures. The two core LMC classes required for this minor teach students the history of
science fiction across media. The three electives required to complete this minor enable students to connect their study of science fiction to issues of social justice, ethics, artistic practice, and the historic relations of science, technology, and culture. Students who pursue this minor will develop the analytic skills and creative mindsets that are crucial for graduate school and for advancements in careers ranging from education to engineering.

Please note: This minor is not allowed for BSLMC or BSCM students. LMC and CM students interested in science fiction studies should consult with their advisors about selecting an equivalent degree thread or creating a science fiction studies concentration.

Minor Program of Study & Guidelines (p. 107)

Program of Study

The Science Fiction Studies minor is comprised of at least 15 credit hours, of which at least 9 credit hours are upper-division coursework (numbered 3000 or above).

Required Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>LMC 3214</td>
<td>Science Fiction</td>
<td>3</td>
</tr>
<tr>
<td>LMC 3215</td>
<td>Science Fiction Film TV</td>
<td>3</td>
</tr>
</tbody>
</table>

Electives

Select three of the following: 9

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>LMC 28XX</td>
<td>Special Topics 1</td>
</tr>
<tr>
<td>LMC 3112</td>
<td>Evolution &amp; Industrial Age</td>
</tr>
<tr>
<td>LMC 3118</td>
<td>Sci Tech &amp; American Empire</td>
</tr>
<tr>
<td>LMC 3219</td>
<td>Literature &amp; Medicine</td>
</tr>
<tr>
<td>LMC 3234</td>
<td>Creative Writing</td>
</tr>
<tr>
<td>LMC 3302</td>
<td>Sci, Tech &amp; Ideology</td>
</tr>
<tr>
<td>LMC 3304</td>
<td>Science, Tech &amp; Gender</td>
</tr>
<tr>
<td>LMC 3306</td>
<td>Science, Tech &amp; Race</td>
</tr>
<tr>
<td>LMC 3308</td>
<td>Environment Ecocritic</td>
</tr>
<tr>
<td>LMC 3310</td>
<td>Rhetoric Sci Inquiry</td>
</tr>
<tr>
<td>LMC 3316</td>
<td>Postcolonialism</td>
</tr>
<tr>
<td>LMC 3318</td>
<td>Biomedicine &amp; Culture</td>
</tr>
<tr>
<td>LMC 3352</td>
<td>Film Technology</td>
</tr>
<tr>
<td>LMC 38XX</td>
<td>Special Topics 1</td>
</tr>
</tbody>
</table>

Total Credit Hours 15

1 with approval of the Director of Undergraduate Studies

• All courses counting toward this minor must be taken on a letter-grade basis and courses used to satisfy the course requirements for a minor must be completed with a grade of C (2.00) or better.

• A maximum of 6 credit hours of Special Topics courses may be included in a minor program or the student may complete 3 credit hours of Special Topics and 3 credit hours of either Special Problems or Undergraduate Research. Students may not use 6 credit hours of either Special Problems or Undergraduate Research for a minor.

• A maximum of 3 credit hours of transfer credit may be used to satisfy the course requirements for a minor. This includes courses taken at another institution or credit earned through the AP or IB program, assuming the scores meet Georgia Tech minimum standards.

• It is the major advisor’s responsibility to verify that students are using only courses from the designated block(s) from the student’s major field of study that are allowed to satisfy a minor program, that they are not using any Core Area A-E courses (including humanities and social sciences), and that they are not using any courses for more than one minor or certificate. Any free elective course used to satisfy the course requirements of the student’s major degree program may also be used to satisfy the course requirements for a minor.

Minor in Science, Technology, and Society

LMC provides minors in Film and Media Studies, Performance Studies, and Technical Communication. The School also co-sponsors minors in

• East Asian Studies;
• Health, Medicine, and Society;
• Science, Technology, and Society; and
• Women, Science, and Technology.

Students wishing to pursue any of these minors should consult LMC for detailed information concerning requirements. Courses for all minors are selected from "Courses of Instruction."

LMC also sponsors a series of certificate programs in American Literature and Culture, Film Studies, and Literary and Cultural Studies. Students should consult the LMC director of undergraduate studies for detailed information on requirements. The courses for these certificates are among those listed in "Courses of Instruction," and all fulfill humanities requirements.

LMC and the School of History and Sociology also cooperate in providing a certificate in African American Studies. Students should consult either school for detailed information concerning requirements. Courses for this certificate are selected from among those listed in "Courses of Instruction" and from the list offered by.

The Science, Technology, and Society minor will provide a context for understanding how science and technology fits within our social world, past and present. It offers students a better understanding of how science and technology develop and change, how they are represented and understood in culture, and how various social and historical contexts shape science and technology. This area of study also develops analytical abilities, verbal and written communications skills, and the critical thinking. It is good preparation for a broad array of careers, including business, education, government, and law.

Minor Program of Study & Guidelines (p. 107)

Program of Study

The multi-disciplinary Science, Technology, and Society minor must comprise at least 15 semester hours, of which at least 9 semester hours are upper-division coursework (numbered 3000 or above).

A multidisciplinary minor may contain courses in a student’s major field of study. A maximum of 6 credit hours of such courses may be used to satisfy the course requirements for the minor, provided these courses are not also used to satisfy any course requirement in the student’s major degree program.

Three credit hours taken outside of STS courses may be counted toward the minor, with approval of the HTS minor advisor.
**Required Courses**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>HTS 1081</td>
<td>Engineering in History</td>
</tr>
<tr>
<td>HTS 2080</td>
<td>Intro Hist Disease &amp; Med</td>
</tr>
<tr>
<td>HTS 2081</td>
<td>Scientific Revolution</td>
</tr>
<tr>
<td>HTS 2082</td>
<td>Tech &amp; Sci-Industrial Age</td>
</tr>
<tr>
<td>HTS 2084</td>
<td>Technology and Society</td>
</tr>
<tr>
<td>HTS 2100</td>
<td>Sci, Tech &amp; Modern World</td>
</tr>
<tr>
<td>HTS 3001</td>
<td>American Economic Hist</td>
</tr>
<tr>
<td>HTS 3007</td>
<td>Soc of Work and Industry</td>
</tr>
<tr>
<td>HTS 3020</td>
<td>Gender and Technology</td>
</tr>
<tr>
<td>HTS 3021</td>
<td>Women in Science &amp; Engr</td>
</tr>
<tr>
<td>HTS 3046</td>
<td>Sci Pol Culture Nazi Ger</td>
</tr>
<tr>
<td>HTS 3081</td>
<td>Tech and Environment</td>
</tr>
<tr>
<td>HTS 3082</td>
<td>Sociology of Science</td>
</tr>
<tr>
<td>HTS 3083</td>
<td>Tech &amp; American Society</td>
</tr>
<tr>
<td>HTS 3084</td>
<td>Culture &amp; Technology</td>
</tr>
<tr>
<td>HTS 3085</td>
<td>Law, Technology &amp; Politics</td>
</tr>
<tr>
<td>HTS 3086</td>
<td>Soc of Medicine &amp; Health</td>
</tr>
<tr>
<td>HTS 3087</td>
<td>History of Medicine</td>
</tr>
</tbody>
</table>

Select two of the following:  

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>LMC 3102</td>
<td>The Classical Tradition</td>
</tr>
<tr>
<td>LMC 3104</td>
<td>Age Scientific Discovery</td>
</tr>
<tr>
<td>LMC 3106</td>
<td>Age Sci Revolution</td>
</tr>
<tr>
<td>LMC 3108</td>
<td>Sci Tech &amp; Enlightenment</td>
</tr>
<tr>
<td>LMC 3110</td>
<td>Sci, Tech &amp; Romanticism</td>
</tr>
<tr>
<td>LMC 3112</td>
<td>Evolution &amp; Industrial Age</td>
</tr>
<tr>
<td>LMC 3114</td>
<td>Sci, Tech &amp; Modernism</td>
</tr>
<tr>
<td>LMC 3116</td>
<td>Sci Tech &amp; Postmodernisms</td>
</tr>
<tr>
<td>LMC 3118</td>
<td>Sci Tech &amp; American Empire</td>
</tr>
<tr>
<td>LMC 3214</td>
<td>Science Fiction</td>
</tr>
<tr>
<td>LMC 3219</td>
<td>Literature &amp; Medicine</td>
</tr>
<tr>
<td>LMC 3302</td>
<td>Sci, Tech &amp; Ideology</td>
</tr>
<tr>
<td>LMC 3304</td>
<td>Science, Tech &amp; Gender</td>
</tr>
<tr>
<td>LMC 3306</td>
<td>Science, Tech &amp; Race</td>
</tr>
<tr>
<td>LMC 3308</td>
<td>Environment Ecocritic</td>
</tr>
<tr>
<td>LMC 3318</td>
<td>Biomedicine &amp; Culture</td>
</tr>
<tr>
<td>LMC 3352</td>
<td>Film Technology</td>
</tr>
</tbody>
</table>

Select two of the following:  

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSE 3352</td>
<td>Film Technology</td>
</tr>
</tbody>
</table>

Select three credit hours from any of the above courses:  

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Total Credit Hours**  

The multi-disciplinary Science, Technology, and Society minor must comprise at least 15 credit hours, of which at least 9 credit hours of upper-division coursework (numbered 3000 or above).

- All courses counting toward the minor must be taken on a letter-grade basis and must be completed with a grade of C (2.00) or better.
- A maximum of 6 credit hours of Special Topics courses may be included in a minor program or the student may complete 3 credit hours of Special Topics and 3 credit hours of either Special Problems or Undergraduate Research. Students may not use 6 credit hours of either Special Problems or Undergraduate Research for a minor.
- A maximum of 3 credit hours of transfer credit may be used to satisfy the course requirements for a minor. This includes courses taken at another institution or credit earned through the AP or IB program, assuming the scores meet Georgia Tech minimum standards.

- It is the major advisor’s responsibility to verify that students are using only courses from the designated block(s) from the student’s major field of study that are allowed to satisfy a minor program, that they are not using any Core Area A-E courses (including humanities and social sciences), and that they are not using any courses for more than one minor or certificate. Any free elective course used to satisfy the course requirements of the student’s major degree program may also be used to satisfy the course requirements for a minor.

### Minor in Scientific and Engineering Computing

The Scientific and Engineering Computing minor provides undergraduate students with computational and numerical skills and knowledge to augment their studies in their major programs. Core courses in mathematics and computing provide broad, general skills in numerical methods, algorithms, and scientific software development. Elective courses provide depth in applying numerical computation to problems in the field of the student’s major.

Computational methods are now used routinely in virtually all fields of science and engineering, and are becoming more common in the social sciences. They have become essential to understand natural and human-created phenomena and systems. Computation has been described as the third paradigm for scientific discovery and innovation, along with theory and experimentation. A minor curriculum in computation is a natural complement to major programs in science, engineering and the social sciences.

Minor Program of Study & Guidelines (p. 107)

### Program of Study

A CS Minor application is required.

The Scientific and Engineering Computing minor must comprise at least 15 credit hours, of which at least 9 credit hours are upper-division coursework (numbered 3000 or above).

#### Prerequisites

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 1331</td>
<td>Intro-Object Orient Prog</td>
</tr>
</tbody>
</table>

#### Required Courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>CX 4010</td>
<td>Computational Prob Solv</td>
</tr>
</tbody>
</table>

#### Numerical Methods

Select one of the following:  

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>AE 3090</td>
<td>Numerical Methods For AE</td>
</tr>
<tr>
<td>CHBE 2120</td>
<td>ChE Numerical Methods</td>
</tr>
<tr>
<td>CX 4640</td>
<td>Numerical Analysis I</td>
</tr>
<tr>
<td>MATH 4640</td>
<td>Numerical Analysis I</td>
</tr>
<tr>
<td>ME 2016</td>
<td>Computing Techniques</td>
</tr>
<tr>
<td>MSE 3025</td>
<td>Stats &amp; Numerical Methods</td>
</tr>
</tbody>
</table>

Intro to Parallel Computing

Select one of the following:  

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>CX 4220</td>
<td>Intro High Perf Comp</td>
</tr>
<tr>
<td>CX 4777</td>
<td>Vector &amp; Parallel Sci Comp</td>
</tr>
</tbody>
</table>
Minor in Social Justice

Requirements

Select two of the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>HTS 2016</td>
<td>Soc Issues/Public Policy</td>
</tr>
<tr>
<td>HTS 3005</td>
<td>Amer Environmental Hist</td>
</tr>
<tr>
<td>HTS 3006</td>
<td>United States Labor Hist</td>
</tr>
<tr>
<td>HTS 3008</td>
<td>Class, Power &amp; Inequality</td>
</tr>
<tr>
<td>HTS 3011</td>
<td>City in American Hist</td>
</tr>
<tr>
<td>HTS 3016</td>
<td>Women &amp; Gender in U.S.</td>
</tr>
</tbody>
</table>

1 CS 1331 is a prerequisite for the minor and must be taken, but not included in the required 15 credit hours. A grade of A or B is required.

2 Computer engineering students should take both CX 4220 and CX 4777/MATH 4777 rather than CX 4010.

3 If Numerical Methods is required by the student’s Major, then the student may take an additional elective. Numerical Methods courses include (ECE and computer engineering students are restricted to taking AE 3090, CX 4640/MATH 4640, or MSE 3025)

- No Special Problems or Internships coursework may be used towards the CS minor.
- A grade of A or B is required for CS 1331. All courses used to satisfy the course requirements for a minor must be completed with a grade of C (2.00) or better.
- All courses counting toward the minor must be taken on a letter-grade basis.
- A maximum of 3 credit hours of transfer credit may be used to satisfy the course requirements for a minor. This includes courses taken at another institution or credit earned through the AP or IB program, assuming the scores meet Georgia Tech minimum standards.
- If it is the major advisor’s responsibility to verify that students are using only courses from the designated block(s) from the student’s major field of study that are allowed to satisfy a minor program, that they are not using any Core Area A-E courses (including humanities and social sciences), and that they are not using any courses for more than one minor or certificate. Any free elective course used to satisfy the course requirements of the student’s major degree program may also be used to satisfy the course requirements for a minor.

Program of Study

A multidisciplinary minor may contain courses in a student’s major field of study. A maximum of 6 credit hours of such courses may be used to satisfy the course requirements for the minor, provided these courses are not also used to satisfy any course requirement in the student’s major degree program.

The multi-disciplinary Social Justice minor must comprise at least 15 credit hours, of which at least 9 credit hours are upper-division coursework (numbered 3000 or above).

Minor in Social Justice

LMC provides minors in Film and Media Studies, Performance Studies, Science Fiction Studies, and Technical Communication. The School also co-sponsors minors in East Asian Studies; Health, Medicine, and Society; Science, Technology, and Society; and, Women, Science, and Technology.

Students wishing to pursue any of these minors should consult LMC director or associate director of undergraduate studies for detailed information concerning requirements. Courses for all minors are selected from "Courses of Instruction."

LMC also sponsors a series of certificate programs in American Literature and Culture, Film Studies, and Literary and Cultural Studies. Students should consult the LMC director or associate director of undergraduate studies for detailed information on requirements. The courses for these certificates are among those listed in "Courses of Instruction," and all fulfill humanities requirements.

LMC and the School of History and Sociology also cooperate in providing a certificate in African American Studies. Students should consult either school for detailed information concerning requirements. Courses for this certificate are selected from among those listed in "Courses of Instruction."

The minor in Social Justice is for undergraduate students who are interested in incorporating an in-depth awareness of social issues into their fields of study and careers. Humanities and social science classes included in the minor address issues of equity and inclusiveness in relation to historical, cultural, social, economic, political, and/or techno-scientific factors. Students develop the analytic skills, social understanding, and creative mindsets needed to become informed, ethical, and innovative problem solvers and leaders in an increasingly global and technological world. The minor in Social Justice supports the missions of the Institute’s Strategic Plan and its Quality Enhancement Plan.

Minor Program of Study & Guidelines (p. 107)
Minor in Sociology

For students in other majors interested in broadening their educational experience at Georgia Tech, the School of History and Sociology offers minors in history; sociology; Health, Medicine, and Society; Science, Technology, and Society; Sports, Society, and Technology; and participates in the interdisciplinary minors in Social Justice; and Women, Science, and Technology.

The study of sociology develops analytical abilities, verbal and written communication skills, and invaluable critical tools for understanding the contemporary world. Sociology is good preparation for a broad array of careers, including business, education, public administration, and social work.

Minor Program of Study & Guidelines (p. 107)

Program of Study

Select 15 hours of Sociology coursework 1,2,3 15

Total Credit Hours 15

1 At least 9 credit hours must be upper-division coursework (numbered 3000 or above).
2 Three credit hours taken outside of sociology may be counted toward the minor, with the approval of the school.
3 Students majoring in HTS may not minor in Sociology.

- All courses counting toward the minor must be on a letter-grade basis and must be completed with a grade of C (2.00) or better.
- A maximum of 6 credit hours of Special Topics courses may be included in a minor program or the student may complete 3 credit hours of Special Topics and 3 credit hours of either Special Problems or Undergraduate Research. Students may not use 6 credit hours of either Special Problems or Undergraduate Research for a minor.
- A maximum of 3 credit hours of transfer credit may be used to satisfy the course requirements for a minor. This includes courses taken at another institution or credit earned through the AP or IB program, assuming the scores meet Georgia Tech minimum standards.
- It is the major advisor’s responsibility to verify that students are using only courses from the designated block(s) from the student’s major field of study that are allowed to satisfy a minor program, that they are not using any Core Area A-E courses (including humanities and social sciences), and that they are not using any courses for more than one minor or certificate. Any free elective course used to satisfy the course requirements of the student’s major degree program may also be used to satisfy the course requirements for a minor.

Minor in Spanish

The School of Modern Languages offers minors in Chinese, French, German, Japanese, Korean, and Spanish as well as in Russian Studies. This program is designed for students who wish to develop their language skills to at least an intermediate level and to provide themselves with a greater depth than possible with a certificate program.

Students wishing to pursue one or more of these minors should declare the minor by filling out the minor change form (http://
Program of Study
Select 15 hours of Spanish courses 1,2  

<table>
<thead>
<tr>
<th>Total Credit Hours</th>
<th>15</th>
</tr>
</thead>
</table>

1 At least nine hours must be 3000-level or higher.
2 Fifteen hours must be beyond 2002 course.

- A maximum of 9 credit hours of transfer credit may be used to satisfy the course requirements for a minor. This includes courses taken at another institution or credit earned through the AP or IB program, assuming the scores meet Georgia Tech minimum standards.
- All courses counting toward a minor must be taken on a letter-grade basis, and a grade of C or better must be received in each course.
- A maximum of 6 credit hours of Special Topics courses may be included in a minor program or the student may complete 3 credit hours of Special Topics and 3 credit hours of either Special Problems or SPAN 2699. Students may not use 6 credit hours of either Special Problems or SPAN 2699 for a minor.
- It is the major advisor’s responsibility to verify that students are using only courses from the designated block(s) from the student’s major field of study that are allowed to satisfy a minor program, that they are not using any Core Area A-E courses (including humanities and social sciences), and that they are not using any courses for more than one minor or certificate. Any free elective course used to satisfy the course requirements of the student’s major degree program may also be used to satisfy the course requirements for a minor.

Minor in Sports, Society, and Technology

For students in other majors interested in broadening their educational experience at Georgia Tech, the School of History and Sociology offers minors in history, sociology; Health, Medicine, and Society; Science, Technology, and Society; Sports, Society, and Technology; and participates in the interdisciplinary minors in Social Justice; and Women, Science, and Technology.

The Sports, Society, and Technology minor draws upon the interdisciplinary field of sports studies and is appealing to undergraduate students interested in the critical, holistic study of sport. The minor includes coursework from such diverse areas as architecture, international studies, applied physiology, business law, economics, history, and sociology. Examples of topics covered in the minor include:

- the legal and economic impact of sports;
- the historical and contemporary relationships between technology, race, nationality, gender and sports;
- sports science, technology and performance; and
- public policy and global sports infrastructure.

Since this curriculum focuses on the critical study of sports, it is particularly attractive for those interested in acquiring the breadth of knowledge and critical thinking skills that numerous employers say they are seeking in college graduates. SST coursework also helps students become innovative leaders in our local and global communities. Therefore SST coursework is good preparation for graduate school, community service or a broad array of careers including those in the sports and health industries, education, government and law.

Minor Program of Study & Guidelines (p. 107)

Program of Study
A multidisciplinary minor may contain courses in a student’s major field of study. A maximum of 6 credit hours of such courses may be used to satisfy the course requirements for the minor, provided these courses are not also used to satisfy any course requirement in the student’s major degree program.

In addition to the courses listed here, there are other courses offered less regularly—for example, Special Topics and Undergraduate Research classes—that may count toward the minor. The SST adviser should be consulted for guidance. Three credit hours taken outside of SST courses may be counted toward the minor, with the approval of the SST minor advisor.

Required Courses
Select five of the following: 1

<table>
<thead>
<tr>
<th>Total Credit Hours</th>
<th>15</th>
</tr>
</thead>
<tbody>
<tr>
<td>HTS 2015</td>
<td>History Sports America</td>
</tr>
<tr>
<td>HTS 3022</td>
<td>Gender and Sports</td>
</tr>
<tr>
<td>HTS 3073</td>
<td>Sociology of Sports</td>
</tr>
<tr>
<td>HTS 3075</td>
<td>Foundations Sports Std</td>
</tr>
<tr>
<td>APPH 2500</td>
<td>Intro to Sport Science</td>
</tr>
<tr>
<td>INTA 3242</td>
<td>Soccer &amp; Global Politics</td>
</tr>
<tr>
<td>ECON 4520</td>
<td>Sports Economics</td>
</tr>
<tr>
<td>MGT 4803</td>
<td>Special Topics 3</td>
</tr>
<tr>
<td>ARCH 4803</td>
<td>Special Topics</td>
</tr>
</tbody>
</table>

1 At least 9 credit hours must be at the 3000 level or above.
2 Required prerequisite is ECON 2106.
3 Required prerequisite is MGT 2106, with a grade of C or higher.

- All courses counting toward the minor must be taken on a letter-grade basis and must be completed with a grade of C (2.00) or better.
- A maximum of 6 credit hours of Special Topics courses may be included in a minor program or the student may complete 3 credit hours of Special Topics and 3 credit hours of either Special Problems or Undergraduate Research. Students may not use 6 credit hours of either Special Problems or Undergraduate Research for a minor.
- A maximum of 3 credit hours of transfer credit may be used to satisfy the course requirements for a minor. This includes courses taken at another institution or credit earned through the AP or IB program, assuming the scores meet Georgia Tech minimum standards.
- It is the major advisor’s responsibility to verify that students are using only courses from the designated block(s) from the student’s major field of study that are allowed to satisfy a minor program, that they are not using any Core Area A-E courses (including humanities and social sciences), and that they are not using any courses for more than one minor or certificate. Any free elective course used to satisfy
Minor in Sustainable Cities

The School of City and Regional Planning offers a minor in Sustainable Cities that emphasizes both sustainability and community engagement. It provides students with a deep learning experience that integrates classroom learning and direct real-world community-based project experience in creating a more sustainable built environment.

Program of study

The minor consists of five courses and 15 credit hours. It includes (1) six credits of required coursework, (2) one additional 3-credit elective from the School of City and Regional Planning, and (3) two additional 3-credit electives selected from a list of sustainability and community engagement courses offered in City Planning and related academic disciplines.

Required Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CP 2233</td>
<td>Sustainable Urban Dvmt</td>
<td>3</td>
</tr>
<tr>
<td>CP 4052</td>
<td>Sustainable Cities Studio</td>
<td>3</td>
</tr>
<tr>
<td>CP 4010</td>
<td>Found-Urban&amp;Region Devel</td>
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</tr>
<tr>
<td>CP 4020</td>
<td>Intro-Urban&amp;Region Plan</td>
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</tr>
<tr>
<td>CP 4105</td>
<td>Land Conservation</td>
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</tr>
<tr>
<td>CP 4190</td>
<td>Intro Climate Chng Plan</td>
<td>3</td>
</tr>
<tr>
<td>CP 4210</td>
<td>Envir Plan&amp;Impact Assess</td>
<td>3</td>
</tr>
<tr>
<td>CP 4310</td>
<td>Urban Transportation</td>
<td>3</td>
</tr>
<tr>
<td>CP 4510</td>
<td>Geographic Info Sys</td>
<td>3</td>
</tr>
<tr>
<td>CP 4610</td>
<td>Intro-Real Estate Invest</td>
<td>3</td>
</tr>
<tr>
<td>CP 4620</td>
<td>Housing&amp;Real Estate Econ</td>
<td>3</td>
</tr>
<tr>
<td>CP 4811</td>
<td>Special Topics</td>
<td>3</td>
</tr>
<tr>
<td>CP 4812</td>
<td>Special Topics</td>
<td>3</td>
</tr>
<tr>
<td>CP 4813</td>
<td>Special Topics</td>
<td>3</td>
</tr>
<tr>
<td>CP 4814</td>
<td>Special Topics</td>
<td>3</td>
</tr>
<tr>
<td>CP 4815</td>
<td>Special Topics</td>
<td>3</td>
</tr>
<tr>
<td>CP 6223</td>
<td>Policy Tools-Environ Mgt</td>
<td>3</td>
</tr>
<tr>
<td>CP 6442</td>
<td>Equity,Justice&amp; Econ Dev</td>
<td>3</td>
</tr>
<tr>
<td>CP 6612</td>
<td>Community Development</td>
<td>3</td>
</tr>
<tr>
<td>CP 6630</td>
<td>Govt &amp; Housing Markets</td>
<td>3</td>
</tr>
<tr>
<td>CP 6836</td>
<td>Urban Ecological Design</td>
<td>3</td>
</tr>
<tr>
<td>GT 2803</td>
<td>Special Topics</td>
<td>3</td>
</tr>
<tr>
<td>INTA 2040</td>
<td>Sci,Tech &amp; Int'l Affairs</td>
<td>3</td>
</tr>
<tr>
<td>CEE 2300</td>
<td>Environmental Engr Prin</td>
<td>3</td>
</tr>
<tr>
<td>ARCH 3231</td>
<td>Environmental Systems I</td>
<td>3</td>
</tr>
<tr>
<td>ARCH 4227</td>
<td>Architecture &amp; Ecology</td>
<td>3</td>
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<tr>
<td>ARCH 4151</td>
<td>History of Urban Form</td>
<td>3</td>
</tr>
<tr>
<td>CEE 4300</td>
<td>Environmental Engr Sys</td>
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</tr>
<tr>
<td>PUBP 3315</td>
<td>Environ Policy&amp;Politics</td>
<td>3</td>
</tr>
<tr>
<td>PUBP 3350</td>
<td>Energy Policy</td>
<td>3</td>
</tr>
<tr>
<td>PUBP 3600</td>
<td>Sustain,Tech &amp; Policy</td>
<td>3</td>
</tr>
<tr>
<td>PHIL 4176</td>
<td>Environmental Ethics</td>
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</tr>
<tr>
<td>MGT 4193</td>
<td>Serv Lead Values Systems</td>
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</tr>
<tr>
<td>MGT 4194</td>
<td>Social Entrepreneurship</td>
<td>3</td>
</tr>
</tbody>
</table>

Select nine hours from the following: 1

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>CP 4811</td>
<td>Special Topics</td>
</tr>
<tr>
<td>CP 4812</td>
<td>Special Topics</td>
</tr>
<tr>
<td>CP 4813</td>
<td>Special Topics</td>
</tr>
<tr>
<td>CP 4814</td>
<td>Special Topics</td>
</tr>
<tr>
<td>CP 4815</td>
<td>Special Topics</td>
</tr>
<tr>
<td>CP 6223</td>
<td>Policy Tools-Environ Mgt</td>
</tr>
<tr>
<td>CP 6442</td>
<td>Equity,Justice&amp; Econ Dev</td>
</tr>
<tr>
<td>CP 6612</td>
<td>Community Development</td>
</tr>
<tr>
<td>CP 6630</td>
<td>Govt &amp; Housing Markets</td>
</tr>
<tr>
<td>CP 6836</td>
<td>Urban Ecological Design</td>
</tr>
<tr>
<td>GT 2803</td>
<td>Special Topics</td>
</tr>
</tbody>
</table>

Total Credit Hours 15

1 The list of courses shown above is not exhaustive. With permission of the Chair of the School of City and Regional Planning students may substitute one course with substantial Sustainable Cities content that is not on the above list. All courses previously approved by the Chair will be included on an updated list available from the website of the School of City and Regional Planning.

- A maximum of 3 credit hours of transfer credit may be used to satisfy the course requirements for a minor. This includes courses taken at another institution or credit earned through the AP or IB program, assuming the scores meet Georgia Tech minimum standards.
- All courses counting toward the minor must be taken on a letter-grade basis and must be completed with a grade of C (2.00) or better.
- It is the major advisor’s responsibility to verify that students are using only courses from the designated block(s) from the student’s major field of study that are allowed to satisfy a minor program, that they are not using any Core Area A-E courses (including humanities and social sciences), and that they are not using any courses for more than one minor or certificate. Any free elective course used to satisfy the course requirements of the student’s major degree program may also be used to satisfy the course requirements for a minor.

Minor in Technical Communication

LMC provides minors in Film and Media Studies, Performance Studies, Science Fiction Studies, and Technical Communication. The School also co-sponsors minors in East Asian Studies; Health, Medicine, and Society; Science, Technology, and Society; and, Women, Science, and Technology.

Students wishing to pursue any of these minors should consult LMC director or associate director of undergraduate studies for detailed information concerning requirements. Courses for all minors are selected from “Courses of Instruction.”

LMC also sponsors a series of certificate programs in American Literature and Culture, Film Studies, and Literary and Cultural Studies. Students should consult the LMC director or associate director of undergraduate studies for detailed information on requirements. The courses for these certificates are among those listed in “Courses of Instruction,” and all fulfill humanities requirements.

LMC and the School of History and Sociology also cooperate in providing a certificate in African American Studies. Students should consult either school for detailed information concerning requirements. Courses for this certificate are selected from among those listed in “Courses of Instruction.”

Minor Program of Study & Guidelines (p. 107)

Program of Study

Students must attain an overall GPA of 2.5 in courses for the minor.

BSLMC and BSCM majors are not eligible to elect the Technical Communication minor. LMC and CM students interested in Technical Communication should consult with their advisors about selecting an equivalent degree thread.
Minor in Technology and Business

The curriculum of the Minor in Technology and Business requires the completion of 22 semester credit hours in the course of study shown below. Students who are admitted to the T&M Program satisfy the requirements for a bachelor's degree in their major.

- Business courses for Architecture, Ivan Allen and Sciences students cover such topics as Marketing, Finance, Accounting, and Investments.
- Together with students in Engineering and Business, these Architecture, Ivan Allen and Sciences students take classes on analyzing emerging technologies and managing product and technology development.
- Together with Business, Computing, and Engineering students, these Architecture, Ivan Allen and Sciences students take an integrated capstone project course, where interdisciplinary teams focus on a specific problem posed by one of the program's corporate affiliates. These projects address problems involving significant technical and managerial issues.

Program of Study

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Semester Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MGT 3743</td>
<td>Emerging Technologies</td>
<td>3</td>
</tr>
<tr>
<td>MGT 3744</td>
<td>Mangn Prod Serv Tech Dev</td>
<td>3</td>
</tr>
<tr>
<td>MGT 4741</td>
<td>Int Mgt Dev-Proj Prep</td>
<td>3</td>
</tr>
<tr>
<td>MGT 4742</td>
<td>Tech &amp; Mgt Cap Proj</td>
<td>4</td>
</tr>
<tr>
<td>MGT 3300</td>
<td>Marketing Management I</td>
<td>3</td>
</tr>
<tr>
<td>MGT 3000</td>
<td>Financ &amp; Managerial Acct</td>
<td>3</td>
</tr>
<tr>
<td>MGT 3078</td>
<td>Finance &amp; Investments</td>
<td>3</td>
</tr>
</tbody>
</table>

- A maximum of 6 credit hours of Special Topics courses may be included in a minor program or the student may complete 3 credit hours of Special Topics and 3 credit hours of either Special Problems or Undergraduate Research. Students may not use 6 credit hours of either Special Problems or Undergraduate Research for a minor.
- A maximum of 3 credit hours of transfer credit may be used to satisfy the course requirements for a minor. This includes courses taken at another institution or credit earned through the AP or IB program, assuming the scores meet Georgia Tech minimum standards.
- It is the major advisor's responsibility to verify that students are using only courses from the designated block(s) from the student's major field of study that are allowed to satisfy a minor program, that they are not using any Core Area A-E courses (including humanities and social sciences), and that they are not using any courses for more than one minor or certificate. Any free elective course used to satisfy the course requirements of the student's major degree program may also be used to satisfy the course requirements for a minor.

Minor in Women, Science, and Technology

The Women, Science, and Technology (WST) program does what no other gender studies program does: it links science and technology issues to those issues more traditionally associated with women's studies. The WST minor prepares Tech students (women and men majoring in engineering, science, social sciences, and humanities) to live and work in an increasingly diverse world. The minor helps students develop their understanding of the human side of science and engineering involving not only gender issues, but inequalities of race and class as well.

WST courses reflect on the theoretical and practical dimensions of diversity. Students are encouraged to explore the values associated with scientific culture and to learn to synthesize knowledge across the disciplines, while viewing science and engineering as social and cultural forces that shape relations among women and men.

With permission of the WST coordinators, students may substitute one independent study course or course from another Georgia Tech unit. This may be chosen from special topics courses, seminars, and other courses that focus upon gender and social inequality or social issues of science and technology. Students may register and plan their courses of study for...
the WST minor by meeting with WST coordinators, Carol Colatrella (LMC) or Mary Frank Fox (PUBP). Students petition for the minor at the time they petition for their major degree. Minors are conferred upon graduation and appear on students' transcripts.


Women, Science, and Tech Information (http://www.wst.gatech.edu/wst-minor)

Program of Study

The WST minor must be comprised of at least 15 credit hours. At least 12 of the minor’s 15 credit hours must be upper-division coursework (numbered 3000 or above).

**Required Courses**

Select two courses from two different schools from the following:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>LMC 3304</td>
<td>Science, Tech &amp; Gender</td>
<td>3</td>
</tr>
<tr>
<td>HTS 3020</td>
<td>Gender and Technology</td>
<td>3</td>
</tr>
<tr>
<td>HTS 3021</td>
<td>Women in Science &amp; Engr</td>
<td>3</td>
</tr>
<tr>
<td>PUBP 4212</td>
<td>Women and Public Policy</td>
<td>3</td>
</tr>
<tr>
<td>PUBP 4214</td>
<td>Gender,Sci,Tech&amp;Pub Plcy</td>
<td>3</td>
</tr>
</tbody>
</table>

**Electives**

Select three courses from at least two different Ivan Allen College schools below OR from the Required Courses above:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>History and Sociology</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Literature, Media, and Communication</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public Policy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>International Affairs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Modern Languages</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Economics</td>
<td></td>
<td></td>
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</tbody>
</table>

Total Credit Hours: 15

Only one independent study course from another GT unit can substitute for one elective course.

**History and Sociology**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>HTS 2082</td>
<td>Tech &amp; Sci-Industrial Age</td>
<td>3</td>
</tr>
<tr>
<td>HTS 2084</td>
<td>Technology and Society</td>
<td>3</td>
</tr>
<tr>
<td>HTS 3007</td>
<td>Soc of Work and Industry</td>
<td>3</td>
</tr>
<tr>
<td>HTS 3016</td>
<td>Women &amp; Gender in U.S.</td>
<td>3</td>
</tr>
<tr>
<td>HTS 3017</td>
<td>Sociology of Gender</td>
<td>3</td>
</tr>
<tr>
<td>HTS 3051</td>
<td>Women&amp;Gender-Middle East</td>
<td>3</td>
</tr>
<tr>
<td>HTS 3082</td>
<td>Sociology of Science</td>
<td>3</td>
</tr>
<tr>
<td>HTS 3083</td>
<td>Tech &amp; American Society</td>
<td>3</td>
</tr>
<tr>
<td>HTS 3084</td>
<td>Culture &amp; Technology</td>
<td>3</td>
</tr>
<tr>
<td>HTS 3086</td>
<td>Soc of Medicine &amp; Health</td>
<td>3</td>
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</table>

**Literature, Media, and Communication**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>LMC 2100</td>
<td>Intro to STAC</td>
<td>3</td>
</tr>
<tr>
<td>LMC 2200</td>
<td>Intro to Gender Studies</td>
<td>3</td>
</tr>
<tr>
<td>LMC 3212</td>
<td>Women, Lit &amp; Culture</td>
<td>3</td>
</tr>
<tr>
<td>LMC 3219</td>
<td>Literature &amp; Medicine</td>
<td>3</td>
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**Public Policy**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PUBP 2012</td>
<td>Foundation-Public Policy</td>
<td>3</td>
</tr>
<tr>
<td>PUBP 4410</td>
<td>Science,Tech&amp; Pub Policy</td>
<td>3</td>
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<tr>
<td>PUBP 4416</td>
<td>Critical Issues-Sci&amp;Tech</td>
<td>3</td>
</tr>
<tr>
<td>PUBP 4200</td>
<td>Social Policy Issues</td>
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**International Affairs**

<table>
<thead>
<tr>
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<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>INTA 4803</td>
<td>Special Topics</td>
<td>3</td>
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<tr>
<td>INTA 8803</td>
<td>Special Topics</td>
<td>3</td>
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</table>

**Modern Languages**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>SPAN 3241</td>
<td>Indiv&amp;Family in Hisp Lit</td>
<td>3</td>
</tr>
<tr>
<td>SPAN 3242</td>
<td>Society in Hispanic Lit</td>
<td>3</td>
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</table>

**Economics**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>ECON 2100</td>
<td>Economics and Policy</td>
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<tr>
<td>ECON 2101</td>
<td>The Global Economy</td>
<td>3</td>
</tr>
<tr>
<td>ECON 2105</td>
<td>Prin of Macroeconomics</td>
<td>3</td>
</tr>
<tr>
<td>ECON 2106</td>
<td>Prin of Microeconomics</td>
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</table>

Students can receive credit for either ECON 2100 or ECON 2101, or for ECON 2105/ECON 2106. Students cannot receive credit for ECON 2100 and ECON 2101, or for ECON 2100 and ECON 2105/ECON 2106, or for ECON 2101 and ECON 2105/ECON 2106.

- A maximum of 6 credit hours of Special Topics courses may be included in a minor program or the student may complete 3 credit hours of Special Topics and 3 credit hours of either Special Problems or Undergraduate Research. Students may not use 6 credit hours of either Special Problems or Undergraduate Research for a minor.
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Professional Master's in Applied Systems Engineering

Stay current and build your systems engineering expertise with our Professional Master’s Degree in Applied Systems Engineering, referred to as PMASE.

Work full-time and expand your “systems thinking” skills with this two-year advanced degree from a top 10 public university in the U.S. The convenient hybrid format that blends face-to-face instruction and online learning.

- Be part of a team of students collaborating on project-based learning to overcome systems engineering hurdles and develop real-life solutions.
- Build relationships with supportive peers, dedicated and accessible professors, and network with professionals to form meaningful connections that will have a long-term career impact.
- Immerse yourself in a practical, hands-on approach to learn how to integrate systems engineering processes into your current and future jobs.
- Be inspired and challenged by passionate Georgia Tech faculty and Georgia Tech Research Institute scientists and engineers who offer extensive real-world experience and lead research for industry and government.
- Learn alongside and share insight with other professionals with at least three to five years of experience and diverse perspectives.
- Immediately apply your new knowledge to your job.

The PMASE program is a two year program divided into core curriculum courses and complex systems courses and is delivered in a cohort model. A cohort is a group of students working towards a common degree and taking the same classes on the same schedule through completion of the degree. During the Fall Term of the cohort’s second year in the program, the students select a domain elective from the options available. Currently the elective options available are in the domains of sensors systems (ASE 6111), information systems (ASE 6121) and human systems integration (ASE 6131). The prerequisite for the domain electives is ASE 6006, Systems Engineering Laboratory.

Core Curriculum:
- ASE 6001 Fund Modern Sys Eng 3
- ASE 6002 Systems Design/Analysis 3
- ASE 6003 Modeling/Sim Sys Eng 3
- ASE 6004 Leading Sys Eng Teams 3
- ASE 6005 Adv Topics SE - SysML 3
- ASE 6006 Systems Engineering Lab 3

Complex System Sequence:
- Domain Electives (Choose one): 3
  - ASE 6111 Analysis & Synth-Sensors
  - ASE 6121 Analysis & Synth-InfoSys
  - ASE 6131 Analysis&Synth-HSI
  - ASE 6102 System of Systems & Arch 3
  - ASE 6103 System Lifecycle & Integ 3
  - ASE 6104 Capstone Complex Systems 3

Total Credit Hours 30

Program of study

Core Courses
- ISYE 6380 Prod Plan & Control 3
- ISYE 6381 Mfg Reliability 3
- ISYE 6382 Quality & Six Sigma 3
- ISYE 6383 Manu Supply Chain Ops 3
- MGT 6753 Prin-Mgt for Engineers 3
- MGT 6114 Leadership Development 3
- MGT 6107 Leadership & Org Change 3
- MLDR 6800 Manuf Leadership Capstone 3

Elective Courses (Select two courses) 6
- MLDR 6701 Found Forest Bioproducts
- MLDR 8803 Emerging Markets for Forest Bioproducts
- MLDR 8813 Foundational Topics in the Chemical Manufacturing Industry
- MLDR 8823 Emerging Markets for the Chemical Manufacturing Industry

Total Credit Hours 30

Professional Master's in Manufacturing Leadership

Strong operations and facility leaders are vital to a manufacturing company’s success. Set yourself apart through this unique graduate program, which includes ten courses structured in a way that enables you to continue working while enrolled.

- Learn about a variety of topics ranging from technical competencies, including sustainable system design and manufacturing continuous improvement, to leadership skills, like leading change and handling conflict.
- Focus on one class at a time.
- Select an area of concentration: The forest bioproducts track covers various aspects of pulp and paper, biorefining pathways, new biomaterials and biotechnologies, and business competitive analysis and forecasting. The chemical manufacturing track will address foundational technologies as well as emerging processes and markets in the chemical processing industry.
- Wrap up the program with a Capstone course, a comprehensive team-based project that challenges you to tackle a real-world industry problem and present the solution to a company sponsor. Benefit from a hybrid approach that only requires three week-long visits to our main campus in Atlanta. You can obtain the remainder of your two-year education online via pre-recorded lectures and real-time web-conferencing sessions.
- Take advantage of faculty support during virtual office hours.
- Obtain the type of education that only a top-ranked technology and engineering university can provide.

Professional Master's in Occupational Safety and Health

The Professional Master’s in Occupational Safety and Health (PMOSH) program is a terminal degree for industry professionals with 3-5 years of work experience. It is designed to help students develop the skills and knowledge necessary to successfully
define and manage complex safety and health programs. As opposed to a Master of Science degree, which typically has a research focus and serves as a gateway to a PhD program, the PMOSH program provides an applied, practical educational experience through projects, teamwork and industry-relevant case studies. Students gain real-world experience by collaborating in a team environment through a hybrid of online and in-person learning. They learn how to think strategically to determine strengths in their company's safety and health management systems while also identifying areas of risks. The six-semester program is delivered on-line and includes three campus visits where students will collaborate in groups and deliver final presentations at the end of the program. Through the ten-course curriculum, students study topics areas including fundamentals of occupational safety and health (OSH) and its standards, technologies that can be implemented on OSH, communication skills, and business aspects of OSH.

Website: https://pe.gatech.edu/degrees/pmosh?utm_campaign=pmosh-launch-2017

To earn the PMOSH degree, students must complete ten courses.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCP 8803</td>
<td>Special Topics (Fundamentals of Occupational Safety and Health Program Management)</td>
<td>3</td>
</tr>
<tr>
<td>BCP 8813</td>
<td>Special Topics (Industrial Hygiene Principles and Health Hazards)</td>
<td>3</td>
</tr>
<tr>
<td>BCP 8823</td>
<td>Special Topics (Hazardous Materials Management)</td>
<td>3</td>
</tr>
<tr>
<td>BCP 8833</td>
<td>Special Topics (Occupational Safety and Health Principles)</td>
<td>3</td>
</tr>
<tr>
<td>BCP 8843</td>
<td>Special Topics (Advanced Safety Principles)</td>
<td>3</td>
</tr>
<tr>
<td>BCP 8853</td>
<td>Special Topics (Applied Ergonomics)</td>
<td>3</td>
</tr>
<tr>
<td>BCP 6700</td>
<td>Issues Occup Sfty &amp; Hlth</td>
<td>3</td>
</tr>
<tr>
<td>BCP 6800</td>
<td>Culture &amp; Leadership S&amp;H</td>
<td>3</td>
</tr>
<tr>
<td>BCP 6900</td>
<td>Econ Risk Fin Ins Safety</td>
<td>3</td>
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<tr>
<td>BCP 6950</td>
<td>Occu Safety &amp; Health Caps</td>
<td>3</td>
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<tr>
<td>Total Credit Hours</td>
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<td>30</td>
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APPLICATIONS

Admission to the Professional Master's in Occupational Safety and Health (PMOSH) program is based on an applicant's professional experience, prior education, and competencies. Please be sure to fulfill the following requirements and gather the items below before beginning the application process:

1. A bachelor's degree from an accredited school with a competitive GPA of at least 3.0.
2. Proof of English Proficiency (i.e., TOEFL). Exempted if degree was earned from a university where English is the language of instruction.
3. At least one year of professional work experience (post-Bachelor's degree) in a safety and health general industry or construction related fields.
4. Three letters of recommendation. Letters should come from past and current supervisors, outlining your skills and capabilities, and describing why you should be considered for admission.
5. A required essay/statement of purpose (no more than one page). The essay/statement of purpose should include:
   a. Why you should be considered?
   b. What experience you can bring to the program?
   c. What you expect to take away from the program to enhance your professional career?
6. A resume including work and educational experience.
7. An official transcript sent from each accredited school in which you received a degree.

Application deadline, including all supporting documents, is May 1 for the fall cohort.

Professional Master's in Sustainable Electrical Energy

This master's degree is targeted to working engineers in the electrical energy and power industry. The Professional Master's in Sustainable Electrical Energy (PMSEE) program is structured to bring in students in specific cohorts. The degree features six required courses, including a culminating capstone project course, and four elective courses taken by all students in a given cohort and chosen from a selection of ten or more elective courses. Courses are organized in a sequential manner to cover in a comprehensive way the engineering content and industry emerging technologies in sustainable electrical energy. The required core for the PMSEE includes courses on power system operation and control, conventional generation, renewable energy sources, power systems economics, power system planning and reliability, and a capstone project course. Elective courses are chosen from subjects such as power system protection, power electronics, wind energy, smart grids, high voltage engineering, computational intelligence in power, solar energy, nuclear engineering and reactor engineering, fuel cell systems, and energy engineering economics and risk management.
COURSES

Latin (LATN)

LATN 2XXX. Latin Elective. 1-21 Credit Hours.

Accounting (ACCT)

ACCT 2101. Accounting I. 3 Credit Hours.
An introduction to the measurement and financial reporting of organizations and the interpretation of the resulting financial statements. Credit not allowed for MGT 3000 and ACCT 2101.

ACCT 2102. Accounting II. 3 Credit Hours.
The course deals with determining the costs of products and services and using cost information for planning and decision making. Credit not allowed for MGT 3000 and ACCT 2102.

Aerospace Engineering (AE)

AE 1355. Design Competition I. 3 Credit Hours.
Team-oriented aerospace systems design project directed by a faculty advisor. Typically a national student competition in aircraft, rotorcraft, or spacecraft design. Technical role commensurate with freshman standing.

AE 1601. Introduction to AE. 1 Credit Hour.
Overview of aerospace engineering. Common terminology, introduction to use of engineering models, professional and ethical standards and experience with team-based design of aerospace systems. Students cannot receive credit for both AE 1601 and AE 1350.

AE 1750. Intro to Bioengineering. 3 Credit Hours.
An introduction to the field of bioengineering, including the application of engineering principles and methods to problems in biology and medicine, the integration of engineering with biology, and the emerging industrial opportunities. Crosslisted with BMED, CHE, ECE, ME, and MSE 1750.

AE 1XXX. Aerospace Engr Elective. 1-21 Credit Hours.

AE 2010. Thermodyn&Fluids Fundam. 4 Credit Hours.
Thermodynamic and fluid properties. Conservation laws, Isentropic flow, shocks and expansions, introduction to flows with friction and heat transfer. Applications to aerospace devices. Students cannot receive credit for both AE 2010 and AE 3450.

AE 2220. Dynamics. 3 Credit Hours.
Motion of particles and mass center of bodies, kinematics and kinetics of rigid bodies in plane motion, work-energy and impulse-momentum methods, 3-D dynamics of rigid bodies.

AE 2355. Design Competition II. 3 Credit Hours.
Team-oriented aerospace systems design project directed by a faculty advisor. Typically a national student competition in aircraft, rotorcraft, or spacecraft design. Technical role commensurate with sophomore standing.

AE 2610. Intro Exper Methods AE. 1 Credit Hour.
Introduction to laboratory instrumentation and measurement techniques used in aerospace. Basic application of sensor principles, uncertainty analysis, interpretation and analysis of experimental data, and documentation.

AE 2611. Technical Commun for AE. 1 Credit Hour.
Development of technical communication skills required by aerospace engineers. Includes written, oral and visual communication methods.

AE 2698. Research Assistantship. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

AE 2699. Undergraduate Research. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

AE 2801. Special Topics. 1 Credit Hour.
Normally taken by sophomores. Course material devoted to special topics in aerospace engineering.

AE 2802. Special Topics. 2 Credit Hours.
Normally taken by sophomores. Course material is devoted to special topics in aerospace engineering.

AE 2803. Special Topics. 3 Credit Hours.
Normally taken by sophomores. Course material devoted to special topics in aerospace engineering.

AE 2901. Special Problems. 1-21 Credit Hours.
Research topic selected in consultation with advisor. A brief description, endorsed by the faculty advisor, must be approved by the School.

AE 2902. Special Problems. 1-21 Credit Hours.
Research topic selected in consultation with advisor. A brief description, endorsed by the faculty advisor, must be approved by the School.

AE 2903. Special Problems. 1-21 Credit Hours.
Research topic selected in consultation with advisor. A brief description, endorsed by the faculty advisor, must be approved by the School.

AE 2XXX. Aerospace Engr Elective. 1-21 Credit Hours.

AE 3030. Aerodynamics. 4 Credit Hours.
Aerodynamics of airfoils and wings in subsonic, transonic and supersonic flight. Laminar and turbulent boundary layers and effects of viscosity on aerodynamic performance.

AE 3090. Numerical Methods For AE. 3 Credit Hours.
Basic numerical methods in Aerospace Engineering taught in Fortran or C, language instruction included. Numerical integration, interpolation, FFT, linear algebra, initial and boundary value problems.

AE 3120. Intro-Structural Analy. 3 Credit Hours.

AE 3140. Structural Analysis. 3 Credit Hours.
Application to structural analysis. Basic equations of elasticity. Bending, shearing and torsion of thin walled structures. Energy methods for structural analysis and application to finite element theory for trusses and beam structures. Students cannot receive credit for both AE 3140 and AE 3125.

AE 3330. Intro AE Vehicle Perform. 3 Credit Hours.

AE 3340. Design&System Eng Method. 2 Credit Hours.
Overview of aerospace design and systems engineering. Tools to organize the design process and to support design decisions. Introduction to numerical optimization and trade studies.
AE 3355. Design Competition III. 3 Credit Hours.
Team-oriented aerospace systems design project directed by a faculty advisor. Typically a national student competition in aircraft, rotorcraft, or spacecraft design. Technical or leadership role commensurate with junior standing.

AE 3450. Thermodynamics & Comp Flow. 3 Credit Hours.

AE 3521. Flight Dynamics. 4 Credit Hours.
Three-dimensional rigid body dynamics, aircraft and spacecraft equations of motion, principles of static stability and control, dynamic stability of uncontrolled motion, gyroscopic instruments. Students cannot receive credit for both AE 3521 and AE 4531.

AE 3530. Sys Dynamics & Vibration. 3 Credit Hours.
Modeling and analysis of lumped- and distributed-parameter systems, free and forced vibration in mechanical systems, free vibration in structural systems. Students cannot receive credit for both AE 3530 and ME 3017 or AE 3530 and AE 3515.

AE 3531. Ctrl Sys Analysis & Design. 3 Credit Hours.
Control system performance analysis and specifications, classical methods of control system analysis and design, introduction to modern control methods. Students cannot receive credit for AE 3531 and AE 3515 or AE 3531 and ME 4452.

AE 3610. Exper Fluids & Solid Mech. 2 Credit Hours.
Experimental laboratory in solid and fluid mechanics, aerodynamics, propulsion. Emphasis on measurement techniques, analysis and interpretation of data, comparison to analytical predictions, and reporting.

AE 3801. Special Topics. 1 Credit Hour.
Normally taken by juniors. Course material devoted to special topics in aerospace engineering.

AE 3802. Special Topics. 2 Credit Hours.
Normally taken by juniors. Course material devoted to special topics in aerospace engineering.

AE 3803. Special Topics. 3 Credit Hours.
Normally taken by juniors. Course material devoted to special topics in aerospace engineering.

AE 3901. Special Problems. 1-21 Credit Hours.
Research topic selected in consultation with advisor. A brief description, endorsed by the faculty advisor, must be approved by the School.

AE 3902. Special Problems. 1-21 Credit Hours.
Research topic selected in consultation with advisor. A brief description, endorsed by the faculty advisor, must be approved by the School.

AE 3903. Special Problems. 1-21 Credit Hours.
Research topic selected in consultation with advisor. A brief description, endorsed by the faculty advisor, must be approved by the School.

AE 3XXX. Aerospace Engr Elective. 1-21 Credit Hours.

AE 4040. Computational Fluid Dyn. 3 Credit Hours.
Discretization of PDEs, stability and accuracy considerations, iterative and time/space marching schemes, aerospace applications.

AE 4060. Aeroacoustics. 3 Credit Hours.
Concepts and techniques, noise sources, data acquisition and reduction, aeroacoustic resonances, commonalities in the music of wind instruments and sources of aircraft noise, community impact.

AE 4070. Propeller & Rotor Theory. 3 Credit Hours.
A study of the theory and equations used in the design of propellers and helicopter rotors.

AE 4080. Aerothermodynamics. 3 Credit Hours.
Convective heat transfer and viscous drag in high-temperature and high-speed flowfields. Inviscid hypersonic theory, real gas effects, and wall thermal protection strategies.

AE 4170. Struct Integrity & Dura. 3 Credit Hours.
Multiaxial stress states, inelasticity in metals and polymers, yield criteria, metal fatigue, fracture, stress intensity factors, fracture toughness, fatigue crack growth, metal creep, and polymer viscoelasticity.

AE 4220. Aeroelasticity. 3 Credit Hours.
Structural dynamics of one-dimensional systems. Analysis of static aeroelastic phenomena, unsteady aerodynamics, and flutter. Equations of motion for complete aeroelastic systems; solution techniques.

AE 4310. Space Flight Mechanics. 3 Credit Hours.
First course in astrodynamics that encompasses two-body orbital mechanics, orbit determination, orbital maneuvers, orbital prediction, interplanetary trajectories, launch and space vehicle performance and atmospheric entry. Students cannot receive credit for both AE 4310 and AE 4532.

AE 4341. Aircraft Design. 3 Credit Hours.
Aircraft Vehicle Design. Preliminary design or case study of a complete flight vehicle, including a propulsion system, a structural system, and a control system. Students cannot receive credit for both AE 4341 and AE 4350.

AE 4342. Space System Design. 3 Credit Hours.
Spacecraft subsystems and synthesis. Students apply mission and spacecraft design principles in developing a space flight mission concept. Topics may vary. Students cannot receive credit for AE 4342 and AE 4356.

AE 4343. Rotorcraft Design. 3 Credit Hours.
Rotorcraft Vehicle Design. Preliminary design or case study of a complete rotorcraft flight vehicle, including a propulsion system, a structural system, and a control system. Students cannot receive credit for both AE 4343 and AE 4358 or AE 4343 and AE 6333.

AE 4351. AE Design Project II. 3 Credit Hours.
Design methodology further developed and applied. Teams formed to prepare competitive proposals in response to given mission requirements. Designs publicly presented and defended.

AE 4355. Design Competition IV. 3 Credit Hours.
Team-oriented aerospace systems design project directed by a faculty advisor. Typically a national student competition in aircraft, rotorcraft, or spacecraft design. Technical or leadership role commensurate with senior standing.

AE 4370. Life Cycle Cost Analysis. 3 Credit Hours.
Modeling of total cost of complex systems over their entire life cycle. Modeling risk uncertainty for complex energy, environmental, and military systems.

AE 4376. Accident Causation & Safety. 2 Credit Hours.
This course provides an in-depth examination of the multi-disciplinary systems.
AE 4451. Jet & Rocket Propulsion. 3 Credit Hours.

AE 4461. Intro to Combustion. 3 Credit Hours.
Basics of combustion and combustion devices. Chemical thermodynamics, reaction rates, premixed/nonpremixed flames, ignition, stabilization, and pollutants. Applications in turbine, rocket, and internal combustion engines.

AE 4531. Aircraft Flight Dynamics. 3 Credit Hours.
Three-dimensional rigid body dynamics, aircraft equations of motion, static and dynamic stability, flight control design, introduction to aeroelastic phenomena. Students cannot receive credit for both AE 4531 and AE 3521.

AE 4532. Spacecraft Flight Dynam. 3 Credit Hours.
Cover fundamental material in orbit and attitude dynamics. Investigate orbits, rendezvous/intercept maneuvers, interplanetary transfers, attitude coordinates, attitude stability, attitude control, and attitude estimation. Students cannot receive credit for both AE 4532 and AE 4310.

AE 4552. Intro Humans & Autonomy. 3 Credit Hours.
Learn the fundamental principles underlying the functions performed by humans and by autonomous systems in dynamic, complex domains. Credit will not be awarded for both AE 4552 and AE 6552.

AE 4580. Avionics Integration. 3 Credit Hours.
Avionics in modern aerospace vehicle systems, including impact on design and performance. Specific case-studies; covers: navigation, GPS, stability augmentation, radar, health monitoring, databases, human factors, and software.

AE 4610. Dynamics & Control Lab. 2 Credit Hours.
Experiments in dynamics and control related to aerospace engineering topics.

AE 4698. Research Assistantship. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

AE 4699. Undergraduate Research. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

AE 4701. Wind Engineering. 3 Credit Hours.
An introductory course on wind energy and its potential; modeling and design of wind turbines; analysis of the economic benefits of wind turbine systems. Credit not allowed for both AE 4701 and ME 4701.

AE 4757. Biofluid Mechanics. 3 Credit Hours.
Introduction to the study of blood flow in the cardiovascular system. Emphasis on modeling and the potential of flow studies for clinical research application. Crosslisted with CHE and ME 4757.

AE 4758. Biosolid Mechanics. 3 Credit Hours.
The mechanics of living tissue, e.g., arteries, skin, heart muscle, ligament, tendon, cartilage, and bone. Constitutive equations and some simple mechanical models. Mechanics of cells. Applications. Crosslisted with CHE and ME 4758.

AE 4760. Acoustics& Noise Control. 3 Credit Hours.
Study of acoustics related to noise and its control; acoustics terminology wave propagation, wave equation solutions, instrumentation, data processing, room acoustics, noise control, noise legislation. Crosslisted with ME 4760.

AE 4791. Mech Behavior-Composites. 3 Credit Hours.
Stress-strain behavior of composites, property of matrix and reinforcing materials, mechanics of fiber-reinforced composites, lamina and laminate analysis, and mechanical performance. Crosslisted with CEE, CHE, ME, MSE, and PTFE 4791.

AE 4793. Composite Mater& Process. 3 Credit Hours.
Basic principles of selection and design of composite materials and their manufacturing and testing. Cost factors. Laboratory exercises on manufacturing and tests. Crosslisted with CEE, CHE, ME, MSE, and PTFE 4793.

AE 4794. Composite Materials&Mfg. 4 Credit Hours.
Basic principles of selection and sign of composite materials and their manufacturing and testing. Cost factors. Laboratory exercises on manufacturing and tests. Crosslisted with CEE, CHE, ME, MSE, and PTFE 4794.

AE 4801. Special Topics. 1 Credit Hour.
Normally taken by seniors. Course material devoted to special topics in aerospace engineering.

AE 4802. Special Topics. 2 Credit Hours.
Normally taken by seniors. Course material devoted to special topics in aerospace engineering.

AE 4803. Special Topics. 3 Credit Hours.
Normally taken by seniors. Course material devoted to special topics in aerospace engineering.

AE 4804. Spec Topic-Aerospace Egr. 4 Credit Hours.
Normally taken by seniors. Course material devoted to special topics in aerospace engineering.

AE 4883. Special Topics. 3 Credit Hours.

AE 4901. Special Problems. 1-21 Credit Hours.
Research topic selected in consultation with advisor. A brief description, endorsed by the faculty advisor, must be approved by the School.

AE 4902. Special Problems. 1-21 Credit Hours.
Research topic selected in consultation with advisor. A brief description, endorsed by the faculty advisor, must be approved by the School.

AE 4903. Special Problems. 1-21 Credit Hours.
Research topic selected in consultation with advisor. A brief description, endorsed by the faculty advisor, must be approved by the School.

AE 4XXX. Aerospace Engr Elective. 1-21 Credit Hours.

AE 6009. Viscous Fluid Flow. 3 Credit Hours.
 Fundamental conservation laws. Laminar flows, wall-bound and free shear flows. Separation, heat transfer, and compressibility effects. Introduction to flow instability and transition to turbulence.

AE 6012. Turbulent Flows. 3 Credit Hours.

AE 6015. Advanced Aerodynamics. 3 Credit Hours.
Introduce concepts, derivation and application of aerodynamic fundamentals. Emphasis on advanced knowledge in analysis and design of fixed-wing, launch/atmospheric return vehicles, and rotating systems.

AE 6020. High Speed Flow. 3 Credit Hours.
AE 6030. Unsteady Aerodynamics. 3 Credit Hours.
Unsteady potential theory for various speed ranges. Calculation of steady and unsteady aerodynamic loads on airfoils and wings. Vortex flows. Topics of current research interest.

AE 6042. Computational Fluid Dyn. 4 Credit Hours.

AE 6050. Gas Dynamics. 3 Credit Hours.
Defining equations for compressible flows, real gas properties and their effect on the behavior of equilibrium and non-equilibrium flows.

AE 6052. Flow Diagnostics. 3 Credit Hours.
Introduction to experimental techniques; flow visualization; statistical methods; pressure, velocity, temperature, density, particle size, reaction rate measurements. Experiment design, data acquisition, and interpretation. Flow control.

AE 6060. Aeroacoustics. 3 Credit Hours.
Lighthill's theory of aerodynamic noise and extensions, flow/acoustic interactions, feedback phenomenon, supersonic jet noise, aeroacoustics of ducts, propeller noise, helicopter noise, sonic boom.

AE 6070. Rotary Wing Aerodynamics. 3 Credit Hours.
Vortex wake modeling; analytical inflow theories; modern computational methods for rotary wing aerodynamic analysis; aerodynamic noise.

AE 6080. Dynamics of Turbulence. 3 Credit Hours.

AE 6100. Structural Stability I. 3 Credit Hours.

AE 6101. Structural Stability II. 3 Credit Hours.
Buckling of beams on elastic foundations, rings and arches; elasticity theory; torsional buckling of shafts, buckling of plates, circular cylindrical shells, rotating beams, nonconservative problems.

AE 6104. Computational Mechanics. 3 Credit Hours.
Development of finite element methods for linear, static structural analysis. The basic tools of the finite element method. The formulation of various structural elements.

AE 6106. Analysis-Aero Structures. 3 Credit Hours.
This course focuses on the analysis of advanced aerospace structures. Beam theory is reviewed, plate theory is introduced. Classical and energy solutions are presented.

AE 6107. Aerol Structural Elements. 3 Credit Hours.
This course focuses on the analysis of advanced aerospace structures. Beam theory is reviewed. Examples of nonlinear behavior of materials are discussed. Plate theory is introduced; classical and energy solution methods are studied.

AE 6111. Elasticity. 3 Credit Hours.
Stresses and deformations in continuum media. Stress and strain measures used in nonlinear elasticity. Equilibrium equations and energy principles. Nonlinear beam, plate, and shear applications.

AE 6112. Inelastic Response. 3 Credit Hours.

AE 6114. Fundamntl Solid Mechanic. 3 Credit Hours.
Unified overview of fundamental aspects of solid mechanics, from nonlinear continuum mechanics to linear elasticity, including an introduction to energy methods and other special topics.

AE 6115. Fndmntl Aero Struct Anal. 3 Credit Hours.
Overview and fundamentals of aerospace structural analysis, including virtual work and energy methods, buckling and advanced structural theories.

AE 6123. Fiber Reinforce Composite. 3 Credit Hours.
Composite material systems, composite structures including anisotropic plate and shell theory, shear deformation, hygrothermal and interlaminar stresses. Finite element modeling. Design case studies and cost-effective applications for thin-walled sections.

AE 6161. Theory of Plates. 3 Credit Hours.
Development of isotropic and anisotropic plate theories. Classical and energy solutions for various geometrics and loadings. Aerospace applications including elastically coupled composite and sandwich plates.

AE 6162. Shell Structures. 3 Credit Hours.
Analysis of stresses and deformation of shells with and without bending, shells forming surfaces of revolution, asymptote methods, buckling of shells, nonlinear theories.

AE 6165. Prin-Fracture & Fatigue. 3 Credit Hours.

AE 6170. Structural Optimization. 3 Credit Hours.
Mathematical methods of constrained optimization, sensitivity analysis, approximation concepts, decomposition techniques, shape optimization in the context of structural design.

AE 6200. Aeroelasticity. 3 Credit Hours.
Understanding and analysis of aeroelastic phenomena in fixed-wing aircraft, static aeroelasticity, dynamic aeroelasticity, and dynamic response and transient stresses in aircraft structures.

AE 6210. Advanced Dynamics I. 3 Credit Hours.
Kinematics of particles and rigid bodies, angular velocity, inertia properties, holonomic and nonholonomic constraints, generalized forces.

AE 6211. Advanced Dynamics II. 3 Credit Hours.
A continuation of AE 6210. Equations of motion, Newtonian frames, consistent linearization, energy and momentum integrals, collisions, mathematical representation of finite rotation.

AE 6220. Rotorcraft Dynamics. 3 Credit Hours.
Elementary blade dynamics, flip-lag dynamics, ground resonance, structural dynamics of rotating beams, nonlinear elastic blade analysis, harmonic balance and trim, Floquet theory.

AE 6230. Structural Dynamics. 3 Credit Hours.
Dynamic response of single-degree-of-freedom systems, Lagrange's equations; modal decoupling; vibration of Euler-Bernoulli and Timoshenko beams, membranes and plates.
AE 6231. System ID in Struct Dyn. 3 Credit Hours.
System identification by complex exponential methods, poly ref techniques, eigen-realization methods and frequency domain methods. Effects of noise, generalized least squares, and recursive online identification.

AE 6240. Numerical Methods. 3 Credit Hours.
Rayleigh quotient, Rayleigh-Ritz and Galerkin methods; extraction of eigenvalues and eigenvectors; analysis of forced harmonic response; direct time integration of large-scale systems.

AE 6251. Exper Meth-Struct Dynam. 3 Credit Hours.
Experimental methods for measurement of structural vibration, random vibration, analytical methods for analysis of vibration data, applications to single and multi-degree-of-freedom problems.

AE 6252. Smart Structure Control. 3 Credit Hours.
Modeling smart sensors and actuators, development of closed loop models, design of controllers, validation of controllers, application to vibration control, noise control, and shape control.

AE 6253. Flexible Multi-Body Dyn. 3 Credit Hours.
Nonlinear, flexible multi-body dynamic systems, parameterization of finite rotations, strategies for enforcement of holonomic and non-holonomic constraints, formulation of geometrically nonlinear structural elements, time-integration techniques.

AE 6254. Nonlinear Dynamics. 3 Credit Hours.
Nonlinear vibration methods through averaging and multiple scales, bifurcation, periodic and quasi-periodic systems, transition to chaos, characterization of chaotic vibrations, thermodynamics of chaos, chaos control.

AE 6280. Wave Propagation. 3 Credit Hours.
Dilational, equivalent mixed waves; Rayleigh and Lamb waves, reflection, refraction, impact problems, plastic waves, N.D.E., vibration control, numerical methods, finite deformation wave propagation, constitutive equations.

AE 6310. Optimiz Design Engin Sys. 3 Credit Hours.
Introduction to optimization problem formulations for engineering design, algorithms for constrained nonlinear programming, multiobjective and multidisciplinary optimization, and robust design optimization.

AE 6322. Spacecraft Design I. 4 Credit Hours.

AE 6323. Spacecraft Design II. 3 Credit Hours.
Space Vehicle Design methodology further developed and applied. Teams formed to prepare competitive proposals in response to given mission requirements. Designs publicly presented and defended.

AE 6333. Rotorcraft Design I. 3 Credit Hours.
System approach to conceptual design of aerospace systems with emphasis on rotorcraft. Comprehensive methodologies for aerospace vehicle synthesis and sizing. Integration of technologies.

AE 6334. Rotorcraft Design II. 4 Credit Hours.
Students work together on this application to complete the preliminary design stage of a specific rotorcraft. Participants are exposed to disciplinary and interdisciplinary issues.

AE 6343. Aircraft Design I. 3 Credit Hours.
Stochastic approach to conceptual design of aerospace systems with emphasis on aircraft and missiles. Comprehensive methodologies for aerospace vehicle synthesis and sizing. Integration of technologies.
AE 6383. Applied Design Lab. 1 Credit Hour.
Introduction to computing tools and processes used in subsequent applied design courses in graduate fixed wing, rotary wing, and space systems design tracks.

AE 6410. Combustion Dynamics. 3 Credit Hours.
Acoustic wave propagation in inhomogeneous flows, flame-acoustic wave interactions, and control of combustion-driven oscillations.

AE 6412. Turbulent Combustion. 3 Credit Hours.

AE 6414. Multiphase Combustion. 3 Credit Hours.

AE 6440. Turbine Engine Aerotherm. 3 Credit Hours.
Analysis and design of gas turbine engine components including axial flow compressors, turbines, inlets, and nozzles. Heat transfer and turbine blade cooling.

AE 6445. Combustor Fundamentals. 3 Credit Hours.
Examination of the chemical and aerothermodynamic processes that govern gas turbine combustor performance and design. Also fuel injection, noise, emissions, and testing methodologies.

AE 6450. Rocket Propulsion. 3 Credit Hours.
Analysis and design of rocket engines including liquid, solid, hybrid, and advanced propulsion systems.

AE 6451. Electric Propulsion. 3 Credit Hours.
The course provides a solid background of the operating principles, performance characteristics, and design features of the state-of-the-art electric propulsion systems.

AE 6503. Helicopter Stability & Ctrl. 3 Credit Hours.
Helicopter general equations of motion, rotor forces and moments, helicopter stability and control characteristics, handling qualities, flight control system design.

AE 6504. Modern Meth-Flight Ctrl. 3 Credit Hours.
Linear quadratic regulator design. Model following control. Stochastic control. Fixed structure controller design. Applications to aircraft flight control.

AE 6505. Kalman Filtering. 3 Credit Hours.
Probability and random variables and processes; correlation; shaping filters; simulation of sensor errors; Wiener filter; random vectors; covariance propagation; recursive least-squares; Kalman filter; extensions.

AE 6506. Guidance & Navigation. 3 Credit Hours.

AE 6511. Optimal Guidance & Ctrl. 3 Credit Hours.
Euler-Lagrange formulation; Hamilton-Jacobi approach; Pontryagin's minimum principle; Systems with quadratic performance index; Second variation and neighboring extremals; Singular solutions; numerical solution techniques.

AE 6520. Adv Flight Dynamics. 3 Credit Hours.
Reference frames and transformations, general equations of unsteady motion, application to fixed-wing, rotary-wing and space vehicles, stability characteristics, flight in turbulent atmosphere.

AE 6530. Multivar Linear Sys & Ctrl. 3 Credit Hours.
Techniques for analysis and description of multivariable linear systems. Tools for advanced feedback control design for these systems, including computational packages. Credit will not be awarded for both AE 6530 and ECE 6550 or AE 6530 and ME 6401.

AE 6531. Robust Control I. 3 Credit Hours.

AE 6532. Robust Control II. 3 Credit Hours.
Advanced treatment of robustness issues. Controller analysis and design for linear and nonlinear systems with structured and non-structured uncertainty. Reduced-order control, stability, multipliers, and mixed-mu.

AE 6534. Control of AE Structures. 3 Credit Hours.
Advanced treatment of control of flexible structures. Topics include stability of multi-degree-of-freedom systems, passive and active absorbers and isolation, positive real models, and robust control for flexible structures.

AE 6551. Cognitive Engineering. 3 Credit Hours.
Cognitive engineering addresses a range of technologies and work environments that will support human cognitive performance, including information systems, decision support, automation, and intelligent systems.

AE 6552. Adv Humans & Autonomy. 3 Credit Hours.
Establish a deep understanding of the theoretical basis for functions performed by humans and by autonomous systems in dynamic, complex domains.

AE 6561. Reliable Ctrl Software. 3 Credit Hours.
Basic principles of reliable control and embedded software design, with aerospace applications. Programming languages and their specific features covered in student projects.

AE 6571. Air Traffic Control & Mgt. 3 Credit Hours.
Funionalities and technologies of air traffic control and management in the areas of communication, navigation, surveillance; decision aiding, automation; conflict detection resolution; collaborative decision-making.

AE 6580. Nonlinear Control. 3 Credit Hours.

AE 6694. Graduate Internship. 1-21 Credit Hours.
Graduate Internship for which the student is paid.

AE 6701. Wind Engineering. 3 Credit Hours.
An introductory course on wind energy and its potential; modeling and design of wind turbines; analysis of the economic benefits of wind turbine systems. Credit will not be awarded for both AE 6701 and ME 6701.

AE 6721. Eval Human Integ Systems. 3 Credit Hours.
Evaluation of human integrated systems including translating research questions into measurable objectives, overview of evaluation methods and data analysis techniques applicable to such systems. Credit not allowed for both AE 6721 and ISYE 6231.

AE 6760. Acoustics I. 3 Credit Hours.
Fundamental principles governing the generation, propagation, reflection, and transmission of sound waves in fluids. Crosslisted with ME 6760.

AE 6761. Acoustics II. 3 Credit Hours.
Radiation and scattering of sound waves in fluids, duct acoustics, dissipation phenomena. Crosslisted with ME 6761.
AE 6762. Applied Acoustics. 3 Credit Hours.
Mufflers, resonators, acoustic materials, barriers, industrial noise, room acoustics, active noise control. Crosslisted with ME 6762.

AE 6765. Kinetics & Thermo Gases. 4 Credit Hours.
Thermodynamics of nonreacting and reacting gas mixtures. Introductory quantum theory, statistical thermodynamics, and gas kinetic theory. Crosslisted with ME 6765.

AE 6766. Combustion. 3 Credit Hours.
Introductory chemical kinetics, detonations and deflagrations, laminar flame propagation in premixed gases, ignition and quenching, laminar diffusion flames and droplet burning, turbulent reacting flows. Crosslisted with ME 6766.

AE 6767. Adv Topics in Combustion. 3 Credit Hours.
Turbulent combustion, combustion instability and control, solid propellants and explosives, chemical kinetics, pollutant formation and destruction, computational and experimental methods for reacting flows. Crosslisted with ME 6767.

AE 6769. Linear Elasticity. 3 Credit Hours.
Governing equations of linear elasticity, plane elasticity, boundary value problems, airy stress function and complex variable methods, simple three-dimensional solutions. Crosslisted with ME 6769.

AE 6770. Energy Meth-Elast&Plast. 3 Credit Hours.
Applications of energy and variational methods in engineering mechanics to elastic, plastic, and dynamical behavior of deformable bodies. Crosslisted with ME 6770.

AE 6779. Dynamic System Modeling. 3 Credit Hours.
Models of dynamic systems, such as aircraft, ground vehicles and machinery, and manual control. Numerical simulation techniques and applications. Interactive simulators. Student programming project. Crosslisted with ISYE 6779.

AE 6XXX. Aerospace Engr Elective. 1-21 Credit Hours.

AE 7000. Master's Thesis. 1-21 Credit Hours.

AE 7764. Acoustic Propagation. 3 Credit Hours.
Propagation of sound in inhomogeneous fluids; ray acoustics, ocean and atmospheric acoustics, nonlinear acoustics. Crosslisted with ME 7764.

AE 7772. Fund-Fracture Mechanics. 3 Credit Hours.
Advanced study of failure of structural materials under load, mechanics of fracture, and microscopic and macroscopic aspects of the fracture of engineering materials. Crosslisted with CHE, CEE, ME, and MSE 7772.

AE 7773. Adv Fracture Mechanics. 3 Credit Hours.
Nonlinear fracture mechanics including elastic-plastic and time-dependent fracture, advanced test methods, J-integral theory, and extensions. Crosslisted with CEE, CHE, ME, and MSE 7773.

AE 7774. Fatigue-Materials&Struct. 3 Credit Hours.
Mechanical and microstructural aspects of nucleation and growth of cracks under cyclic loading conditions, notch effects, cumulative damage, multiaxial loading, and fatigue crack propagation. Crosslisted with CEE, CHE, ME, and MSE 7774.

AE 7775. Fract&Fatigue-Structures. 3 Credit Hours.

AE 7778. Intro Robotics Research. 3 Credit Hours.
Familiarizes students with the core areas of robotics; mechanics, control, perception, AI, and autonomy. Provides an introduction to the mathematical tools required in robotics research.

AE 7791. Damage & Fail-Composites. 3 Credit Hours.

AE 7792. Mechanics of Composites. 3 Credit Hours.
Anisotropic elasticity, hygrothermal behavior, stress analysis of laminted composites including 3D effects, stress concentrations, free-edge effects, thick laminates, adhesive and mechanical connections, fracture of composites. Crosslisted with CHE, CEE, ME, MSE, and PTFE 7792.

AE 7793. Manufacture-Composites. 3 Credit Hours.
Major manufacturing techniques of metal-ceramic and polymer-matrix composites. Modeling of processes with emphasis on fundamental mechanisms and effects. Crosslisted with CHE, CEE, ME, MSE, and PTFE 7793.

AE 8001. Design Seminar. 1 Credit Hour.
Case studies of existing aerospace systems; assessment of design payoffs and risks; industry experts provide case examples and knowledge transfer to course participants; field trips.

AE 8002. AE Graduate Seminar. 1 Credit Hour.
Introduce AE graduate students to world-class aerospace researchers and topics, discuss and demonstrate basic graduate student resources and skills.

AE 8750. Robotics Research Fnd I. 3 Credit Hours.
Multidisciplinary research course supervised by two robotics faculty from different schools participating in the robotics Ph.D. program.

AE 8751. Robotics Research Fnd II. 3 Credit Hours.
Continuation of AE 8751 (Robotics Research Foundation I).

AE 8801. Special Topics. 1 Credit Hour.
Special topics of current interest.

AE 8802. Special Topics. 2 Credit Hours.
Special topics of current interest.

AE 8803. Special Topics. 3 Credit Hours.
Special topics of current interest.

AE 8804. Special Topics. 4 Credit Hours.
Special topics of current interest.

AE 8805. Special Topics. 5 Credit Hours.
Special topics of current interest.

AE 8883. Special Topics. 3 Credit Hours.

AE 8900. Special Problems. 1-21 Credit Hours.

AE 8901. Special Problems. 1-21 Credit Hours.

AE 8902. Special Problems. 1-21 Credit Hours.

AE 8903. Special Problems. 1-21 Credit Hours.

AE 8997. Teaching Assistantship. 1-9 Credit Hours.
For graduate students holding graduate teaching assistantships.

AE 8998. Research Assistantship. 1-9 Credit Hours.
For graduate students holding graduate research assistantships.

AE 8999. Prep-Doctoral Dissertat'n. 1-21 Credit Hours.

AE 9000. Doctoral Thesis. 1-21 Credit Hours.
Air Force Aerospace Studies (AS)

AS 1110. Foundations of the AF I. 1 Credit Hour.
A survey course designed to introduce students to the United States Air Force and Air Force Reserve Officer Training Corps. Topics include: military customs and courseties, Air Force officer opportunities, and an introduction to communication skills. Leadership Laboratory is mandatory for AFROTC cadets, and complements this course by providing cadets with followership experiences.

AS 1111. Leadership Laboratory. 1 Credit Hour.
Introduction to the customs, traditions, and courseties of the Air Force through drill and ceremonies, guest speakers, physical fitness activities, sports, and base visits.

AS 1120. Foundations of the AF II. 1 Credit Hour.
A course designed to introduce students to the United States Air Force and Air Force Reserve Officer Training Corps. Featured topics include: mission and organization of the Air Force, offceriences, and professionalism. Leadership Laboratory is mandatory for AFROTC cadets and complements this course.

AS 1121. Leadership Laboratory. 1 Credit Hour.
Continuation of AS 1111. Emphasis on role and responsibilities of an Air Force junior officer. Air Force customs and courseties, drill and ceremonies, and introduction to the military environment.

AS 2210. US Air & Space Power I. 1 Credit Hour.
This course provides the students with a knowledge level of understanding for the general element and employment of air and space power, and is designed to examine general aspects of it through a historical perspective covering a time period from the first balloons and dirigibles to the beginning of the Vietnam War. Leadership Laboratory is mandatory for AFROTC cadets and complements this course by providing cadets with followership experiences.

AS 2211. Leadership Laboratory. 1 Credit Hour.
Emphasizes development of techniques used to direct and inform. Prepares students for field training.

AS 2220. US Air & Space Power II. 1 Credit Hour.
This course is a continuation of AS 2210 and examines the use of air and space power from Southeast Asia to the space age global positioning systems of the Persian Gulf War. In addition, the students will continue to discuss the importance of the Air Force Core Values with the use of operational examples and historical Air Force leaders, and will continue to develop their communication skills. Leadership Laboratory is mandatory for AFROTC cadets and complements this course.

AS 2221. Leadership Laboratory. 1 Credit Hour.
Continuation of AS 2221. Emphasis on preparation for field training.

AS 3310. Leadership Studies I. 3 Credit Hours.
A study of leadership, management fundamentals, professional knowledge, and communication skills required of an Air Force junior officer. Case studies are used to examine Air Force leadership and management situations as a means of demonstrating and exercising practical application of the concepts being studied. A mandatory Leadership Laboratory for AFROTC cadets complements this course.

AS 3311. Leadership Laboratory. 1 Credit Hour.
Supervisory practice and exercise of leadership functions in controlling and directing activities of the cadet corps. Practical development of leadership potential.

AS 3320. Leadership Studies II. 3 Credit Hours.
Examine the Air Force personnel and evaluation systems, leadership ethics, and Air Force supervision and counseling techniques. A mandatory Leadership Laboratory for AFROTC cadets complements this course by providing advanced leadership experiences in office-type activities, giving students the opportunity to apply the leadership and management principles of this course.

AS 3321. Leadership Laboratory. 1 Credit Hour.
Continues AS 3311 with emphasis on supervisory and leadership skills, and advantages of an Air Force career.

AS 4410. National Security Affair. 3 Credit Hours.
Examines the national security process, Air Force structure, and doctrine. Special topics of interest focus on civilian control of the military and joint operations with the Army, Navy, and Marines. Within this structure, continued emphasis is given to refining communication skills. A mandatory Leadership Laboratory for AFROTC cadets complements this course.

AS 4411. Leadership Laboratory. 1 Credit Hour.
Exercise of management functions in planning, supervising, and directing cadet corps activities. Emphasis on acquiring proficiency in military leadership skills.

AS 4420. Prep for Active Duty. 3 Credit Hours.
Topics include the military as a profession, regional studies, officeries, military justice, advanced leadership ethics, preparation for active duty, and current issues affecting military professionalism. A mandatory Leadership Laboratory for AFROTC cadets complements this course.

AS 4421. Leadership Laboratory. 1 Credit Hour.
Continues AS 4411. Emphasis on developing top-level management skills. Includes the planning, organizing, and implementation of cadet military training.

Applied Physiology (APPH)

APPH 1040. Sci Foundation of Health. 2 Credit Hours.
Students will learn how genetics, the environment and human behavior influence well-being. Topics include health fitness, immunity, nutrition, stress management and chronic disease prevention. Credit not allowed for both APPH 1040 and APPH 1050 or APPH 1040 or HPS 1040.

APPH 1050. Sci of Phys Act & Health. 2 Credit Hours.
Students will learn the importance of health fitness, good nutrition, stress management and chronic disease prevention. Activity portion of course will focus on training to improve fitness. Credit not allowed for both APPH 1050 and HPS 1040 or APPH 1050 or APPH 1040.

APPH 11XX. Wellness Requirement. 1-21 Credit Hours.

APPH 1XXX. Applied Physiology elective. 1-21 Credit Hours.

APPH 2500. Intro to Sport Science. 3 Credit Hours.
Students will apply scientific principles to human performance related to sport and movement across an array of topics (e.g., rehabilitation, exercise physiology, locomotion biomechanics, prosthetics).

APPH 2698. Research Assistantship. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

APPH 2699. Undergraduate Research. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.
APPH 2XXX. Applied Physiology elective. 1-21 Credit Hours.

APPH 3000. Survey of Medicine. 3 Credit Hours.
Content focuses on scientific, social, and cultural aspects of illness, how perceptions and behavior influence disease concept and fundamental aspects of medical diagnosis and treatment.

APPH 3300. Health Promotion. 3 Credit Hours.
Through small group discussions and lectures, this class examines contemporary health issues facing college students and the theory and skill required to conduct health promotion activities.

APPH 3500. Nutrition and Health. 2 Credit Hours.
Study of human nutrition as an applied science. Nutrition physiology, metabolism, energy, production, biochemical aspect, role of nutrients, weight control mechanisms, and preventative nutrition in health management will be covered.

APPH 3751. Anatomy & Physiology. 3 Credit Hours.
The study of human anatomy and fundamental physiological mechanisms with concentration in skeletal, muscular, nervous, circulatory, respiratory, digestive, urinary, endocrine, and reproductive systems. Crosslisted with BIOL 3751.

APPH 3753. Anatomy. 3 Credit Hours.
Detailed studies of human body structures using a regional and systems approach. Emphasis is placed on structural relationships and the integration of body systems.

APPH 3754. Anatomy Lab. 1 Credit Hour.
A detailed hands-on study of human structure using high resolution models, specialized specimens and dissection of selected mammalian organs and tissues.

APPH 3755. Human Physiology. 3 Credit Hours.
Students will explore the function and adaptation of the human body emphasizing neuromuscular, cardio-respiratory, gastrointestinal, endocrine, and urinary systems to maintain homeostasis and human health.

APPH 3756. Physiology Lab. 1 Credit Hour.
A laboratory application of concepts in Physiology, providing hands-on experience focusing primarily on non-invasive human experiments supplemented with vitro tissues experiments.

APPH 3801. Special Topics. 1 Credit Hour.
Topics of current interest in applied physiology.

APPH 3802. Special Topics. 2 Credit Hours.
Topics of current interest in applied physiology.

APPH 3803. Special Topics. 3 Credit Hours.
Topics of current interest in applied physiology.

APPH 3804. Special Topics. 4 Credit Hours.
Topics of current interest in applied physiology.

APPH 3831. Special Topics. 1 Credit Hour.
Topics of current interest in applied physiology.

APPH 3832. Special Topics. 2 Credit Hours.

APPH 3833. Special Topics. 3 Credit Hours.
Topics of current interest in applied physiology.

APPH 3834. Special Topics. 4 Credit Hours.
Topics of current interest in applied physiology.

APPH 3901. Special Problems. 1-21 Credit Hours.
Individual studies in applied physiology.

APPH 3902. Special Problems. 1-21 Credit Hours.
Individual studies in applied physiology.

APPH 3903. Special Problems. 1-21 Credit Hours.
Individual studies in applied physiology.

APPH 3904. Special Problems. 1-21 Credit Hours.
Individual studies in applied physiology.

APPH 4100. Exercise Physiology. 3 Credit Hours.
Physiology of human movement with emphasis on metabolic, cardiorespiratory, and musculoskeletal aspects; associated topics include body composition, thermoregulation, and ergogenic aids.

APPH 4200. Kinesiology. 3 Credit Hours.
Analysis of human movement from a kinesiological, neural and anatomical perspective including the study of locomotion and the mechanisms of selected musculoskeletal injuries, chronic and acute.

APPH 4238. Ion Channels. 3 Credit Hours.
We will examine the basic biophysical properties, structure-function relationships, physiological regulation, pathology and pharmacological manipulation of ion channels with heavy reliance on recent literature.

APPH 4400. Human Neuroanatomy. 3 Credit Hours.
The purpose of this course is to learn the anatomical makeup of the human nervous system. In this course we will closely examine details of central and peripheral neuranatomy with links to function. As well, comparisons with non-human vertebrate neuroanatomy will be made. Credit not allowed for both APPH 4400 and APPH 6400.

APPH 4600. Muscle Struct&Plasticity. 3 Credit Hours.
To provide an in-depth understanding of the biological processes underlying skeletal muscle structure and function.

APPH 4651. Human Anatomy. 4 Credit Hours.
The study of human system anatomy involving cadaver dissection, lectures and practical exams. The human muscular, nervous, skeletal and cardiorespiratory systems will be emphasized.

APPH 4698. Research Assistantship. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

APPH 4699. Undergraduate Research. 1-12 Credit Hours.
Independent research under the guidance of a faculty member.

APPH 4801. Special Topics. 1 Credit Hour.
Topics of current interest in applied physiology.

APPH 4802. Special Topics. 2 Credit Hours.
Topics of current interest in applied physiology.

APPH 4803. Special Topics. 3 Credit Hours.
Topics of current interest in applied physiology.

APPH 4804. Special Topics. 4 Credit Hours.
Topics of current interest in applied physiology.

APPH 4831. Special Topics. 1 Credit Hour.
Topics of current interest in applied physiology.

APPH 4832. Special Topics. 2 Credit Hours.
Topics of current interest in applied physiology.

APPH 4833. Special Topics. 3 Credit Hours.
Topics of current interest in applied physiology.

APPH 4834. Special Topics. 4 Credit Hours.
Topics of current interest in applied physiology.

APPH 6202. Clinical Gait Analysis. 3 Credit Hours.
Analysis of normal and pathological human locomotion. Study of theory and instrumentation for measurement of temporal and spatial kinematics and kinetics, electromyography, and plantar pressure.
APPH 6203. Biomech & Kines in P&O. 2 Credit Hours.
Mechanics of human movement applied to the study of artificial limbs and braces. Emphasis on neuromuscular control, Newtonian mechanics, kinematics and kinetics.

APPH 6209. Clinical Pathology. 2 Credit Hours.
Systems level overview of human pathology with emphasis on the effect of disease on human movement and neuromechanical function.

APPH 6211. Systems Physiology I. 3 Credit Hours.
The course will focus on adaptations of skeletal, muscular, and neural systems at the cellular level.

APPH 6212. Systems Physiology II. 3 Credit Hours.
The course will focus on function and adaptations of skeletal, muscular, and neural systems. Interactions among the various systems and their plasticity will be emphasized.

APPH 6213. Systems Physiology III. 3 Credit Hours.
The course will focus on integrative mechanism impacting motor system performance. Interactions among the various systems and their plasticity will be emphasized.

APPH 6214. Lab Rotations In P&O. 2 Credit Hours.
This course will provide the opportunity for students in individual laboratories to support their graduate training in prosthetics and orthotics.

APPH 6215. RCR in P&O. 3 Credit Hours.
This course will cover areas related to research ethics, the responsible use of animal and human models and collaborative research issues in prosthetics and orthotics.

APPH 6216. Rehabilitation Research. 1 Credit Hour.
This course will provide students in the PhD Training Program in Prosthetics and Orthotics to study issues in Rehabilitation Medicine.

APPH 6223. CAD/CAM-Prosth/Orth Lab. 1 Credit Hour.
Theoretical and practical analysis of the application of computer-aided design and manufacturing to prosthetics and orthotics. Includes methods of digitization and multiple manufacturing processes.

APPH 6225. Biostatistics. 3 Credit Hours.
Introductory statistical principles and methods of experimental design, sampling, power estimation, and hypothesis testing using ANOVA and regression.

APPH 6230. Exercise Metabolism. 3 Credit Hours.
The course will focus on the biochemical pathways that provide fuel for the human body during rest and various levels of physical activity.

APPH 6231. Human Motor Control. 3 Credit Hours.
The course will examine selected motor control problems that the nervous system faces in the process of managing this mechanical complexity.

APPH 6232. Locomotion Neuromechan. 3 Credit Hours.
This is a course that will introduce topics on the biomechanical and neural aspects of the control of limbed locomotion and movement.

APPH 6233. Aging Movement Control. 3 Credit Hours.
The aim of this course is to review research literature dealing with the effects of advances in age on the CNS and motor performance.

APPH 6234. Physical Act-Human Behav. 3 Credit Hours.
Focus is on understanding physical activity as a behavior using health behavior change models. An interdisciplinary perspective integrating research from the fields of epidemiology, physiology, and psychology.

APPH 6235. Mechanics of Movement. 3 Credit Hours.
This course is designed to understand the potential effects of selected disorders of the neuromuscular system on movement control.

APPH 6236. Neuromuscular Physiology. 3 Credit Hours.
This course discusses the application of current experimental techniques in human studies in vivo.

APPH 6237. Human Neuroimaging. 3 Credit Hours.
The purpose of the course is to introduce various methods of functional neuroimaging in humans.

APPH 6238. Ion Channel Structure. 3 Credit Hours.
This course will examine the structure, function and regulation of ion channels from both excitable and non-excitable cells.

APPH 6239. Movement Disorders. 3 Credit Hours.
This course serves as an introduction to the clinical and research aspects of movement disorders.

APPH 6400. Human Neuroanatomy. 3 Credit Hours.
The purpose of this course is to learn the anatomical makeup of the human nervous system. In this course we will closely examine details of central and peripheral neuroanatomy with links to function. As well, comparisons with non-human vertebrate neuroanatomy will be made.

APPH 6500. Classics in Neuroscience. 1 Credit Hour.
The purpose of this seminar is to learn and explore the history of neuroscience from a perspective of reading classic papers that have evolved.

APPH 6600. Muscle Struct & Plasticity. 3 Credit Hours.
Covers the biological processes underlying skeletal muscle structure and function, as well as rigorous mathematical models of those processes.

APPH 6651. Human Anatomy. 4 Credit Hours.
The study of human system anatomy involving cadaver dissection, lectures and practical exams. The human muscular, nervous, skeletal and cardiorespiratory systems will be emphasized.

APPH 6710. Ethics Biotech Research. 3 Credit Hours.
This course examines the ethics of biotechnological research, including issues in the realm of research ethics, bioethics, and healthcare robotics.

APPH 6746. Rehab Engineering. 3 Credit Hours.
Students will participate in rehabilitation engineering as practiced in the assistive technology industry. Credit not allowed for both APPH 6746 and ME 6746.

APPH 6895. Lower Limb Orthotics I. 3 Credit Hours.
This course is the first part of a two course series and sets the essential elements of theory, technical design and patient management.

APPH 6896. Lower Limb Orthotics II. 4 Credit Hours.
This course is the second in a two part course series and applies more advanced elements of theory, technical design and patient management.

APPH 6970. Intro to P&O Processes. 1 Credit Hour.
This course introduces basic processes for fabrication of prostheses and orthoses. Clinical methods associated with the provision of prostheses and orthoses will also be introduced.

APPH 6975. Intro to Prosthetics. 2 Credit Hours.
This course introduces the history and development of external limb prostheses including their design, alignment, socket interfaces, suspension mechanisms, and components.

APPH 6981. Upper Limb Prosthetics. 4 Credit Hours.
Clinical training for the practice of prosthetics emphasizing adult and pediatric upper limb prostheses.
APPH 6982. Spinal Orthotics. 4 Credit Hours.
Clinical training for the practice of orthotics emphasizing adult and pediatric spinal orthoses.

APPH 6983. Upper Limb Orthotics. 3 Credit Hours.
Clinical training for the practice of orthotics emphasizing adult and pediatric upper limb orthoses.

APPH 6984. Transtibial Prosthetics. 4 Credit Hours.
Clinical training for the practice of prosthetics emphasizing adult and pediatric transtibial (below knee) prostheses.

APPH 6985. Transfemoral Prosthetics. 4 Credit Hours.
Clinical training for the practice of prosthetics emphasizing adult and pediatric transfemoral (above knee) prostheses.

APPH 6997. Assistive Technology. 1 Credit Hour.
Theories and devices associated with assistive technology and mobility aids, emphasizing topics important to clinical practice in prosthetics and orthotics.

APPH 6999. Clinical Practicum. 1-21 Credit Hours.
Clinical observation of the practice of prosthetics and orthotics and related medical disciplines.

APPH 8000. Seminar. 3 Credit Hours.
The purpose of this course is for students to learn the research process from the early stage of identifying a question through publication of work.

APPH 8009. Research Seminar I. 1 Credit Hour.
A forum for graduate students in prosthetics and orthotics to present topics related to their research interests.

APPH 8010. Research Seminar II. 1 Credit Hour.
A forum for graduate students in prosthetics and orthotics to present and discuss topics related to their research interests.

APPH 8012. Research Seminar III. 3 Credit Hours.
A forum for graduate students in prosthetics and orthotics to present topics related to their research interests.

APPH 8801. Special Topics. 1 Credit Hour.
Topics of special interest not covered in the regular course offerings.

APPH 8802. Special Topics. 2 Credit Hours.
Topics of special interest not covered in the regular course offerings.

APPH 8803. Special Topics. 3 Credit Hours.
Topics of special interest not covered in the regular course offerings.

APPH 8804. Special Topics. 4 Credit Hours.
Topics of special interest not covered in the regular course offerings.

APPH 8813. Special Topics. 3 Credit Hours.
Topics of current interest not covered in other courses.

APPH 8823. Special Topics. 3 Credit Hours.
Topics of current interest not covered in other courses.

APPH 8833. Special Topics. 3 Credit Hours.
Topics of current interest not covered in other courses.

APPH 8901. Special Problems. 1-21 Credit Hours.
Individual studies and/or experimental investigations of problems of current interest.

APPH 8902. Special Problems. 1-21 Credit Hours.
Individual studies and/or experimental investigations of problems of current interest.

APPH 8903. Special Problems. 1-21 Credit Hours.
Individual studies and/or experimental investigations of problems of current interest.

APPH 8904. Special Topics. 1-21 Credit Hours.
Individual studies and/or experimental investigations of problems of current interest.

APPH 8997. Teaching Assistantship. 1-21 Credit Hours.
This course is for students holding a graduate teaching assistantship.

APPH 8998. Research Assistantship. 1-9 Credit Hours.
For graduate students holding research assistantships.

APPH 9000. Doctoral Thesis. 1-21 Credit Hours.

Applied Systems Engineering (ASE)

ASE 6001. Fund Modern Sys Eng. 3 Credit Hours.
Explore a wide range of modern systems engineering principles and development methodologies. Address requirements engineering, systems definition, design and analysis, implementation, operation, and technical management.

ASE 6002. Systems Design/Analysis. 3 Credit Hours.
Introduce emerging techniques for systems and systems-of-systems analysis including IPPD, DOE, Taguchi methods, response surface equations, multi-attribute decision making, and concept feasibility assessment.

ASE 6003. Modeling/Sim Sys Eng. 3 Credit Hours.
Introduction to modeling and simulation for systems engineers. Topics include problem formulation, conceptual modeling, simulation methodologies, verification and validation, DOE, simulation execution, and output analysis.

ASE 6004. Leading Sys Eng Teams. 3 Credit Hours.
Systems engineering processes provide a model for successfully managing complex systems. Learn to apply management and development techniques used for successful commercial and government programs.

ASE 6005. Adv Topics SE - SysML. 3 Credit Hours.
This core elective introduces SymML as a system modeling and design tool, with example applications, guidelines for application, and student projects on implementations in practice.

ASE 6006. Systems Engineering Lab. 3 Credit Hours.
Application of working knowledge of systems engineering techniques applied to a "case study" in an applicable domain.

ASE 6101. Analysis & Synth-Vehicle. 3 Credit Hours.
Vehicle Preliminary Design involves design iteration with disciplinary physics-based methods and tools. Includes geometry and databases from conceptual design, six DOF modeling, analysis, and synthesized baseline.

ASE 6102. System of Systems & Arch. 3 Credit Hours.
Develop a broader understanding of the interdependencies and interoperability issues, interfaces, and processes for creating and defining Systems Architecture for complex systems.

ASE 6103. System Lifecycle & Integ. 3 Credit Hours.
System preliminary design must address product and process design throughout system lifecycle from integration through manufacturing to phase-out along with interfaces to other emerging systems.

ASE 6104. Capstone Complex Systems. 3 Credit Hours.
Student teams apply methods and techniques taught throughout the program to conduct complex system Conceptual Design based on requirements provided in a Request for Proposal.
ASE 6111. Analysis & Synth-Sensors. 3 Credit Hours.
Defines, classifies, and examines technology used in stand-alone sensor systems. Centers on system-engineering trades useful in designing systems of sensors and systems of systems.

ASE 6121. Analysis & Synth-InfoSys. 3 Credit Hours.
Tools and approaches for analysis and synthesis of enterprise information systems. Topics include user-centered requirement, scenario-based design, UML, network/communications, iterative prototyping, and enterprise support.

ASE 6131. Analysis&Synth-HSI. 3 Credit Hours.
Human Systems Integration Analysis and Synthesis, a PMASE complex systems elective, ensures human-related technical issues are properly addressed during system definition, design, development, and implementation.

ASE 8801. Special Topics. 1 Credit Hour.
Topics of current interest in Applied Systems Engineering.

ASE 8803. Special Topics. 3 Credit Hours.
Topics of current interest in Applied Systems Engineering.

ASE 8901. Special Problems. 1-21 Credit Hours.

Arabic (ARBC)

ARBC 1001. Elementary Arabic I. 4 Credit Hours.
Development of basic communication skills in the spoken language. Introduction to the writing system, the reading of simple texts, and basic grammatical structures.

ARBC 1002. Elementary Arabic II. 4 Credit Hours.
Continuation of Arabic I.

ARBC 10X1. Trans Arabic Elementary I. 3 Credit Hours.

ARBC 10X2. Trans Arabic Elementary II. 3 Credit Hours.

ARBC 1501. Understand Arab Culture. 3 Credit Hours.
Arab beliefs and values regarding topics such as religion, society, family, the dynamics between men and women, and social norms are discussed. Taught in English.

ARBC 1801. Special Topics. 1 Credit Hour.
Topics of current interest in Arabic.

ARBC 1813. Special Topics. 3 Credit Hours.
Topics of current interest in Arabic.

ARBC 1814. Special Topics. 4 Credit Hours.
Topics of current interest in Arabic.

ARBC 1XXX. Arabic Elective. 1-21 Credit Hours.

ARBC 2001. Intermediate Arabic I. 3 Credit Hours.
This course continues the introduction to features of Arabic in the context of Arab culture at large. Students are exposed to features of several Arabic dialects.

ARBC 2002. Intermediate Arabic II. 3 Credit Hours.
This course is a continuation of ARBC 2001.

ARBC 2301. Arts Sci Tech Thu Hist. 3 Credit Hours.
An examination of Arab accomplishments in Sciences, Technology, Philosophy and Art (700-1300 AD) through historical documents, books and movies. Taught in English.

ARBC 2698. Research Assistantship. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

ARBC 2699. Undergraduate Research. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

ARBC 2811. Special Topics. 1 Credit Hour.
Topics of current interest in Arabic.

ARBC 2813. Special Topics. 3 Credit Hours.
Topics of current interest in Arabic.

ARBC 2821. Special Topics. 2 Credit Hours.
Topics of current interest in Arabic.

ARBC 2823. Special Topics. 3 Credit Hours.
Topics of current interest in Arabic.

ARBC 2833. Special Topics. 3 Credit Hours.
Topics of current interest in Arabic.

ARBC 2XXX. Arabic Elective. 1-21 Credit Hours.

ARBC 3001. Advanced Arabic I. 3 Credit Hours.
Advanced grammar, listening, reading, writing, speaking, the language of contemporary Arabic society, politics and culture through task-based language teaching. Taught in Arabic.

ARBC 3002. Advanced Arabic II. 3 Credit Hours.
Listening, reading, writing, speaking the language of contemporary Arabic society, politics and culture through task-based language teaching. Taught in Arabic.

ARBC 3501. Men-Women In Islam. 3 Credit Hours.
The course discusses contemporary Arab women and men writers' interpretation of the Qur'an demonstrating the egalitarian and anti-patriarchal nature of its teachings. Taught in English.

ARBC 3691. Intensive Advanced ARBC. 3 Credit Hours.
Develops students' receptive & communicative skills in Arabic while capitalizing on the rich linguistic & cultural surroundings. Part of ARBC LBAT summer program.

ARBC 3692. Arabic Business & Tech I. 3 Credit Hours.
The first sequence of two courses in which students learn the linguistic and pragmatic language of business culture in the Arab World. Taught in Arabic.

ARBC 3693. Arabic Business &Tech II. 3 Credit Hours.
The continuation of two courses in which students learn the linguistic and pragmatic language of business culture in the Arab World. Taught in Arabic.

ARBC 3811. Special Topics. 1 Credit Hour.
Topics of current interest in Arabic.

ARBC 3812. Special Topics. 2 Credit Hours.
Topics of current interest in Arabic.

ARBC 3813. Special Topics. 3 Credit Hours.
Topics of current interest in Arabic.

ARBC 3823. Special Topics. 3 Credit Hours.
Topics of current interest in Arabic.

ARBC 3833. Special Topics. 3 Credit Hours.
Topics of current interest in Arabic.

ARBC 3XXX. Arabic Elective. 1-21 Credit Hours.

ARBC 4698. Research Assistantship. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.
ARBC 4699. Undergraduate Research. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

ARBC 4813. Special Topics. 3 Credit Hours.
Topics of current interest in Arabic.

ARBC 4823. Special Topics. 3 Credit Hours.
Topics of current interest in Arabic.

ARBC 4833. Special Topics. 3 Credit Hours.
Topics of current interest in Arabic.

ARBC 4901. Special Problems. 1-21 Credit Hours.
Special problems course for advanced students. Topics to be arranged with instructor.

ARBC 4902. Special Problems. 1-21 Credit Hours.
Special problems course for advanced students. Topics to be arranged with instructor.

ARBC 4XXX. Arabic Elective. 1-21 Credit Hours.

Architecture (ARCH)

ARCH 1009. Fundamentals Of Arch I. 4 Credit Hours.
Introduction to creative problem-solving and the design realization cycle through project-based design exercises that emphasize the role of representation.

ARCH 1010. Fundamentals Of Arch II. 4 Credit Hours.
Introduction to the design of complex problems through an emphasis on integrative and collaborative design strategies, research, critical reflection, and interdisciplinary teamwork.

ARCH 1060. Intro-Design & Built Env. 3 Credit Hours.
Introduction to architecture and building construction through case studies that illuminate past and present practices, as well as future possibilities within the discipline.

ARCH 1854. Special Topics. 4 Credit Hours.
Special topics in design.

ARCH 1XXX. Architecture Elective. 1-21 Credit Hours.

ARCH 2011. Arch Design Studio I. 4 Credit Hours.
Elementary design exercises exploring fundamental issues of form and space through analysis of architectural elements and compositions and their use in creative problem solving.

ARCH 2012. Arch Design Studio II. 4 Credit Hours.
Elementary design exercises focusing upon the compositional integration of building and site through the creative assimilation of programmatic, technical, and contextual requirements.

ARCH 2111. History of Arch I. 3 Credit Hours.
Architectural history from antiquity through the eighteenth century emphasizing buildings in their cultural context as informed by social, technological, and constructive factors and theoretical positions.

ARCH 2112. History of Arch II. 3 Credit Hours.
Architectural history during the nineteenth and twentieth centuries emphasizing buildings in their cultural context as informed by social, technological, and constructive factors and theoretical positions.

ARCH 2115. Modern Arch & Art. 3 Credit Hours.
A brief survey of architecture and art in the nineteenth and twentieth centuries, including a discussion of related influences on developments in those fields.

ARCH 2211. Construction Tech I. 3 Credit Hours.
Introduction to building anatomy, technical and expressive characteristics of materials and their organizational assembly.

ARCH 2472. Arch Modeling & Media 2. 3 Credit Hours.
Intermediate approaches to two and three dimensional modeling and representation in architecture using both manual and digital media and techniques.

ARCH 2474. Arch Modeling & Media 3. 3 Credit Hours.
Advanced approaches to two and three dimensional modeling and representation in architecture using both manual and digital media and techniques.

ARCH 2698. Research Assistantship. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

ARCH 2699. Undergraduate Research. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

ARCH 2803. Special Topics. 3 Credit Hours.

ARCH 2854. Special Topics. 4 Credit Hours.
Special Topics in design.

ARCH 28XX. Special Topics. 4 Credit Hours.

ARCH 3111. Arch Design Studio III. 5 Credit Hours.
Intermediate architectural design projects emphasizing the functional priorities and expressive potential of buildings technologies through studio problems of varying programmatic and contextual complexity.

ARCH 3112. Arch Design Studio IV. 5 Credit Hours.
Intermediate architectural design projects exploring the inter-relationships of various programmatic models, normative building types, and technological themes within specific physical, urban, and cultural contexts.

ARCH 3115. Modern Arch & Art Wkshp. 3 Credit Hours.
A brief survey of key ideas of architecture and art in the twentieth century and exploration of their application to current architectural design and representation.

ARCH 3135. City Literacy. 3 Credit Hours.
The course frames the city as material and social space, focusing on everyday experience in exemplary cities to explore how they are conceived and negotiated.

ARCH 3231. Environmental Systems I. 3 Credit Hours.
Human physiology, the occupation of space, and principles of sustainability. Micro-climate, energy consumption, thermal loading, passive solar strategies, daylighting, optics, and acoustics.

ARCH 3241. Fund of Structures. 3 Credit Hours.
Physics of structure: principles of statics, strengths of materials, and the dynamic forces acting upon them.

ARCH 3404. Arch Design Studio III. 4 Credit Hours.
Advanced studies in architectural design emphasizing application of analytical, conceptual, and representational skills within projects that problematize urban context culturally, ecologically, and technologically.

ARCH 3405. Arch Design Studio IV. 4 Credit Hours.
Advanced studies in architectural design emphasizing application of analytical, conceptual, and representational skills within projects that problematize urban context culturally, ecologically, and technologically.

ARCH 3855. Special Topics. 5 Credit Hours.
Special Topics in design.
ARCH 3XXX. Architecture Elective. 1-21 Credit Hours.

ARCH 4011. Arch Design Studio V. 5 Credit Hours.
Advanced studies in architectural design emphasizing application of analytical, conceptual, and representational skills within projects that engage and problematize urban context culturally, ecologically, and technologically.

ARCH 4012. Arch Design Studio VI. 5 Credit Hours.
Advanced studies in architectural design emphasizing application of analytical, conceptual, and representational skills within projects that engage and problematize context culturally, ecologically, and technologically.

ARCH 4107. Intro to Historic Preser. 3 Credit Hours.
This course provides an overview of the history, philosophy, organization, current legislation, policies, and practice of historic preservation.

ARCH 4109. Arch and Minimalism. 3 Credit Hours.
This course examines the influence of "minimalism," the 1960s art phenomenon, upon architecture culture and production from 1968-present.

ARCH 4110. Public Space. 3 Credit Hours.
This course addresses questions concerning present-day configurations of public space as a platform for analysis of the contemporary city.

ARCH 4112. Arch in Georgia. 3 Credit Hours.
A field study and archival research on the architecture of the state of Georgia outside of Atlanta.

ARCH 4113. Renaissance&Manner Arch. 3 Credit Hours.
Investigation of the history and theory of Renaissance and Mannerist architecture with a primary emphasis on Italy.

ARCH 4114. Medieval Architecture. 3 Credit Hours.
Investigations of the architecture of Medieval Europe with an emphasis on English and French Romanesque and Gothic, including towns and castles.

ARCH 4115. Intro Classical Design. 3 Credit Hours.
An introduction to the principles of Classical and traditional architectural design through readings, discussions, and site visits with Classical architects.

ARCH 4117. Arts and Crafts Arch. 3 Credit Hours.
Investigations in the theory, design, and building methods of English and American architects associated with the Arts and Crafts Movement.

ARCH 4118. American Academic Arch. 3 Credit Hours.
Investigations of the history and theory of late nineteenth- and twentieth-century classicism in America.

ARCH 4119. Arch-Frank Lloyd Wright. 3 Credit Hours.
Investigations on the life and work of Frank Lloyd Wright.

ARCH 4120. Atlanta Architecture. 3 Credit Hours.
Investigations through lectures, reading, and research of the history of Atlanta architecture and significant architectural firms from the city’s founding to the present.

ARCH 4123. European Modernism. 3 Credit Hours.
Survey of European architecture from Art Nouveau to LeCorbusier.

ARCH 4124. Hist of Arch in the U.S.. 3 Credit Hours.
History investigations of architecture within the continental United States from the colonial period to the present.

ARCH 4125. French Arch. 3 Credit Hours.
History of French architecture from Ledoux to LeCorbusier with special emphasis on Paris.

ARCH 4126. Paris Urban History. 3 Credit Hours.
The social, cultural, urban, and architectural history of the city of Paris, from its founding until the present. Course offered in Paris only.

ARCH 4127. Intro to Art & Arch in Italy. 1 Credit Hour.
Required preparation for the COA Summer Program in Italy. The course includes the fundamentals of art and architecture, basic Italian language skills, and library research for required summer program projects.

ARCH 4128. Barcelona Architecture. 3 Credit Hours.
Architectural history of the city of Barcelona and its public spaces, with a focus on the major urban and architectural projects since 1850. Offered through the Studies Abroad Program.

ARCH 4129. Form and Narrative. 3 Credit Hours.
This theory course will involve an extended comparison between architecture and related art forms, especially painting, film, and writing.

ARCH 4133. Arch&Discourse Everyday. 3 Credit Hours.
Application of the concept of the everyday to architectural practice from perspectives of European social theory, American cultural landscape studies, and contemporary architectural theory.

ARCH 4137. Postwar Arch & Urbanism. 3 Credit Hours.
Introduction to the economic, social, political, cultural, and technological forces that shape architecture and cities in the United States after World War II.

ARCH 4140. Modern Arch Theory. 3 Credit Hours.
Introduction to modern and contemporary architectural theory and criticism, including writings and manifestoes, analyses, projects and buildings.

ARCH 4142. Dwelling Env Behav Des. 3 Credit Hours.
Explores scholarship and case studies from multiple disciplines relating to issues of place, community identity and memory, culturally constructed meaning, and appropriate use of resources.

ARCH 4143. Museums Hist Theo Des. 3 Credit Hours.
Investigates museums as manifestations of the construction and content of knowledge, the public mission of cultural and scientific institutions and the framing of visitors experience.

ARCH 4151. History of Urban Form. 3 Credit Hours.
History of the city as a collective work of architecture with an emphasis on the city’s physical form and space. Credit not allowed for both ARCH 4151 and COA 6151.

ARCH 4220. Construction Tech II. 3 Credit Hours.
Integration, representation, and constructability of building assemblies and structural systems. Grading, drainage, foundations, structure, and enclosure in relation to building codes and principles of sustainability.

ARCH 4225. Reinvestigating Details. 3 Credit Hours.
Explores the role of the detail in contemporary architectural practice.

ARCH 4226. Green Construction. 3 Credit Hours.
This course focuses on the means, methods, strategies, and technologies to improve the energy efficiency and performance of buildings, and to reduce the environmental impact of buildings. Credit will not be awarded for both ARCH 4226 and ARCH 6226 or ARCH 4226 and BC 4710.

ARCH 4227. Architecture & Ecology. 3 Credit Hours.
Introduction to ecological design theory, research, and practice in architecture, including writings, criticism, and analyses of buildings and projects.
ARCH 4335. Social Practice of Arch. 3 Credit Hours.
Introduction to theories and findings about human use and experience of architecture.

ARCH 4350. Architectural Theory. 3 Credit Hours.

ARCH 4404. Arch Design Studio V. 4 Credit Hours.
Advanced studies in architectural design emphasizing application of analytical, conceptual, and representational skills within projects that problematize urban context culturally, ecologically, and technologically.

ARCH 4405. Arch Design Studio VI. 4 Credit Hours.
Advanced studies in architectural design emphasizing application of analytical, conceptual and representational skills within projects that engage and problematize context culturally, ecologically and technologically.

ARCH 4411. Intro to Visual Arts. 3 Credit Hours.
Orientation to issues of visual perception and representation of form and space through freehand drawing, composition, color, texture, mixed-media, and journal making.

ARCH 4412. Life Drawing. 3 Credit Hours.
Studio instruction in figure drawing from the live model with emphasis on the structure and dynamics of the human figure.

ARCH 4413. Collage Making. 3 Credit Hours.
Concepts of collage within art, architecture, and culture; manual and electronic approaches to two and three-dimensional collage making.

ARCH 4414. Represent in Watercolor. 3 Credit Hours.
Introductory course in the use of transparent watercolor for field painting and architectural representation. Theory of pigment characteristics in applied painting.

ARCH 4415. Photography I. 3 Credit Hours.
Introduction to studio, darkroom, and field photography with emphasis on composition, processing, and printing.

ARCH 4416. Photography II. 3 Credit Hours.
Advanced techniques in photography. Use of color, filters, four-by-five format cameras with emphasis on architectural photography.

ARCH 4417. Furnishing Buildings. 3 Credit Hours.
A course that focuses on schematic design development of furniture. The emphasis of this course is on conceptual development and material and structural clarity.

ARCH 4447. Urban Ecological Design. 3 Credit Hours.
This course engages the contemporary issues of urban ecology and its articulation to design. It explores relationship between urban forms and flows of ecology, energy, material, water and information. Credit will not be awarded for both ARCH 4447 and ARCH 6447 or ARCH 4447 and CP 6836.

ARCH 4503. BIM Applications. 3 Credit Hours.
Survey of Building Information Modeling - its technologies exploration of new technologies to be applied and new procedures of project execution. Credit is not awarded for both ARCH 4503 and ARCH 6503.

ARCH 4505. Geometric Constructs. 3 Credit Hours.
Geometric surface and solid construction fundamentals using parametric modeling tools; use of sketching workbenches. Credit will not be awarded for both ARCH 4505 and ARCH 6505.

ARCH 4507. Parametric Design. 3 Credit Hours.
Exploration of concepts and mechanisms for creating custom parametric models that use hierarchies of relationships, constraints and rules for architectural components through parameters. Credit not awarded for both ARCH 4507 and ARCH 6507.
ARCH 4508. Shape Grammars. 3 Credit Hours.
Shape grammars are a powerful formal system for the generative
description, interpretation and evaluation of designs. Credit will not be
awarded for both ARCH 4508 and ARCH 6508.

ARCH 4515. Collaborative Design. 3 Credit Hours.
Collaborative Design Workshop provides a platform for students to
participate in a "live project" that requires them to navigate external
relationships and constraints as part of the design process.

ARCH 4630. Arch Space and Culture. 3 Credit Hours.
Analytical models of the social functions of architectural space and
evaluation of associated design choices, across a variety of building
types.

ARCH 4698. Research Assistantship. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty
member.

ARCH 4699. Undergraduate Research. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty
member.

ARCH 4701. Analog-Digital Des Comp. 3 Credit Hours.
Analog and digital approaches in design computation. Visual and
symbolic representations. Algorithmic and computational tools. History
and logic. Credit will not be awarded for both ARCH 4701 and ARCH 6501.

ARCH 4702. Design Scripting. 3 Credit Hours.
Learning the concepts and application of scripting languages in
architecture and form generation. Credit will not be awarded for both
ARCH 4702 and ARCH 6502.

ARCH 4770. Environmental Design. 3 Credit Hours.
Introduction to psychological concepts relevant to environmental design.
Crosslisted with PSYC 4770.

ARCH 4801. Special Topics. 1 Credit Hour.
ARCH 4802. Special Topics. 2 Credit Hours.
ARCH 4803. Special Topics. 3 Credit Hours.
ARCH 4804. Special Topics. 4 Credit Hours.
ARCH 4805. Special Topics. 5 Credit Hours.
ARCH 4811. Spec Topic-Arch Design. 1 Credit Hour.
ARCH 4812. Spec Topic-Arch Design. 2 Credit Hours.
ARCH 4813. Spec Topic-Arch Design. 3 Credit Hours.
ARCH 4814. Spec Topic-Arch Design. 4 Credit Hours.
ARCH 4815. Spec Topic-Arch Design. 5 Credit Hours.
ARCH 4821. Spec Top-Hist,Theor&Crit. 3 Credit Hours.
ARCH 4822. Spec Top-Hist,Theor&Crit. 3 Credit Hours.
ARCH 4823. Spec Top-Hist,Theor,Crit. 3 Credit Hours.
ARCH 4831. Special Topics-Arch Tech. 3 Credit Hours.
ARCH 4832. Special Topics-Arch Tech. 3 Credit Hours.
ARCH 4833. Special Topics-Arch Tech. 3 Credit Hours.
ARCH 4841. Spec Topic: Practice. 3 Credit Hours.
ARCH 4842. Spec Topic: Practice. 3 Credit Hours.
ARCH 4843. Spec Topic: Practice. 3 Credit Hours.
ARCH 4851. Spec Top-Vis Arts&Comput. 1 Credit Hour.
ARCH 4852. Spec Top-Vis Arts&Comput. 2 Credit Hours.
ARCH 4853. Spec Top-Vis Arts&Comput. 3 Credit Hours.
ARCH 4855. Special Topics. 5 Credit Hours.
Special topics in design.
ARCH 4863. Special Topics. 3 Credit Hours.
Topics of current interest in architecture.
ARCH 4901. Special Problems. 1-21 Credit Hours.
ARCH 4902. Special Problems. 1-21 Credit Hours.
ARCH 4903. Special Problems. 1-21 Credit Hours.
ARCH 4904. Special Problems. 1-21 Credit Hours.
ARCH 4905. Special Problems. 1-21 Credit Hours.
ARCH 4911. Spec Prob: Arch Design. 1-21 Credit Hours.
ARCH 4912. Spec Prob: Arch Design. 1-21 Credit Hours.
ARCH 4913. Spec Prob: Arch Design. 1-21 Credit Hours.
ARCH 4914. Spec Prob: Arch Design. 1-21 Credit Hours.
ARCH 4915. Spec Prob: Arch Design. 1-21 Credit Hours.
ARCH 4921. Spec Prob: Hist, Theo, Crit. 1-21 Credit Hours.
ARCH 4922. Spec Prob: Hist, Theo, Crit. 1-21 Credit Hours.
ARCH 4923. Spec Prob: Hist, Theo, Crit. 1-21 Credit Hours.
ARCH 4931. Spec Prob; Arch Tech. 1-21 Credit Hours.
ARCH 4932. Spec Prob: Arch Tech. 1-21 Credit Hours.
ARCH 4933. Spec Prob: Arch Tech. 1-21 Credit Hours.
ARCH 4941. Special Prob: Practice. 1-21 Credit Hours.
ARCH 4942. Special Prob: Practice. 1-21 Credit Hours.
ARCH 4943. Special Prob: Practice. 1-21 Credit Hours.
ARCH 4951. Spec Prob: Vis Art & Comput. 1-21 Credit Hours.
ARCH 4952. Spec Prob: Vis Art & Comput. 1-21 Credit Hours.
ARCH 4953. Spec Prob: Vis Art & Comput. 1-21 Credit Hours.
ARCH 4XXX. Architecture Elective. 1-21 Credit Hours.
ARCH 6024. Arch Core I Studio. 5 Credit Hours.
Foundation studies in architectural design emphasizing analytical and analogical generative strategies applied to studio problems that engage architectural representation, composition, and fabrication. Credit not allowed for both ARCH 6024 and ARCH 4021.
ARCH 6026. Arch Core II Studio. 5 Credit Hours.
Intermediate studies in architectural design emphasizing integrative design strategies that engage the programmatic, contextual, and constructed dimensions of architecture and its representations. Credit not allowed for both ARCH 6026 and ARCH 4022.
ARCH 6027. Arch Core III Studio. 5 Credit Hours.
Intermediate studies in architectural design emphasizing integrative design strategies that engage the programmatic, contextual, and constructed dimensions of architecture and its representations. Credit not allowed for both ARCH 6027 and ARCH 4023.
ARCH 6069. Advanced Arch Design I. 6 Credit Hours.
Architectural design studio exploring advanced issues in architecture from the perspectives of professional practice, sustainability, technology and urban design.
ARCH 6070. Advanced Arch Design II. 6 Credit Hours.
Architectural design studio exploring advanced issues in architecture from the perspectives of professional practice, sustainability, technology and urban design.
ARCH 6071. Arch Des & Res Studio I. 6 Credit Hours.
Advanced architectural design emphasizing innovation through applied research. Emerging methods of design generation/evaluation. Changing topics: healthcare, fabrication, urbanism, ecology, building performance, cultural institutions.
ARCH 6072. Arch Des & Res Studio 2. 6 Credit Hours.
Advanced architectural design emphasizing innovation through applied research. Emerging methods of design generation/evaluation. Changing topics: healthcare, fabrication, urbanism, ecology, building performance, cultural institutions.
ARCH 6105. Arch History I. 3 Credit Hours.
Architectural history from antiquity through the 18th century emphasizing buildings in their cultural context as informed by social, technological, and constructive factors and theoretical positions. Credit not allowed for both ARCH 6105 and ARCH 4105 or ARCH 2111.
ARCH 6106. Arch History II. 3 Credit Hours.
Architectural history during the 19th and 20th centuries emphasizing buildings in their cultural context as informed by social, technological, and constructive factors and theoretical positions. Credit not allowed for both ARCH 6106 and ARCH 4106 or ARCH 2112.
ARCH 6107. Intro to Historic Preser. 3 Credit Hours.
This course provides an overview of the history, philosophy, organization, current legislation, policies, and practice of historic preservation.
ARCH 6109. Arch and Minimalism. 3 Credit Hours.
This course examines the influence of "minimalism," the 1960's art phenomenon, upon architecture culture and production from 1968-present.
ARCH 6110. Public Space. 3 Credit Hours.
This course addresses questions concerning present-day configurations of public spaces as a platform for analysis of the contemporary city.
ARCH 6112. Islamic Arch & Urbanism. 3 Credit Hours.
Two-part survey of Asian architecture and urbanism (excluding East Asia). The Islamic world up to the 18th century: the Mughal, Raj, and post-independence periods in Indian subcontinent.
ARCH 6113. Hist Renaiss&Manner Arch. 3 Credit Hours.
Investigation of the history and theory of Renaissance and Mannerist architecture with a primary emphasis on Italy.
ARCH 6114. Arch & Discourse Everyday. 3 Credit Hours.
Application of the concept of the everyday to architectural practice from perspectives of European social theory, American cultural landscape studies, and contemporary architectural theory.
ARCH 6115. Intro Classical Design. 3 Credit Hours.
An introduction to the principles of Classical and traditional architectural design through readings, discussions, and site visits with Classical architects.
ARCH 6117. Arch-Arts&Crafts Movemnt. 3 Credit Hours.
Study of the theory, design, and construction of the "artistic" house as embodied in the English and American Arts and Crafts Movement and in related developments elsewhere.
ARCH 6119. FL Wright & His Influence. 3 Credit Hours.
Study of the life, work, and influence of Frank Lloyd Wright, including work of his apprentices and followers.
ARCH 6120. History of Atlanta Arch. 3 Credit Hours.
Study of the architecture of the Atlanta metro area.
ARCH 6127. Intro-Art & Arch in Italy. 1 Credit Hour.
Required preparation for the COA Summer Program in Italy. Includes the fundamentals of art and architecture; basic Italian language skills; library research for required summer program projects.
ARCH 6129. Form and Narrative. 3 Credit Hours.
This theory course will involve an extended comparison between architecture and related art forms, especially painting, film, and writing.
ARM 6135. Arch Representation. 3 Credit Hours.
Systems of architectural representation and codes of thinking, drawing, and reading architecture.

ARM 6136. Arch and Ideology. 3 Credit Hours.
Architecture and politics in Italy, Germany, and the Soviet Union between the wars.

ARM 6137. Postwar Arch & Urbanism. 3 Credit Hours.
Introduction to the economic, social, political, cultural, and technological forces that shape architecture and cities in the United States after World War II.

ARM 6142. Dwelling Env Behav Des. 3 Credit Hours.
Explores scholarship and case studies from multiple disciplines relating to issues of place, community identity and memory, culturally constructed meaning, and appropriate use of resources.

ARM 6143. Museums Hist Thry Design. 3 Credit Hours.
Investigates museums as manifestations of the construction and content of knowledge, the public mission of cultural and scientific institutions and the framing of visitors experience.

ARM 6151. Theories of Urban Design. 3 Credit Hours.
Contemporary theories of urban design and their relationship to the contemporary city examined through architects' writings, urban projects, and interdisciplinary criticism.

ARM 6152. Landscape Architecture. 3 Credit Hours.
History and theory of the designed landscape and garden from the ancient world to the present.

ARM 6153. Hist&Theory-Modern City. 3 Credit Hours.
An examination of the evolution of the modern city in the nineteenth and twentieth centuries with particular reference to architectural, city planning, and urban design theories.

ARM 6154. Intro to Urban Design. 3 Credit Hours.
Introduction of urban design ideas, research, and practice, examining traditional qualities of the American city and their possible applications in the contemporary city.

ARM 6155. Contemp Arch in Europe. 3 Credit Hours.
A course on contemporary architecture and urban projects in Europe, including the architect's writings, published criticism, and analyses of the buildings and projects.

ARM 6160. Race and Space. 3 Credit Hours.
This course examines the relationship between architecture - as social practice and as a labor market - and race in the United States.

ARM 6171. Design Intention in Arch. 3 Credit Hours.
Reviews theories of interpretive criticism in architecture, and develops methodological approaches to interpreting criticizing, and formulating conceptual intent in architectural design.

ARM 6206. Building Assemblies. 3 Credit Hours.
Structural and cladding systems integration, environmental control, and tectonic representation explored through historical and contemporary case studies and applied design solutions.

ARM 6209. Building Enclosure. 3 Credit Hours.
Investigations of enclosure design from three perspectives (technology, form, and culture), analyzing relationships of the four Semperian elements and Alberti's three parts of the enclosure.

ARM 6210. Architectonics. 3 Credit Hours.
The study of architecture of form from both an historical and a mathematical perspective. The formal theory is applied mathematics, group theory, combinatorics, as well as recent studies in the history of mathematics.

ARM 6215. Contemp Arch&Constr Tech. 3 Credit Hours.
General exposure to questions pertaining to the production of building systems and assemblies through a series of case study projects by contemporary practicing architects.

ARM 6216. Eco-Tectonics. 3 Credit Hours.
Strategies of ecologically sustainable design and construction and the role of the architect in the stewardship of the environment.

ARM 6218. Material Logic of Arch. 3 Credit Hours.
Introduction to scientific and practical nature of architectural materials: soils, cements, metals, plastics, and glazing materials. Laboratory includes fabrication of, and experiments on, architectural materials.

ARM 6225. Reinvestigating Details. 3 Credit Hours.
Explores the role of the detail in contemporary architectural practice.

ARM 6226. Green Construction. 3 Credit Hours.
This course focuses on the means, methods, strategies, and technologies to improve the energy efficiency and performance of buildings, and to reduce the environmental impact of buildings.

ARM 6227. Architecture + Ecology. 3 Credit Hours.
Introduction to ecological design theory, research, and practice in architecture, including writings, criticism, and analyses of buildings and projects.

ARM 6228. Analyt Invest Urb Design. 3 Credit Hours.
Measures of urban and spatial form. Analysis of street connectivity. Models of space use and spatial cognition. Comparison and evaluation of design alternatives.

ARM 6229. Construction Tech I. 3 Credit Hours.
Introduction to building anatomy, technical and expressive characteristics of materials and their organizational assembly. Credit not allowed for both ARCH 6229 and ARCH 4219.

ARM 6230. Construction Tech 2. 3 Credit Hours.
Integration, representation, and constructability of building assemblies and structural systems. Grading, drainage, foundations, structure, and enclosure in relation to building codes and principles of sustainability.

ARM 6241. Bldg Simula Design Pract. 3 Credit Hours.
Learn to use mainstream simulation packages to support building design in domains of Energy, CFD, Lighting, Ventilation.

ARM 6242. Bldg Physics Modeling. 3 Credit Hours.
Survey of basic thermo-fluid energy and mass flows in buildings, the interrelations between these flows, physical system modeling, and implications for building performance goals.

ARM 6243. Evidence-Based Design. 3 Credit Hours.

ARM 6251. Building Structures I. 3 Credit Hours.
Introduction to design and analysis of building structures and ordering of structural systems to resist gravity and lateral loads. Emphasis on wood structures.

ARM 6252. Building Structures II. 3 Credit Hours.
Introduction to structural design and framing systems for steel and concrete with consideration of lateral loads and lateral load resisting systems.
ARCH 6268. Adv Arch, Cult & Behav. 3 Credit Hours.
Theories, models, methods and case studies linking architectural design to culture and behavior.

ARCH 6271. Healthcare Des Of Future. 3 Credit Hours.
Introduction to research-based approaches to integrated healthcare design innovation.

ARCH 6303. Urban Design Policy. 3 Credit Hours.
Introduction to urban design policy and practice across a range of scales including planning, architecture, landscape architecture, civil engineering, public policy and administration. Credit not allowed for both ARCH 6303 and CP 6834.

ARCH 6305. Cross-Cultural Practice. 3 Credit Hours.
This course will address the material culture of globalization and cultural diffusion, emphasizing the multicultural registers of work produced between and across geographical, cultural, and disciplinary boundaries.

ARCH 6312. Ecological Practice. 3 Credit Hours.
An historically and culturally grounded examination of the ecological perspective. Critical and productive engagement with green guidelines, laws, products, design briefs, and procedures.

ARCH 6313. Traditions Arch Practice. 3 Credit Hours.
Critical examination of architectural practice. Cultural derivation and technological transformation of various conventions of representation, construction, and design; speculations about future paradigms of architectural practice.

ARCH 6315. Practice of Arch I. 3 Credit Hours.
Architectural practice from historical, sociological, and ethical perspectives with focus on professional leadership, practice management, and entrepreneurship.

ARCH 6316. Practice of Arch 2. 3 Credit Hours.
Methods of architectural project delivery and project management. Fundamentals of building economics. Emergent models of research-driven architectural practice.

ARCH 6350. Theory of Architecture I. 3 Credit Hours.

ARCH 6352. Theory of Architecture 2. 3 Credit Hours.
Approaches to architectural form, style, and tectonics from aesthetic, social, and technological perspectives. Instrumental and symbolic uses of architectural media in design and building production.

ARCH 6404. Electronic Media. 3 Credit Hours.
The influence of electronic media upon representation and invention in architecture.

ARCH 6412. Dwelling Env Behav Des. 3 Credit Hours.
Explores scholarship and case studies from multiple disciplines relating to issues of place, community identity and memory, culturally constructed meaning, and appropriate use of resources.

ARCH 6417. Furnishing Buildings. 3 Credit Hours.
A course that focuses on schematic design and design development of furniture. The emphasis of this course is on conceptual and material/structural clarity.

ARCH 6420. Design Computing. 3 Credit Hours.
Survey of computer representations and modeling techniques, including pixel-based images, vector-based drawing systems, and surface and solid modeling; use of applications built upon these systems. Credit not allowed for both ARCH 6420 and ARCH 4420.

ARCH 6426. 3D Modeling. 3 Credit Hours.
Construction of 3D computer models of architectural structures. Topics include: geometry creation, light and materials property, rendering, data exchange, and basic animation.

ARCH 6427. Adv Modeling & Animation. 3 Credit Hours.
Advanced computer modeling of architectural form. Topics include: parametric design, parametric materials, special effects, object libraries, animation, and video production.

ARCH 6428. Formal Sys-Dgn,Art&Arch. 3 Credit Hours.
This course will examine generative descriptions of languages of design, art, and architecture and explore various computational approaches to design with a special emphasis on shape grammars.

ARCH 6447. Urban Ecological Design. 3 Credit Hours.
This course engages the contemporary issues of urban ecology and its articulation to design. It explores relationship between urban forms and flows of ecology, energy, material, water and information. Credit not allowed for both ARCH 6447 and CP 6836.

ARCH 6470. Arch Modeling & Media I. 3 Credit Hours.
Introductory approaches to two and three dimensional modeling and representation in architecture using both manual and digital media and techniques.

ARCH 6472. Arch Modeling & Media 2. 3 Credit Hours.
Intermediate approaches to two dimensional modeling and representation in architecture using both manual and digital media and techniques.

ARCH 6474. Arch Modeling & Media 3. 3 Credit Hours.
Advanced approaches to two and three dimensional modeling and representation in architecture using both manual and digital media and techniques.

ARCH 6501. Analog-Digital Des Comp. 3 Credit Hours.

ARCH 6502. Design Scripting. 3 Credit Hours.
Learning the concepts and application of scripting languages in architecture and form generation.

ARCH 6503. BIM Applications. 3 Credit Hours.
Survey of Building Information Modeling - its technologies exploration of new technologies to be applied and new procedures of project execution.

ARCH 6504. Fabrication Workshop. 6 Credit Hours.
Parametric design, planning and programming. Develop design for fabrication in specific materials including wood, plastic, metals, concrete, or composite.

ARCH 6505. Geometric Constructs. 3 Credit Hours.
Geometric surface and solid construction fundamentals using parametric modeling tools; use of sketching workbenches.

ARCH 6506. Materials/Fabrications. 3 Credit Hours.

ARCH 6507. Parametric Design. 3 Credit Hours.
Design using parametric modeling tools; use of sketching workbenches and development of custom parametric models.

ARCH 6508. Shape Grammars. 3 Credit Hours.
Shape grammars are a powerful formal system for the generative description, interpretation and evaluation of designs.
ARCH 6509. Comp Creativity Des Cogn. 3 Credit Hours.
This course investigates computational methods, models tools that support design creativity and cognition. Credit not allowed for both ARCH 6509 and ID 6509.

ARCH 6511. Robotic Fabrication. 3 Credit Hours.
Introduction to robotics in design and construction. Kinematics and programming of 6-axis industrial robots. Use of robotics in building fabrication and assembly operations.

ARCH 6512. Research Colloquium. 3 Credit Hours.
Introduces students to the processes of developing a topic of inquiry and delivering projects in architectural design, and to prepare students for the development of the MS research project to be delivered as a final deliverable of the MS program during the subsequent semester.

ARCH 6513. Building Systems & Data. 3 Credit Hours.
A focus on the overlap between AEC (Architecture, Engineering, Construction) processes and the building models and data that support them.

ARCH 6531. Environmental Systems I. 3 Credit Hours.
Basics of heat, light, and sound applied to buildings. Thermal loading, passive thermal control, thermal comfort, climate, passive solar strategies, light and daylighting, acoustics.

ARCH 6532. Environmental Systems II. 3 Credit Hours.
Survey of active building systems: artificial lighting, mechanical (HVAC), electrical plumbing, transportation systems. Choice of active systems for sustainability, cost, etc.

ARCH 6731. Zero Energy House. 3 Credit Hours.
Design, analysis, operation, construction, and cost feasibility of so-called "zero energy" houses. Credit not allowed for both ARCH 6731 and BC 6731.

ARCH 6XXX. Architecture Elective. 1-21 Credit Hours.

ARCH 7000. Master's Thesis. 1-21 Credit Hours.

ARCH 7042. Urban Design Workshop. 3 Credit Hours.
Advanced problems in urban design and development focusing on the Atlanta region. Integration of urban design theory and methods, economic development, political registration, and communication.

ARCH 7043. Urban Design Workshop. 4 Credit Hours.
Advanced problems in urban design and development focusing on the Atlanta region. Integration of urban design theory and methods, economic development, political registration, and communication.

ARCH 7044. Urban Design Workshop. 5 Credit Hours.
Advanced problems in urban design and development focusing on the Atlanta region. Integration of urban design theory and methods, economic development, political registration, and communication.

ARCH 7045. Urban Design Workshop. 6 Credit Hours.
Advanced problems in urban design and development focusing on the Atlanta region. Integration of urban design theory and methods, economic development, political registration, and communication.

ARCH 7060. Critical Positions. 3 Credit Hours.
Advanced topics in the theory of architectural production focusing upon contemporary ethical dilemmas and the development of critical positions of design.

ARCH 7252. Compu Bldg Simulation. 3 Credit Hours.
Students learn how to develop their own extensible Building Simulation software using Finite Element discretization in Matlab and apply it to research problem.
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<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>BIOL 1520</td>
<td>Intro to Organismal Biol.</td>
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<tr>
<td>BIOL 1521</td>
<td>Honors Organismal Biol.</td>
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<td>BIOL 1511</td>
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<td>BIOL 1512</td>
<td>Spec Prob-Organismal Design.</td>
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<td>BIOL 1513</td>
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<td>Spec Prob-Organismal Design.</td>
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Biology (BIOL)

BIOL 1220. Biology of Sex & Death. 4 Credit Hours.
Students learn biology through the lens of the formation and collapse of biological systems, organized around questions pertaining to life, sex, and death.

BIOL 1510. Biological Principles. 4 Credit Hours.
An introduction to the basic principles of modern biology, including biomacromolecules, bioenergetics, cell structure, genetics, homeostasis, evolution, and ecological relationships.

BIOL 1511. Honors Biological Prin. 4 Credit Hours.
An advanced introduction to the principles of modern biology, including biomacromolecules, bioenergetics, cell structure, genetics, homeostasis, evolution, and ecological relationships.

BIOL 1520. Intro to Organismal Biol. 4 Credit Hours.
An introduction to biology at the organ and organismal levels, with emphasis on physiological processes and integration of growth and development.

BIOL 1521. Honors Organismal Biol. 4 Credit Hours.
Introduction to biology at the organ and organismal levels, with emphasis on biodiversity, physiological processes, and integration of growth, reproduction and development.

BIOL 1XXX. Biology Elective. 1-21 Credit Hours.

BIOL 2100. Biogeography-New Zealand. 3 Credit Hours.
Introduction to theory of island biogeography focused on New Zealand’s geological history and unique biota.

BIOL 2335. General Ecology. 3 Credit Hours.
Introduction to ecological processes at individual, population, and community levels that occur in plant, animal, and microbial taxa, and their relevance to current environmental problems.

BIOL 2336. General Ecology Lab. 1 Credit Hour.
The companion laboratory for BIOL 2335 (Ecology). This course stresses understanding ecological concepts through a combination of lab and field experiments, and computer simulations. 0.

BIOL 2337. Honors Ecology. 3 Credit Hours.
A problem-based learning course in ecology. Student teams will do research and solve challenges typically faced by ecologists and environmental scientists.

BIOL 2338. Honors Ecology Lab. 1 Credit Hour.
Companion course to Honors Ecology. Student teams will explore solutions to ecological challenges using experiments and mathematical models.

BIOL 2344. Genetics. 3 Credit Hours.
Mendelian and molecular genetics; principles of inheritance, gene structure and function, foundations of recombinant DNA technology, genetic basis of variation and evolution.

BIOL 2345. Genetics Laboratory. 1 Credit Hour.
A laboratory course in the fundamental techniques of genetic analysis.

BIOL 2354. Honors Genetics. 3 Credit Hours.
A comprehensive genetics course incorporating discussions of primary literature. Topics include molecular genetics and gene action, transfer systems and mapping, cytological, quantitative and population genetics. Credit not allowed for both BIOL 2354 and BIOL 2344.

BIOL 2355. Honors Genetics Lab. 1 Credit Hour.
Hands-on introduction to practical techniques, critical thinking, and important concepts in genetics. Students carry out laboratory experiments that explore transmission, population, and molecular genetics.

BIOL 2400. Math Models in Biol. 3 Credit Hours.
Introductory probability and deterministic models in biology, including discrete and continuous probability distributions and dynamic models from molecular and cellular biology to ecology and epidemiology.

BIOL 2694. Intern Assistantship. 1-21 Credit Hours.
Biology Undergraduate Internship for pay for freshmen and sophomores, by permit only. The internship experience must be at a unit or agency approved by the School of Biology.

BIOL 2695. Undergraduate Internship. 1-21 Credit Hours.
Biology Undergraduate Internship for credit freshmen and sophomores, by permit only. The internship experience must be at a unit or agency approved by the School of Biology.

BIOL 2698. Research Assistantship. 1-12 Credit Hours.
For graduate students holding graduate research assistantships.

BIOL 2699. Undergraduate Research. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.
BIOL 2801. Special Topics. 1 Credit Hour.
This designation enables the School of Biology to provide new lecture courses dealing with areas of current interest in biological sciences.

BIOL 2802. Special Topics. 2 Credit Hours.
This designation enables the School of Biology to provide new lecture courses dealing with areas of current interest in biological sciences.

BIOL 2803. Special Topics. 3 Credit Hours.
This designation enables the School of Biology to provide new lecture courses dealing with areas of current interest in biological sciences.

BIOL 2804. Special Topics. 4 Credit Hours.
This designation enables the School of Biology to provide new lecture courses dealing with areas of current interest in biological sciences.

BIOL 2805. Special Topics. 5 Credit Hours.
This designation enables the School of Biology to provide new lecture courses dealing with areas of current interest in biological sciences.

BIOL 2901. Special Problems. 1-21 Credit Hours.
Research problems in biology under the supervision of a faculty member.

BIOL 2902. Special Problems. 1-21 Credit Hours.
Research problems in biology under the supervision of a faculty member.

BIOL 2903. Special Problems. 1-21 Credit Hours.
Research problems in biology under the supervision of a faculty member.

BIOL 2904. Special Problem. 1-21 Credit Hours.
Research problems in biology under the supervision of a faculty member.

BIOL 2905. Special Problems. 1-21 Credit Hours.
Research problems in biology under the supervision of a faculty member.

BIOL 2XXX. Biology Elective. 1-21 Credit Hours.
This course covers basic concepts of cancer biology and new technologies that are being developed to understand, detect, treat, and prevent cancer. Credit not allowed for both BIOL 4015 and BIOL 7015.

BIOL 3100. Ecology&Evol-Australia. 3 Credit Hours.
Evolution and ecology of Australian ecosystems, including rainforests, open woodlands, coastal habitats; conservation of endangered ecosystems. Earns biology technical credit. Research project required.

BIOL 3101. Sensory Ecology. 3 Credit Hours.
A quantitative analyses of communication channels and information acquisition involving visual, auditory, mechanosensory, and olfactory modalities across a range of species and habitats.

BIOL 3221. Biological Oceanography. 3 Credit Hours.
An introduction to the major biological processes in the ocean including primary production, elemental cycling, food webs, and fisheries.

BIOL 3300. Tropical Ecology. 3 Credit Hours.
Ecological processes in the tropics including community organizations, biotic interactions, biodiversity, coevolution. Students perform research projects in rain forest, cloud forest, and seashore.

BIOL 3380. Intro Microbiology. 3 Credit Hours.
Basic biology of bacteria, fungi, algae, and viruses, with emphasis on bacteriology.

BIOL 3381. Intro Microbiology Lab. 1 Credit Hour.
Fundamental laboratory techniques in microbiology.

BIOL 3450. Cell Molecular Biol. 3 Credit Hours.
An introduction to the structure and function of cells and their organelles with emphasis on eucaryotic cellular and molecular processes. Credit not allowed for both BIOL 3450 and BIOL 3340.

BIOL 3451. Cell Molecular Biol Lab. 1 Credit Hour.
An introduction to experimental methods of cell and molecular biology research that will cover some fundamental topics of cell biology. Credit not allowed for both BIOL 3451 and BIOL 3341.

BIOL 3600. Intro Evolutionary Biol. 3 Credit Hours.
Comprehensive introduction to evolutionary biology. Includes focus on processes (natural selection, genetic drift) and resulting patterns (genome organization, phylogeny) illustrated with prokaryote and eukaryote examples.

BIOL 3751. Anatomy & Physiology. 3 Credit Hours.
Study of human anatomy and fundamental physiological mechanisms. Topics include nervous, musculoskeletal, and cardiorespiratory systems. Free elective for biology majors. Crosslisted with AP 3751.

BIOL 3753. Anatomy. 3 Credit Hours.
Detailed study of human body structures using a regional and systems approach. Emphasis is placed on structural relationships and the integration of body systems.

BIOL 3754. Anatomy Lab. 1 Credit Hour.
A detailed hands-on study of human structure using high-resolution models, specialized specimens and dissection of selected mammalian organs and tissues.

BIOL 3755. Human Physiology. 3 Credit Hours.
Students will explore the function and adaptation of the human body emphasizing neuromuscular, cardio-respiratory, gastrointestinal, endocrine, and urinary systems to maintain homeostasis and human health.

BIOL 3756. Physiology Lab. 1 Credit Hour.
A laboratory application of concepts in Physiology, providing hands-on experience focusing primarily on non-invasive human experiments supplemented with in vitro tissue experiments.

BIOL 3813. Special Topics. 3 Credit Hours.
Topics of current interest not covered in other courses in the department.

BIOL 3XXX. Biology Elective. 1-21 Credit Hours.
This course covers basic concepts of cancer biology and new technologies that are being developed to understand, detect, treat, and prevent cancer. Credit not allowed for both BIOL 4015 and BIOL 7015.

BIOL 4012. Protein Biology. 3 Credit Hours.
Biological view of proteins, including protein biosynthesis, processing, modification, folding, trafficking, interactions, degradation, natural and directed evolution, assembly diseases, amyloids, prions and protein-based inheritance.

BIOL 4015. Cancer Bio/Tech. 3 Credit Hours.
This course covers basic concepts of cancer biology and new technologies that are being developed to understand, detect, treat, and prevent cancer. Credit not allowed for both BIOL 4015 and BIOL 7015.

BIOL 4016. Sensory Ecology. 3 Credit Hours.
A quantitative analyses of communication channels and information acquisition involving visual, auditory, mechanosensory, and olfactory modalities across a range of species and habitats.

BIOL 4101. Sensory Ecology. 3 Credit Hours.
A quantitative analyses of communication channels and information acquisition involving visual, auditory, mechanosensory, and olfactory modalities across a range of species and habitats.

BIOL 4105. Macromolecular Modeling. 4 Credit Hours.
Principles and practices in the use of molecular mechanics methods (minimization; molecular dynamics) to study structure-function relationships in biological macromolecules.

BIOL 4150. Genomics&Appl Bioinf. 3 Credit Hours.
Retrieval and analysis of biological sequence, gene expression, and proteomics data from public databases and other sources; applying standard bioinformatics tools to investigate biological questions. Credit not allowed for both BIOL 4150 and BIOL 6150.

BIOL 4221. Biological Oceanography. 3 Credit Hours.
An introduction to the major biological processes in the ocean including primary production, elemental cycling, food webs, and fisheries.

BIOL 4225. Molecular Evolution. 3 Credit Hours.
Evolutionary processes at molecular level, organizations of genomes and genetic systems. Students will read and present up-to-date research articles in various topics in molecular evolution.
Biology (BIOL)

BIOL 4340. Medical Microbiology. 3 Credit Hours.
Advanced study of bacteria, protozoa, fungi, and viruses that cause human diseases; emphasis on epidemiology, mechanisms of disease causation, prevention, and treatment.

BIOL 4401. Exper Dgn&Statis Methods. 3 Credit Hours.
Introductory course on experimental design, hypothesis testing and basic statistical techniques commonly applied in biological research. Exercises based on computer statistical software packages.

BIOL 4410. Microbial Ecology. 3 Credit Hours.
Advanced studies of microbial ecosystems, the specific roles of bacteria in maintaining ecological balance, and the evolution of the ecosystem in response to changing environments.

BIOL 4417. Marine Ecology. 3 Credit Hours.
An overview of the physical forces and biotic interactions structuring marine communities and of the major threats to these communities. Credit not allowed for both BIOL 4417 and BIOL 6417.

BIOL 4418. Microbial Physiology. 3 Credit Hours.
Study of the physiology of growth and metabolic activities of microorganisms.

BIOL 4422. Theoretical Ecology. 3 Credit Hours.
Theoretical foundations of ecology, from the population to the community and ecosystem levels.

BIOL 4428. Population Dynamics. 3 Credit Hours.
Students will examine the ecological factors that affect dynamics, regulation, and evolution of natural populations, emphasizing the connections with mathematical models, genetics, and ecology. Credit will not be awarded for both BIOL 4428 and BIOL 6428.

BIOL 4440. Plant Physiology. 3 Credit Hours.
Chemical transformation in photosynthesis, photophysiology and water relationships, organic nutrition and effects of hormones on growth and development of plants.

BIOL 4446. Animal Physiology. 3 Credit Hours.
Systems physiology including nerves, muscles, kidney, digestion, circulation, endocrinology, reproduction, and respiration.

BIOL 4460. Comm Biological Research. 1 Credit Hour.
Students learn to convey the importance of research findings in the biological sciences and to critically evaluate research results through discussions and scientific presentations. Credit will not be awarded for both BIOL 4450 and BIOL 4460.

BIOL 4464. Developmental Biology. 3 Credit Hours.
Investigations of cell differentiation and development using the tools of molecular genetics and cell biology.

BIOL 4471. Behavior Biology. 3 Credit Hours.
An introduction to the study of the principles of behavior of all kinds of organisms, from microbes to mammals.

BIOL 4478. Biophysics. 3 Credit Hours.
Biophysical aspects of nucleic acids, proteins, and their interactions.

BIOL 4480. Evolution-Develop Biol. 2 Credit Hours.
This course teaches students how the process of development from embryo to adult impacts evolutionary diversity and human health. Credit not allowed for both BIOL 4480 and BIOL 6480.

BIOL 4545. Human Genetics. 3 Credit Hours.
Introduction to the genetics and evolution of complex human traits, focusing on contemporary approaches to understanding susceptibility to malignant, metabolic, immune and psychological diseases.

BIOL 4570. Immunology & Immunochem. 3 Credit Hours.
A survey of modern immunology and its applications.

BIOL 4590. Research Project Lab. 3 Credit Hours.
Experience in designing, implementing, and communicating a biology research project, and practical training in modern approaches for biological research.

BIOL 4607. Molecular Microbiology. 3 Credit Hours.
Molecular genetics of bacteria with an emphasis on experimental approaches, regulatory mechanisms in disease-causing and environmental bacteria, and biotechnology applications derived from microbes. Credit not awarded for both BIOL 4607 and BIOL 4608 or BIOL 4607 and BIOL 6608 or BIOL 4607 and BIOL 6607.

BIOL 4608. Prokaryotic Mole Genetics. 3 Credit Hours.
The molecular genetics of bacteria and their viruses, with emphasis in the organization, replication, expression, transfer and experimental manipulation of prokaryotic genes and genomes. Credit not allowed for both BIOL 4220 and BIOL 4608 or BIOL 4607 or BIOL 4608 and BIOL 6607.

BIOL 4620. Aquatic Chemical Ecology. 3 Credit Hours.
Focuses on understanding the chemical mechanisms of aquatic signaling and the cascading effects on population regulation, community organization, and ecosystem function. Credit not allowed for both BIOL 4620 and BIOL 6620.

BIOL 4650. Bioethics. 2 Credit Hours.
This course will examine the process of scientific inquiry and the ethical implications of research in the biological sciences.

BIOL 4651. Foundations of Bioethics. 3 Credit Hours.
This course examines important bioethical issues in research, policy, medicine, and the environment in light of ethical theory and the process of scientific inquiry. Credit not awarded for both BIOL 4651 and BIOL 4650.

BIOL 4668. Eukaryotic Mol Genetics. 3 Credit Hours.
Topics in molecular genetics, including genetic engineering techniques, gene expression and regulation, genetic structure, stability and evolution, with emphasis on eukaryotic organisms.

BIOL 4690. Research Project Lab. 3 Credit Hours.
Experience in designing, implementing, and communicating a biology research project, and practical training in modern approaches for biological research.

BIOL 4695. Undergraduate Internship. 1-21 Credit Hours.
Experience in designing, implementing, and communicating a biology research project, and practical training in modern approaches for biological research.

BIOL 4696. Biol Teaching Assistant. 3 Credit Hours.
Biology teaching carried out under the guidance of a faculty member. Credit not allowed for both BIOL 4696 and BIOL 4697.

BIOL 4697. Biol Undergrad Teaching. 3 Credit Hours.
Experience in designing, implementing, and communicating a biology research project, and practical training in modern approaches for biological research.

BIOL 4698. Research Assistantship. 1-12 Credit Hours.
Experience in designing, implementing, and communicating a biology research project, and practical training in modern approaches for biological research.

BIOL 4699. Research Assistantship. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.
BIOL 4699. Undergraduate Research. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

BIOL 4740. Bio-Inspired Design. 3 Credit Hours.
We examine evolutionary adaptation as a source for engineering design inspiration, utilizing principles of scaling, adaptability, and robust multifunctionality that characterize biological systems. Credit not allowed for both BIOL 4740 and (ISYE 4740 or PTFE 4740 or MSE 4740 or ME 4740).

BIOL 4744. Microbial Symbiosis. 3 Credit Hours.
This course explores how symbiotic interactions with microbes affect the biology of other organisms, focusing extensively on the beneficial microbes native to the human body.

BIOL 4746. Signaling Molecules. 3 Credit Hours.
The diversity of chemical signals between organisms and their structural specifications will be presented along with chemical and biological methods for isolating signaling molecules.

BIOL 4752. Intro Neuroscience. 3 Credit Hours.
Goals are to understand the components of the nervous system and their functional interactions, and appreciate the complexity of higher order brain functions and pathways. Crosslisted with BMED 4752.

BIOL 4755. Mathematical Biology. 3 Credit Hours.
An introduction to practical applications of mathematical models to help unravel the underlying mechanisms involved in biological processes. Crosslisted with MATH 4755.

BIOL 4801. Special Topics. 1 Credit Hour.
This designation enables the School of Biology to provide new lecture courses dealing with areas of current interest in biological science.

BIOL 4802. Special Topics. 2 Credit Hours.
This designation enables the School of Biology to provide new lecture courses dealing with areas of current interest in biological science.

BIOL 4803. Special Topics. 3 Credit Hours.
This designation enables the School of Biology to provide new lecture courses dealing with areas of current interest in biological science.

BIOL 4804. Special Topics. 4 Credit Hours.
This designation enables the School of Biology to provide new lecture courses dealing with areas of current interest in biological science.

BIOL 4805. Special Topics. 5 Credit Hours.
This designation enables the School of Biology to provide new lecture courses dealing with areas of current interest in biological science.

BIOL 4813. Special Topics. 3 Credit Hours.
Special Topics in BIOS.

BIOL 4823. Special Topics. 3 Credit Hours.
Special Topics in BIOS.

BIOL 4833. Special Topics. 3 Credit Hours.
Special Topics in BIOS. (null)

BIOL 4901. Special Problems. 1-21 Credit Hours.
Research problem in biology under supervision of a faculty member. To be offered any term with credit to be arranged. Seven hours (four hours technical electives + three hours free elective) are the maximum credits allowed toward the Bachelor of Science in Biology degree.

BIOL 4902. Special Problems. 1-21 Credit Hours.
Research problem in biology under supervision of a faculty member. To be offered any quarter with credit to be arranged. Seven hours (four hours technical electives + three hours free electives) are the maximum credits allowed toward the Bachelor of Science in Biology degree.

BIOL 4903. Special Problems. 1-21 Credit Hours.
Research problem in biology under supervision of a faculty member. To be offered any quarter with credit to be arranged. Seven hours (four hours technical electives + three hours free electives) are the maximum credits allowed toward the Bachelor of Science in Biology degree.

BIOL 4904. Special Problems. 1-21 Credit Hours.
Research problem in biology under supervision of a faculty member. To be offered any quarter with credit to be arranged. Seven hours (four hours technical electives + three hours free electives) are the maximum credits allowed toward the Bachelor of Science in Biology degree.

BIOL 4905. Special Problems. 1-21 Credit Hours.
Special problem in biology under supervision of a faculty member. To be offered any quarter with credit to be arranged. Seven hours (four hours technical electives + three hours free electives) are the maximum credits allowed toward the Bachelor of Science in Biology degree.

BIOL 4910. Honors Research Thesis. 3 Credit Hours.
Writing and submission of an Undergraduate Research Thesis describing research accomplishments with a biology faculty member.

BIOL 4XXZ. Biology Elective. 1-21 Credit Hours.

BIOL 6150. Genomics Appl Bioinf. 3 Credit Hours.
Retrieval and analysis of biological sequence, gene expression, and proteomics data from public databases and other sources; applying standard bioinformatics tools to investigate biological questions. Credit not allowed for both BIOL 6150 and BIOL 4150.

BIOL 6221. Biological Oceanography. 3 Credit Hours.
An introduction to the major biological processes in the ocean, including primary production, elemental cycling, food webs, and fisheries.

BIOL 6410. Microbial Ecology. 3 Credit Hours.
Advanced studies of microbial ecosystems, the specific roles of bacteria in maintaining ecological balance, and the evolution of the ecosystem in response to changing environments.

BIOL 6417. Marine Ecology. 3 Credit Hours.
An overview of the ecological and evolutionary patterns, processes, and mechanisms affecting the organization, structure, and function of a broad variety of marine communities. Credit not allowed for both BIOL 6417 and BIOL 4417.

BIOL 6418. Microbial Physiology. 3 Credit Hours.
Study of the physiology of growth and metabolic activities of microorganisms.

BIOL 6422. Theoretical Ecology. 3 Credit Hours.
Theoretical foundations of ecology, from the population to the community and ecosystem levels.

BIOL 6428. Population Dynamics. 3 Credit Hours.
Students will examine the ecological factors that affect dynamics, regulation, and evolution of natural populations, emphasizing the connections with mathematical models, genetics, and ecology. Credit will not be awarded for both BIOL 6428 and BIOL 4428.

BIOL 6478. Methods Molec Biophysics. 3 Credit Hours.
An introduction to biophysical methods that are employed to study biological macromolecules and their interaction to gain understanding of how they function. Credit not allowed for both BIOL 6478 and BIOL 4478.

BIOL 6480. Evolution-Develop Biol. 2 Credit Hours.
This course teaches students how the process of development from embryo to adult impacts evolutionary diversity and human health. Credit not allowed for both BIOL 6480 and BIOL 4480.
Biology (BIOL)

Biol 6570. Immunology. 4 Credit Hours.  
A survey of modern immunology and its applications, with emphasis on immunological methods used in molecular and cell biological research.

Biol 6600. Evolution. 3 Credit Hours.  
An introduction to evolutionary patterns and processes, including the history of life, phylogenetics, population genetics, quantitative genetics, molecular evolution, and other important topics in evolutionary biology.

Biol 6607. Molecular Microbiology. 3 Credit Hours.  
Molecular genetics of bacteria with an emphasis on experimental approaches, regulatory mechanisms in disease-causing and environmental bacteria, and biotechnology applications derived from microbes. Credit will not be awarded for both BIOL 6607 and BIOL 4607, BIOL 4608, or BIOL 6608.

Biol 6608. Prokaryotic Molec Gene. 3 Credit Hours.  
Molecular mechanisms of bacterial and plasmid genetic processes. Topics covered include genome organization, DNA replication, transcription, and translation. Credit will not be awarded for both BIOL 6608 and BIOL 4607 or BIOL 6608 and BIOL 6607.

Biol 6611. Adv Microbial Physiology. 3 Credit Hours.  
Advanced studies of selected aspects of the physiology of prokaryotic and eukaryotic microorganisms.

Biol 6620. Aquatic Chemical Ecology. 3 Credit Hours.  
The course focuses on understanding the chemical mechanisms of aquatic signaling and the cascading effects on population regulation, community organization, and ecosystem function. Credit not allowed for both BIOL 6620 and BIOL 4620.

Biol 6623. Exper-Aquatic Signaling. 6 Credit Hours.  
A full-time commitment to student-originated, but faculty-guided, interdisciplinary research in aquatic chemical signaling using field, lab, and flume facilities at Skidaway Institution of Oceanography on the coast.

Biol 6626. Physiological Ecology. 3 Credit Hours.  
Study of the basic physiological processes and systems in vertebrates and invertebrates. Comparative study on how these systems are adapted for specific environments and functions.

Biol 6628. Aquatic Toxicology. 3 Credit Hours.  
Study of the biological effects of toxicants on aquatic organisms—mechanisms of toxicity, biotransformation, toxicity tests, ecological risk assessment.

Biol 6630. Adv Microbial Ecology. 3 Credit Hours.  
Advanced studies of selected aspects of the ecology of prokaryotic and eukaryotic organisms.

Biol 6720. Env Microbial Genomics. 3 Credit Hours.  
To introduce advanced concepts and principles of contemporary environmental microbiological research and associated bioinformatics techniques through representative examples from recent literature.

Biol 6756. Signaling Molecules. 3 Credit Hours.  
The diversity of chemical signals between organisms and their structural specificities will be presented along with chemical and biological methods for isolating signaling molecules. Crosslisted with CEE 6756 and CHEM 6756.

Biol 6765. Geomicrobiology. 3 Credit Hours.  
Interactions between microorganisms and the geosphere, microbial energetics and genetics, geochemical controls on microbial diversity and activity. Crosslisted with EAS 6765.

Biol 6XXX. Biology Elective. 1-21 Credit Hours.

Biol 7000. Master’s Thesis. 1-21 Credit Hours.

Biol 7001. Found-Molecul&Cell Biol. 4 Credit Hours.  
The goal of this course is to provide new students with fundamental knowledge in the general areas of prokaryotic and eukaryotic molecular biology, biochemistry, structural biology, and bioinformatics.

Biol 7010. Advanced Cell Biology. 3 Credit Hours.  
Current topics in eukaryotic cell biology including membrane functions, intracellular sorting and compartmentalization, cell signaling, cell cycle, cytoskeleton, cell adhesion, motility, and current experimental approaches.

Biol 7015. Cancer Biol/Tech. 3 Credit Hours.  
This course covers the major concepts of cancer biology as well as to state-of-the-art technologies that are being applied to cancer research, detection and treatment. Credit not allowed for both BIOL 7015 and BIOL 4015.

Biol 7023. Bioinformatics. 3 Credit Hours.  
Introduction to mathematical, statistical, and computer methods of nucleic acid and protein sequence analysis and interpretation. Algorithms for gene finding, protein structure and function prediction, constructing phylogenetic trees.

Biol 7101. Advanced Sensory Ecology. 3 Credit Hours.  
A quantitative analysis of how organisms of all kinds obtain information about their environment, and how they use it to guide locomotions.

Biol 7110. Macromolecular Modeling. 4 Credit Hours.  
Principles and practices in the use of molecular mechanics methods (minimization: molecular dynamics) to study structure-function relationships in biological macromolecules.

Biol 7111. Molecular Evolution. 3 Credit Hours.  
Evolutionary processes at the molecular level, organizations of genomes and genetic systems. Students will read and present up-to-date research articles in various topics in molecular evolution.

Biol 7200. Program Bioinformatics. 3 Credit Hours.  
This active-learning, project-based course provides a rigorous introduction to scientific computing for bioinformatics, including Linux utilities, shell scripting and bioinformatics programming.

Biol 7210. Computational Genomics. 3 Credit Hours.  
In this active learning class, students will learn to convert sequence information into knowledge through the use of computational genomics tools, applications and databases.

Biol 7668. Eukaryotic Molec Genetic. 3 Credit Hours.  
Topics in molecular genetics of eukaryotic organisms, including: gene structure and expression, protein processing and folding, genome stability, and molecular evolution.

Biol 7913. Advances in Microbiology. 2 Credit Hours.  
Topics of current interest in microbial physiology, applied microbiology, microbial ecology, and medical microbiology.

Biol 7914. Advances in Bacteriology. 2 Credit Hours.  
Topics of current interest in the physiology and ecology of bacteria and applications to practical problems.

Biol 7923. Advances in Ecology. 2 Credit Hours.  
Topics of current interest in the general areas of population growth and limitation, and the structure and stability of ecosystems.

Biol 7924. Adv-Environmental Biol. 2 Credit Hours.  
Topics of current interest in environmental biology.
Research problems in biology under the supervision of a faculty member.

BIOL 7963. Advances-Molecular Biol. 2 Credit Hours.
Topics of current interest in molecular biology.

BIOL 7964. Advances in Genetics. 2 Credit Hours.
Topics of current interest in genetics.

BIOL 8000. Integrative Biol Seminar. 2 Credit Hours.
A reading and discussion course structured around the School of Biology weekly seminar.

BIOL 8001. Seminar. 2 Credit Hours.
Presentation of research seminar.

BIOL 8002. Seminar. 1 Credit Hour.
Weekly seminars on current research presented by various scientists in the field of biology.

BIOL 8003. Seminar. 1 Credit Hour.
Weekly seminars on current research presented by various scientists in the field of biology.

BIOL 8005. Signals in the Sea Sem. 2 Credit Hours.
Students and invited authorities in the field will present seminars and lead discussions focused on currently emerging topics in aquatic chemical ecology and signaling.

BIOL 8006. Integrative Systems Biol. 2 Credit Hours.
This course will investigate, using samples from the literature and faculty research, the general principles of biological systems, from gene expression circuits to ecological communities.

BIOL 8106. Tools of Science Seminar. 2 Credit Hours.
This course addresses issues important to all successful scientists and engineers such as: research ethics; collaborations between industry, academics, and government; women and minorities in science; balancing research, teaching and service; writing, editing, and reviewing, presentations; job interviews; time management; speaking to the public and media; and scientific and university politics.

BIOL 8744. Microbial Symbiosis. 3 Credit Hours.
This course explores how symbiotic interactions with microbes affect the biology of other organisms, focusing extensively on the beneficial microbes native to the human body.

BIOL 8801. Special Topics. 1 Credit Hour.
New graduate lecture courses in areas of current interest.

BIOL 8802. Special Topics. 2 Credit Hours.
New graduate lecture courses in areas of current interest.

BIOL 8803. Special Topics. 3 Credit Hours.
New graduate lecture courses in areas of current interest.

BIOL 8804. Special Topics. 4 Credit Hours.
New graduate lecture courses in areas of current interest.

BIOL 8805. Special Topics. 5 Credit Hours.
New graduate lecture courses in areas of current interest.

BIOL 8813. Special Topics. 3 Credit Hours.
Special Topics in Biology.

BIOL 8814. Special Topics. 4 Credit Hours.
Special Topics in Biology (lecture + supervised lab).

BIOL 8823. Special Topics. 3 Credit Hours.

BIOL 8833. Special Topics. 3 Credit Hours.
Special Topics in Biological Sciences.

BIOL 8901. Special Problems. 1-21 Credit Hours.
Research problems in biology under the supervision of a faculty member.

BIOL 8902. Special Problems. 1-21 Credit Hours.
Research problems in biology under the supervision of a faculty member.

BIOL 8997. Teaching Assistantship. 1-9 Credit Hours.
For graduate students holding a teaching assistantship.

BIOL 8998. Research Assistantship. 1-9 Credit Hours.
For graduate students holding research assistantships.

BIOL 9000. Doctoral Thesis. 1-21 Credit Hours.

Biomed Engr/Joint Emory PKU (BMEJ)

BMEJ 9999. GT-PKU. 12 Credit Hours.
For GT, PKU, and Emory students during terms when they are not taking other GT courses. Placeholder course.

Biomedical Engineering (BMED)

BMED 1000. Intro to Biomedical Engr. 1 Credit Hour.
An introduction to the field of biomedical engineering, with an emphasis on career preparation.

BMED 1300. Problems-Biomed Engr I. 3 Credit Hours.
Biomedical engineering problems from industrial and clinical applications are addressed and solved in small groups using problem-based learning methodologies.

BMED 1750. Intro to Bioengineering. 3 Credit Hours.
An introduction to the field of bioengineering, including the application of engineering principles and methods to problems in biology and medicine, the integration of engineering with biology, and the emerging industrial opportunities. Crosslisted with AE, CHE, ECE, ME, and MSE 1750.

BMED 1801. Special Topics. 1 Credit Hour.
Courses in special topics of current interest not included in the regular course offerings.

BMED 1802. Special Topics. 2 Credit Hours.
Courses in special topics of current interest not included in the regular course offerings.

BMED 1803. Special Topics. 3 Credit Hours.
Courses in special topics of current interest not included in the regular course offerings.

BMED 1804. Special Topics. 4 Credit Hours.
Courses in special topics of current interest not included in the regular course offerings.

BMED 1805. Special Topics. 5 Credit Hours.
Courses in special topics of current interest not included in the regular course offerings.

BMED 1811. Special Topics. 1 Credit Hour.
Courses in special topics of current interest not included in the regular course offerings.

BMED 1812. Special Topics. 2 Credit Hours.
Courses in special topics of current interest not included in the regular course offerings.

BMED 1813. Special Topics. 3 Credit Hours.
Courses in special topics of current interest not included in the regular course offerings.

BMED 1814. Special Topics. 4 Credit Hours.
Courses in special topics of current interest not included in the regular course offerings.
BMED 1815. Special Topics. 5 Credit Hours.
Courses in special topics of current interest not included in the regular course offerings.

BMED 1XXX. Bioengineering Elective. 1-21 Credit Hours.

BMED 2210. Conservation Prin in BME. 4 Credit Hours.
A study of material and energy balances applied to problems in biomedical engineering.

BMED 2250. Problems in Biomed Engr. 3 Credit Hours.
Biomedical engineering problems from industrial and clinical applications are addressed and solved in problem-based learning methodologies. Credit will not be awarded for both BMED 2250 and BMED 1300.

BMED 2300. Problems-Biomed Engr II. 3 Credit Hours.
Biomedical engineering problems from industrial and clinical applications are addressed and solved in small groups using problem-based learning methods.

BMED 2310. Intro Biomed Engr Design. 3 Credit Hours.
In small teams students will apply problem-based learning and human centered design to reverse engineer, analyze, and redesign medical devices. Credit will not be awarded for both BMED 2310 and BMED 2300.

BMED 2400. Intro-Bioengr Stats. 3 Credit Hours.
Introduction to statistical modeling and data analysis in bioscientific and bioengineering applications. Topics include estimation, testing, regression, and experimental design.

BMED 2598. Research Assistanship. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

BMED 2599. Undergraduate Research. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

BMED 2801. Special Topics. 1 Credit Hour.
Courses in special topics of current interest not included in the regular course offerings.

BMED 2802. Special Topics. 2 Credit Hours.
Courses in special topics of current interest not included in the regular course offerings.

BMED 2803. Special Topics. 3 Credit Hours.
Courses in special topics of current interest not included in the regular course offerings.

BMED 2804. Special Topics. 4 Credit Hours.
Courses in special topics of current interest not included in the regular course offerings.

BMED 2805. Special Topics. 5 Credit Hours.
Courses in special topics of current interest not included in the regular course offerings.

BMED 2811. Special Topics. 1 Credit Hour.
Courses in special topics of current interest not included in the regular course offerings.

BMED 2812. Special Topics. 2 Credit Hours.
Courses in special topics of current interest not included in the regular course offerings.

BMED 2813. Special Topics. 3 Credit Hours.
Courses in special topics of current interest not included in the regular course offerings.

BMED 2814. Special Topics. 4 Credit Hours.
Courses in special topics of current interest not included in the regular course offerings.

BMED 2815. Special Topics. 5 Credit Hours.
Courses in special topics of current interest not included in the regular course offerings.

BMED 2XXX. Bioengineering Elective. 1-21 Credit Hours.

BMED 3100. Systems Physiology. 3 Credit Hours.
An introduction to human physiology emphasizing biomedical engineering approaches to the understanding of basic organ function, disease states, and medical intervention.

BMED 3101. Intro Biomed Data Sci. 3 Credit Hours.
Practical/hands-on experience in performing biomedical-related data processing/computation/analysis with a variety of computer tools, platforms, and applications.

BMED 3110. Quant Engr Physio Lab I. 2 Credit Hours.
A hands-on lab providing an active learning team environment to reinforce selected engineering principles of physiology, emphasizing a quantitative model-oriented approach to physiological systems.

BMED 3300. Biotransport. 4 Credit Hours.
Fundamental principles of fluid, heat, and mass transfer with particular emphasis on physiological and biomedical systems.

BMED 3310. Biotransport. 3 Credit Hours.
Fundamental principles of fluid, heat, and mass transfer with particular emphasis on physiological and biomedical systems. Credit will not be awarded for both BMED 3310 and BMED 3300.

BMED 3400. Intro to Biomechanics. 4 Credit Hours.
An introduction to the basic concepts and methods in biomechanics, including statistics and the mechanics of biomaterials. The biomedical applications of mechanics will be illustrated.

BMED 3500. Sensors& Instrumentation. 3 Credit Hours.
A study of basic concepts and design of electronic sensors and instrumentation used in biomedical measurements. Standard clinical measurement techniques will also be examined.

BMED 3510. Biomed Systems & Model. 4 Credit Hours.
Basic concepts, modeling tools and analysis techniques for the study of biochemical, bioelectrical and biomedical systems.

BMED 3520. Biomed Sys & Modeling. 3 Credit Hours.
Introduction of computational systems biology, including the modeling process, various types of models, standard analysis and simulation of systems, and applications in real-world biological systems. Credit will not be awarded for both BMED 3520 and BMED 3510.

BMED 3600. Physio Cell & Mol Syst. 3 Credit Hours.
In depth cell and molecular physiology focused on cellular responses to stimuli, including cell organization/ reorganization, membrane transport/ kinetics, cell signaling/ molecular biology, mechanobiology and energy requirements.

BMED 3610. Quant Engr Physio Lab II. 2 Credit Hours.
This lab provides an active learning team environment, incorporating common cell/molecular biology techniques, to reinforce selected engineering principles in an in vitro cell culture setting.
BMED 3XXX. Bioengineering Elective. 1-21 Credit Hours.

BMED 4400. Neuroengineering Fund. 4 Credit Hours.
Lab and lecture on current topics in Neuroengineering, including electrophysiology, clinical and diagnostic neuroengineering, neural prosthetics, sensory-motor integration, neuromorphic VLSI, neurodynamics and neuromotorics.

BMED 4477. Bio Networks & Genomics. 3 Credit Hours.
Introduction to modeling of biological networks involved in gene regulation, cell signaling and metabolism. Mathematical modeling of cellular processes, such as gene expression, using genomic data.

BMED 4500. Cell & Tissue Engr Lab. 3 Credit Hours.
The principles of cell and tissue engineering will be presented as a laboratory course to give students a hands-on experience. Cell engineering topics include receptor/ligand interactions, cell cycle/metabolism, cell adhesion, cellular mechanics, cell signal transduction, and cell transfection. Tissue engineering topics include applications, biomaterials/scaffolds and cells for reparative medicine, bioreactors and bioprocessing, functional assessment, in vivo issues.

BMED 4600. Senior Design Project I. 2 Credit Hours.
Team-oriented major design project in biomedical engineering, incorporating engineering standards and realistic design constraints. Credit not allowed for BMED 4600 and BMED 4603 (or BMED 4601).

BMED 4601. Senior Design Project II. 3 Credit Hours.
Team-oriented major design project in biomedical engineering, incorporating engineering standards and realistic design constraints. Credit not allowed for both BMED 4601 and BMED 4603 (or BMED 4600).

BMED 4602. Capstone Design. 3 Credit Hours.
Team-oriented design project in biomedical engineering, incorporating engineering standards and realistic design constraints. Includes introduction to relevant regulatory, intellectual property, and business management topics.

BMED 4603. Advanced Design. 3 Credit Hours.
Continuation of a team-oriented design experience initiated in BMED 4602 Capstone Design. Includes more advanced relevant regulatory, intellectual property, and business management topics. Credit not allowed for both BMED 4603 and BMED 4600 (or BMED 4601).

BMED 4698. Research Assistantship. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

BMED 4699. Undergraduate Research. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

BMED 4739. Medical Robotics. 3 Credit Hours.
An interdisciplinary course focusing on fundamental understanding of robot kinematics and dynamics as well as the design, development, and evaluation of a medical robotic system.

BMED 4740. Bio-Inspired Design. 3 Credit Hours.
We examine evolutionary adaptation as a source for engineering design inspiration, utilizing principles of scaling, adaptability, and robust multifunctionality that characterize biological systems.

BMED 4750. Diagnostic Imaging Phys. 3 Credit Hours.
Physics and image formation methods for conventional X-ray, digital X-ray CT, nuclear medicine, and magnetic resonance and ultrasound imaging. Crosslisted with MP 4750 and NRE 4750.

BMED 4751. Intro to Biomaterials. 3 Credit Hours.
Introduction to different classes of biomaterials (polymers, metals, ceramics) and physiological responses to biomaterial implantation. Topics include material properties, host response, and biomaterial characterization techniques. Crosslisted with MSE 4751.

BMED 4752. Intro Neuroscience. 3 Credit Hours.
Goals are to understand the components of the nervous system and their functional interactions, and appreciate the complexity of higher order brain functions and pathways. Crosslisted with BIOL 4752.

BMED 4757. Biofluid Mechanics. 3 Credit Hours.

BMED 4758. Biosolid Mechanics. 3 Credit Hours.

BMED 4765. Drug Design, Develpmnt&Delivery. 3 Credit Hours.
Introduction to the pharmaceutical development process, including design of new drugs, synthesis and manufacturing issues, and methods for delivery into the body. Includes student presentations. Crosslisted with CHEM and CHBE 4765.

BMED 4781. Biomed Instrumentation. 3 Credit Hours.
A study of medical instrumentation from a systems viewpoint. Pertinent physiological and electro-physiological concepts will be covered. Credit not allowed for both BMED 4781 and (CHE 4781 or ME 4781 or CHBE 4781 or ECE 4781).

BMED 4782. Biosystems Analysis. 3 Credit Hours.
Analytical methods for modeling biological systems, including white-noise protocols for characterizing nonlinear systems. Crosslisted with CHE, ECE, and ME 4782.

BMED 4783. Intro-Medical Image Proc. 3 Credit Hours.
A study of mathematical methods used in medical image acquisition and processing. Concepts, algorithms, and methods associated with acquisition, processing, and display of two- and three-dimensional medical images are studied. Crosslisted with ECE 4783.

BMED 4784. Engr Electrophysiology. 3 Credit Hours.
Basic concepts of electrophysiology from an engineering perspective. Functionality of relevant organs and systems; instrumentation tools which monitor electrophysiology function. Crosslisted with ECE 4784.

BMED 4801. Special Topics. 1 Credit Hour.
Courses in special topics of current interest not included in the regular course offerings.

BMED 4802. Special Topics. 2 Credit Hours.
Courses in special topics of current interest not included in the regular course offerings.

BMED 4803. Special Topics. 3 Credit Hours.
Courses in special topics of current interest not included in the regular course offerings.

BMED 4804. Special Topics. 4 Credit Hours.
Courses in special topics of current interest not included in the regular course offerings.

BMED 4805. Special Topics. 5 Credit Hours.
Courses in special topics of current interest not included in the regular course offerings.
BMED 4811. Special Topics. 1 Credit Hour.
Courses in special topics of current interest not included in the regular course offerings.

BMED 4812. Special Topics. 2 Credit Hours.
Courses in special topics of current interest not included in the regular course offerings.

BMED 4813. Special Topics. 3 Credit Hours.
Courses in special topics of current interest not included in the regular course offerings.

BMED 4814. Special Topics. 4 Credit Hours.
Courses in special topics of current interest not included in the regular course offerings.

BMED 4815. Special Topics. 5 Credit Hours.
Courses in special topics of current interest not included in the regular course offerings.

BMED 4823. Special Topics. 3 Credit Hours.
Courses in special topics of current interest not included in the regular course offerings.

BMED 4833. Special Topics. 3 Credit Hours.
Courses in special topics of current interest not included in the regular course offerings.

BMED 4843. Special Topics. 3 Credit Hours.
Courses in special topics of current interest not included in the regular course offerings.

BMED 4900. Special Problems. 1-21 Credit Hours.
Individualized studies in certain specialized areas of interest in biomedical engineering.

BMED 4901. Special Problems. 1-21 Credit Hours.
Individualized studies in certain specialized areas of interest in biomedical engineering.

BMED 4902. Special Problems. 1-21 Credit Hours.
Individualized studies in certain specialized areas of interest in biomedical engineering.

BMED 4903. Special Problems. 1-21 Credit Hours.
Individualized studies in certain specialized areas of interest in biomedical engineering.

BMED 4XXX. Bioengineering Elective. 1-21 Credit Hours.

BMED 6041. Analytical Methods. 3 Credit Hours.
Basic analytical approaches to solve mathematical problems involved in biomedical engineering applications. Course focuses on ordinary and partial differential equations and on integral transform methods.

BMED 6042. Systems Physiology. 3 Credit Hours.
Regulation of physiological functions in the cardio-respiratory-renal, musculoskeletal, and gastrointestinal systems, and their interactions with the neural, endocrine, and immune systems.

BMED 6210. Magnetic Resonance Imag. 3 Credit Hours.
This course covers the basic physics and engineering principles, advanced techniques and major applications of magnetic resonance imaging.

BMED 6501. Funda BioID Process. 3 Credit Hours.
Key steps, multiple stakeholders and interdependencies in the design and commercialization process for medical products.

BMED 6502. Clinical Literacy Experi. 3 Credit Hours.
Education in interfacing with medical healthcare professionals, medical terminology, on-site clinical observations, needs-finding, case analysis, creating design solutions for improved methods, products and procedures.

BMED 6503. Med Mkts & Clinical Spec. 3 Credit Hours.
Introduction to medical device and biologics industries, interdependencies of commercial companies, vendors and suppliers required for development, commercialization and sales of products and equipment.

BMED 6504. Fina Planning for Pros. 3 Credit Hours.
Finance planning for development projects including: costing, forecasting, time value of money, breakeven analysis, return on investment analysis, capital budgeting, risk and return, working capital management.

BMED 6505. Prod Plan & Project Mgt. 3 Credit Hours.
Strategy and analysis techniques to evaluate and manage new product innovations, product improvements and product line extensions in context of an entity's mission and goals.

BMED 6506. Prof Communication BioID. 3 Credit Hours.
Techniques and practice of effective oral presentations project/grant proposal writing, technical and project report writing to support medical device engineering, design and business.

BMED 6507. Medical Device Reg Req. 3 Credit Hours.
FDA Regulations for medical devices including clearance-approval pathways to commercialization, Quality Systems Regulations and ISO Standards for medical devices in the European Economic Community.

BMED 6508. BioID Masters Project I. 3 Credit Hours.
Team project to address an unmet medical need and develop an innovative solution including the engineering design document package and proof-of-concept prototype.

BMED 6509. BioID Masters Project II. 6 Credit Hours.
Teams will construct prototypes for Course I biomedical device project solution, conduct and analyze performance testing, prepare FDA 510(k) submission, and prepare project commercialization plan.

BMED 6517. Machine Learning Biosci. 3 Credit Hours.
Introduces machine learning concepts and methods, including supervised and unsupervised learning, dimension reduction and visualization. Topics are accompanied by bioinformatics and systems biology applications.

BMED 6700. Biostatistics. 3 Credit Hours.
An introduction to fundamental ideas and techniques in Biostatistics, with an emphasis on conceptual understanding and on the analysis of real data sets.

BMED 6710. Rational Design Biomat. 3 Credit Hours.
The goal of this course is to give graduate students the ability to rationally design new biomaterials by integrating organic chemistry concepts with molecular biology.

BMED 6711. Rational Design Biom Lab. 3 Credit Hours.
The goal of this course is to teach students the laboratory skills needed to design and synthesize new biomaterials.

BMED 6720. Biotransport. 3 Credit Hours.
This graduate level course covers the analysis of fluid flow phenomena in the human body, cardiovasculature, respiratory system and other organ systems.
BMED 6730. Mat Sci Cell Components. 3 Credit Hours.
Addresses structure-property relationship of cellular components. Credit not allowed for both BMED 6730 and MSE 6730.

BMED 6739. Medical Robotics. 3 Credit Hours.
This interdisciplinary course focuses on a fundamental understanding of robot kinematics and dynamics as well as the design, development, and evaluation of a medical robotic system.

BMED 6740. Living System Modeling. 3 Credit Hours.
The purpose of this course is to introduce graduate students to living system models as pre-clinical test beds for a wide variety of biotechnologies.

BMED 6743. Tissue Mechanics. 3 Credit Hours.
Structure-function relationships and constitutive models for a variety of biological tissues, with an emphasis on understanding the mechanical behaviors of normal and pathological tissues. Credit not given for both BMED/ME 6783 and BMED/ME 6743. Crosslisted with ME 6743.

BMED 6753. Prin-Mgt for Engineers. 3 Credit Hours.
The course will provide an introduction to selected topics needed to be successful in the technology industries. Cannot count toward major requirements in M.S. or Ph.D. programs of study.

BMED 6760. Info Process Model Neura. 3 Credit Hours.
This course will examine "top down" modeling approaches for sensorineural systems, where an optimal computational principle used in engineering (e.g., information theory, Bayesian inference, control theory) explains observed information processing.

BMED 6765. Drug Development. 3 Credit Hours.
Introduction to the pharmaceutical development process, including design of new drugs, synthesis and manufacturing issues, and methods of delivery into the body. Includes student presentations. Crosslisted with BMED 6765 and CHBE 6765.

BMED 6774. Biomaterials:Struct&Funct. 3 Credit Hours.
Structure-function relationships of biomaterials and biomaterial characterization will be covered. Materials for medial implants, tissue engineering, biosensing, imaging, and drug delivery will be covered. Crosslisted with CHE, ME, and MEE 6774.

BMED 6777. Advanced Biomaterials. 3 Credit Hours.
Advanced topics of biomaterials performance and engineering, including biointerfaces, host reactions to materials, and bio-inspired/Smart-materials strategies. Crosslisted with CHE, ME, and MEE 6777.

BMED 6779. Bioprocess Engineering. 3 Credit Hours.
Study of enzymes and microbial and mammalian cells for production of biochemicals and protein therapeutics in bioreactors; downstream separation and purification; integrated view of bioprocesses. Crosslisted with CHE, ME, and MEE 6779.

BMED 6780. Medical Image Processing. 3 Credit Hours.
A study of methods for enhancing, analyzing, interpreting, and visualizing information from two- and three-dimensional data obtained from a variety of medical imaging modalities. Crosslisted with ECE and CS 6780.

BMED 6782. Cellular Engineering. 3 Credit Hours.
Engineering analysis of cellular systems. Crosslisted with CHE and ME 6782.

BMED 6784. Cardiovascular Biomech. 3 Credit Hours.
Mechanical analysis of the cardiovascular system emphasizing the normal and pathologic function in relation to clinical cardiovascular medicine. Crosslisted with CHE and ME 6784.

BMED 6786. Medical Imaging Systems. 3 Credit Hours.
A study of the principles and design of medical imaging systems such as X-ray, ultrasound, nuclear medicine, and nuclear magnetic resonance. Crosslisted with ECE 6786.

BMED 6787. Quantitative Electrophys. 3 Credit Hours.
A quantitative presentation of electrophysiological systems in biological organisms, emphasizing the electrical properties and modeling of neural and cardiac cells and systems. Crosslisted with PHYS and ECE 6787.

BMED 6789. Technology Ventures. 3 Credit Hours.
Team discussion and case studies in biomedical engineering technology transfer, including licensing, financial capital, safety and efficacy studies, clinical trials, and strategic planning. Crosslisted with ECE, CHE, ME, and MGT 6789.

BMED 6790. Info Proc Model Neur Sys. 3 Credit Hours.
Examines "top-down" modeling approaches for sensorineural systems, where optimal computational principles used in engineering (e.g., information theory, Bayesian inference, control theory) explain observed information processing.

BMED 6793. Systems Pathophysiology. 3 Credit Hours.
Overview of human pathophysiology from a quantitative perspective. A brief introduction to the application of quantitative models to the understanding of biological systems. Crosslisted with CHE, ECE, and ME 6793.

BMED 6794. Tissue Engineering. 3 Credit Hours.
Biological, engineering, and medical issues in developing tissue engineered constructs. Emphasis in the integration of these disciplines at a basic molecular and cell biology level. Crosslisted with CHE and ME 6794.

BMED 6799. Legal Issues-Tech Transf. 3 Credit Hours.
Study and analysis of U.S. law as it applies to the patenting and licensing processes. Crosslisted with CHE, ME, and MGT 6799.

BMED 6XXX. Bioengineering Elective. 1-21 Credit Hours.

BMED 7000. Master's Thesis. 1-21 Credit Hours.

BMED 7001. Biomed Engineer Seminar. 1 Credit Hour.
Graduate students of the Biomedical Engineering department (all programs) participate in seminars involving current research projects presented by faculty and invited speakers.

BMED 7002. Teaching Practicum I. 1 Credit Hour.
This course provides discipline-specific training that addresses intellectual problems and teaching strategies from the perspective of the discipline. Credit not allowed for both BMED 7002 and BMED 8696.

BMED 7003. Teaching Practicum II. 1 Credit Hour.
This course provides discipline-specific training that addresses intellectual problems and teaching strategies from the perspective of the discipline. Credit not allowed for both BMED 7003 and BMED 8697.

BMED 7004. Teaching & Research I. 1 Credit Hour.
This course provides the practical framework for understanding challenges faced during teaching, research, and academic life. This course includes topical materials required for BME RCR requirements.

BMED 7005. Teaching & Research II. 1 Credit Hour.
This course provides the practical framework for understanding challenges faced during teaching, research, and academic life.

BMED 7011. Integ Core-Int Exp&Model. 3 Credit Hours.
An introduction to how engineers approach problems - via conceptual models that are then used to create wet lab models and in silico models.
BMED 7012. Integ Core-Experi Design. 3 Credit Hours.
This integrative core course focuses on the design of experiments to answer scientific questions, with an emphasis on the spatial and temporal scales of measurements.

BMED 7013. Integ Core-Prob Solv Com. 3 Credit Hours.
An introduction to computational model methodologies for complex biomedical/biological systems. Emphasis is placed on developing well-posed scientific hypotheses through the use of simulations.

BMED 7101. Adv Sem-Biomat&Regen Med. 3 Credit Hours.
This course is intended to promote critical review of the "State-of-the-art" biomaterial technologies to identify knowledge gaps that must be overcome to further biomaterials development.

BMED 7201. Adv Sem-Cardio Biol&Biom. 3 Credit Hours.
To review current topics in cardiovascular engineering, biology and diseases through critical literature review. In addition, each student will develop and present a "Proposal" by the end of the class.

BMED 7301. Adv Sem-Cellular&Biomole. 3 Credit Hours.
This seminar course illustrates the development of micro- and nano-scale engineering approaches for studies of biomolecules and cells and their applications to medicine.

BMED 7310. Stem Cell Engineering. 3 Credit Hours.
Fundamentals for the application of analytical engineering approaches to the quantitative study of stem cell biology and translation into cell therapies and diagnostics.

BMED 7410. Multiscale Analysis Syst. 3 Credit Hours.
The class explores modeling analyses spanning multiple levels of biological organization at different resolutions of detail. Emphasis is placed on control in complex biological systems.

BMED 7411. Math Models Biol & Medic. 3 Credit Hours.
The course introduces the student to a representative set of models that elucidate the nature of biological and medical phenomena.

BMED 7413. Biochemical Systems Anal. 3 Credit Hours.
The course introduces BME students interested in mathematical modeling and systems biology to the computational analysis of metabolic and other dynamic systems in biology.

BMED 7601. Adv Sem-Neuroengineering. 3 Credit Hours.
Current issues in neuroengineering. Focus is placed on neuropsychological complexity across cellular and organ level scales through literature reading, discussion, and independent study.

BMED 7610. Quantitative Neuroscienc. 3 Credit Hours.
A quantitative presentation of neural signal processing and information coding, emphasizing the circuitry of sensory and motor pathways of the brain.

BMED 7785. Intro Robotics Research. 3 Credit Hours.
Familiarizes students with the core of robotics: mechanics, control, perception, AI, and autonomy. Provides an introduction to the mathematical tools required in robotics research. Cross-listed with AE 7785, ECE 7785, and CS 7785.

BMED 8750. Robotics Research Fnd I. 3 Credit Hours.
Multidisciplinary research course supervised by two robotics faculty from different schools participating in the robotics Ph.D. program. Cross-listed with AE, CS, and ECE 8750.

BMED 8751. Robotics Research Fnd II. 3 Credit Hours.
Continuation of BMED 8750 (Multidisciplinary Robotics Research I). Cross-listed with AE, CS, and ECE 8751.

BMED 8811. Special Topics. 1 Credit Hour.
Topics of current interest in biomedical engineering.

BMED 8812. Special Topics. 2 Credit Hours.
Topics of current interest in biomedical engineering.

BMED 8813. Special Topics. 3 Credit Hours.
Topics of current interest in biomedical engineering.

BMED 8814. Special Topics. 4 Credit Hours.
Topics of current interest in biomedical engineering.

BMED 8815. Special Topics. 5 Credit Hours.
Topics of current interest in biomedical engineering.

BMED 8823. Special Topics. 3 Credit Hours.
Topics of current interest in biomedical engineering.

BMED 8853. Special Topics. 3 Credit Hours.
Topics of current interest in biomedical engineering.

BMED 8901. Special Problems. 1-21 Credit Hours.
Individual studies and/or experimental investigations of problems of current interest in bioengineering.

BMED 8902. Special Problems. 1-21 Credit Hours.

BMED 8903. Special Problems. 1-21 Credit Hours.

BMED 8997. Teaching Assistantship. 1-9 Credit Hours.
For graduate students holding a teaching assistantship.

BMED 8998. Research Assistantship. 1-9 Credit Hours.
For graduate students holding a research assistantship.

BMED 9000. Doctoral Thesis. 1-21 Credit Hours.

Biomedical Engr/Joint Emory (BMEM)

BMEM 6000. BMED Eng-Joint w/ Emory. 1-21 Credit Hours.

BMEM 6001. BMED Eng-Joint w/Emory. 1-21 Credit Hours.

Building Construction (BC)

BC 1XXX. Bldg Construction Elect. 1-21 Credit Hours.

BC 2600. Construction Contracting. 3 Credit Hours.
The goal of this course is to teach students the basics of construction contracting, business methods, organizational models, bidding, construction insurance, and labor relations.

BC 2610. Construction Tech I. 3 Credit Hours.
An introduction to the planning and physical development process for the construction of projects of residential and light construction scale.

BC 2620. Construction Tech II. 3 Credit Hours.
A continuation of Construction Technology I with an emphasis on large-scale and high-rise building, i.e., commercial building construction.

BC 2630. Construction Seminar. 1 Credit Hour.
Provides an introduction to the construction industry with emphasis on exploring career opportunities in construction.

BC 2698. Research Assistantship. 1-9 Credit Hours.
Independent research conducted under the guidance of a faculty member.

BC 2699. Undergraduate Research. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.
BC 2XXX. Bldg Construction Elect. 1-21 Credit Hours.

BC 3600. Construction Cost Mgt. 3 Credit Hours.
Introduction to cost principles and cost analysis of construction projects, including classification of work, quantity survey techniques, construction operation costs, and bid proposals.

BC 3610. Construction Law. 3 Credit Hours.
Legal aspects of construction contracts, bonds, insurance, and bidding. Owner, architect, contractor, and subcontractor relationships.

BC 3620. Real Est&Constr Fin&Acct. 3 Credit Hours.
General introduction to the financing of construction and real estate development projects. Emphasis on financing requirements, activities, sources, and uses.

BC 3630. Project Management I. 3 Credit Hours.
This course will offer construction planning and management techniques for project design and construction with a focus on different scheduling methods and their use.

BC 3640. Construction Mechanics. 3 Credit Hours.
An introductory course to the evaluation of behavior of buildings, the properties of structural materials, and the behavior of load-resisting members.

BC 3XXX. Bldg Construction Elect. 1-21 Credit Hours.

BC 4050. Building Info Modeling. 3 Credit Hours.
This course introduces students to BIM and the changes it has been causing to the traditional design, planning, management, construction, facility management, and contracting practices.

BC 4110. Trends & Pol For Res Dev. 3 Credit Hours.
An overview of development in the United States, current trends in residential development, and the impact of external factors on residential development. This course is designed to help Building Construction students understand how their development impacts the social environment and quality of life of the community.

BC 4120. Community Dsgn & Constr. 3 Credit Hours.
An overview of the principles of smart growth, livable communities and new urbanism and how these principles are implemented in the process from design to construction and marketing.

BC 4130. Intg Design Constr & Dev. 3 Credit Hours.
A study of contemporary examples of an integrated approach to design, construction and development. Course involves real-world project analysis from multiple points of view.

BC 4140. Construction Mgt Project. 3 Credit Hours.
This class is the application of course materials covered throughout the Certificate in Construction Management to an actual construction project with a simulated business construct.

BC 4600. Project Management II. 3 Credit Hours.
This course covers practical project management, technology, and tools for this approach and the required management skills for successful execution of projects.

BC 4610. Value Engr & Bldg Econ. 3 Credit Hours.
First part is an introduction to principles and methodology. Second part is an introduction to economic principles and theories and how to apply the concepts and methods of building economics.

BC 4620. Bldg Structural Analysis. 3 Credit Hours.
Emphasis being placed on the practical design and construction of structural elements. The course includes basic design principles with a heavy emphasis on constructability and buildability.

BC 4630. Senior Capstone Project. 3 Credit Hours.
A senior construction project that includes redevelopment analysis and feasibility study, project development, and construction.

BC 4640. Construction Marketing. 3 Credit Hours.
Methods of construction marketing and business development. Innovative computer applications, verbal skills development, professional strategies, market segmentation, and buyer behavior.

BC 4650. Lab for Sustainable Dsgn. 3 Credit Hours.
The goal of the laboratory is to teach students a comprehensive sustainable design and construction information system and a program of real-world, hands-on projects.

BC 4660. Entrepreneurship-Constru. 3 Credit Hours.

BC 4672. MEP Systems. 3 Credit Hours.
The course will cover the fundamentals of design, selection, installation, commissioning, and maintenance of mechanical, electrical and plumbing systems. Credit not allowed for both BC 4672 and BC4670.

BC 4680. Professional Internship. 3 Credit Hours.
Students work for a professional architecture/engineering/ construction company in which they learn, first-hand, about the construction industry.

BC 4698. Research Assistantship. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

BC 4699. Undergraduate Research. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

BC 4700. Construction Management. 3 Credit Hours.
An accelerated-pace course designed to provide a basic understanding of fundamental topics including planning, budgeting, estimation, scheduling, and project close out.

BC 4710. Green Construction. 3 Credit Hours.
This course focuses on the means, methods, strategies, and technologies to improve the energy efficiency and performance of buildings, and to reduce the environmental impact of buildings.

BC 4720. Resident Constr&Prop Mgt. 3 Credit Hours.
A course designed to orient students to the basics of apartment management and includes the business functions of marketing, leasing, and financing.

BC 4730. Best Prac Multi-Fam Prop. 3 Credit Hours.
A course designed to provide students with a broad range of the best practices related to the management of all types of multi-family residential property.

BC 4735. Real Estate Dev&Construc. 3 Credit Hours.
Provides an overview of the real estate development process as it pertains to construction development including trends and current issues.

BC 4801. Special Topics. 1 Credit Hour.
BC 4802. Special Topics. 2 Credit Hours.
BC 4803. Special Topics. 3 Credit Hours.
BC 4823. Special Topics. 3 Credit Hours.
BC 4833. Special Topics. 3 Credit Hours.
BC 4843. Special Topics. 3 Credit Hours.
Topics of current interest in building construction.
BC 6900. Special Problems. 1-21 Credit Hours.
BC 4XXX. Bldg Construction Elect. 1-21 Credit Hours.
BC 6002. Issues In Sust Construct. 3 Credit Hours.
Course designed to help students achieve a basic understanding of the materials used in the commercial segments in the construction industry and how these relate to sustainable construction.
BC 6004. Sustainable Energy AEC. 3 Credit Hours.
An introductory course on sustainable energy in architecture, engineering and construction. The goal of the course is to introduce students to fundamental concepts of sustainable sources of energy to power buildings and address the impact of these sources to applicable green building rating systems.
BC 6005. Tech Apps in Const Indst. 3 Credit Hours.
Hands-on exploration of various present and Future technologies that can be applied in all stages of a facilities' lifecycle.
BC 6025. Construction Management. 3 Credit Hours.
An accelerated paced course providing graduate students a basic understanding of fundamental topics including planning, budgeting, estimating, scheduling and project closeout.
BC 6050. Building Info Modeling. 3 Credit Hours.
This course introduces students to BIM and the changes it has been causing to the traditional design, planning, management, construction, facility management, and contracting practices. Credit will not be awarded for both BC 4050 and BC 6050.
BC 6100. Prof Trends-Facility Mgt. 3 Credit Hours.
An introductory course covering the organizational, managerial, ethical, and legal principles for the delivery of facility management services. Includes contracts and risk management.
BC 6125. Professional Internship. 3 Credit Hours.
A course in which students work for a professional architecture/engineering/construction company in which they learn, first-hand, about the construction industry.
BC 6150. Design-Build Orgn & Mgt. 3 Credit Hours.
Introduction to Design-Build (DB) as a project delivery system. Provides information about the organization, the process, and the effects of DB on the industry.
BC 6175. Real Estate Dev & Constr. 3 Credit Hours.
Provides an overview of the real estate development process as it pertains to construction development including trends and current issues.
BC 6185. Intro to Const Prog Mgt. 3 Credit Hours.
Survey of the construction program management profession, focusing on the comprehensive management of single and multiple building programs including pre-design, design, construction and post-construction activities.
BC 6200. Maint Mgt-Built Assets. 3 Credit Hours.
This course covers the processes by which a facility and its systems are serviced and maintained during the facility's life cycle. Includes acquisition, installation, operation, maintenance, and disposal of built assets.
BC 6250. Value Mgt-Integrated Dgn. 3 Credit Hours.
Principles and methodology of value management analysis concepts and an examination of future values and worth criteria affecting building design, construction, furnishings, and operations performance.
Topics of current interest in building construction.

BC 6685. Leadership in Des&Constr. 3 Credit Hours.
Framework and guidelines for effective leadership and communications during design and construction.

BC 6700. Adv Facility Mgt Practic. 3 Credit Hours.
Students apply specific methods and procedures from core courses to actual business situations in the facility and property management industry.

BC 6731. Zero Energy Housing. 3 Credit Hours.
Design, analysis, operation, construction, and cost feasibility of so-called “zero energy” houses. Credit not allowed for both BC 6731 and ARCH 6731.

BC 6800. Facil&Prop Mgt Capstone. 3 Credit Hours.
Designed to integrate the learning from basic topics through the use of actual case studies and situations found within the facility and property management industry.

BC 6850. Bldg Cons Fac Mgmt Capst. 3 Credit Hours.
Application of coursework covered in the Master of Science in Building Construction and Facility Management curriculum with a stimulated business construct from different perspectives: construction manager, program manager, or facility manager.

BC 6875. Real Estate Dev Capstone. 3 Credit Hours.
Formulation and exploration of a real estate development project. Topics include business plan, market analysis, site selection, regulations, finance, project delivery, design and engineering.

BC 6910. Best Prac Multi-Fam Prop. 3 Credit Hours.
A course designed to provide students with a broad range of the best practices related to the management of all types of multi-family residential property.

BC 6920. Intro-Resident Prop Mgt. 3 Credit Hours.
A course designed to orient students to the basics of apartment management and includes the business functions of marketing, leasing, and financing.

BC 6930. Intg Design Constr & Dev. 3 Credit Hours.
This course will focus on contemporary integrated approach to design, construction and development. Course involves real-world project analysis from multiple points of view. Examples to be selected from the Atlanta region.

BC 6XXX. Bldg Construct Elective. 1-21 Credit Hours.

BC 7000. Master’s Thesis. 1-21 Credit Hours.

BC 7100. Quant Meth Constr Resch. 3 Credit Hours.
Introductory course in graduate research in the building construction industry. Covers types of research, sampling methods, and basic analysis and evaluation techniques.

BC 7200. Adv Readings In BC. 1-12 Credit Hours.
This course is designed around advanced readings in research and practice for PhD students working in the building construction area.

BC 8000. PhD Seminar. 1 Credit Hour.
This is an introduction to PhD-level research in Building Construction.

BC 8100. Research Methodology. 3 Credit Hours.
Research design course that teaches the basics of creating credible scientific research plans with examples from construction related research.

BC 8803. Special Topics. 3 Credit Hours.

BC 8811. Special Topics. 1 Credit Hour.
Topics of current interest in building construction.

BC 8812. Special Topics. 2 Credit Hours.
Topics of current interest in building construction.

BC 8813. Special Topics. 3 Credit Hours.
Topics of current interest in building construction.

BC 8814. Special Topics. 4 Credit Hours.
Topics of current interest in building construction.

BC 8815. Special Topics. 5 Credit Hours.
Topics of current interest in building construction.

BC 8823. Special Topics. 3 Credit Hours.
Topics of current interest in building construction.

BC 8833. Special Topics. 3 Credit Hours.
Topics of current interest in building construction.

BC 8843. Special Topics. 3 Credit Hours.
Topics of current interest in building construction.

BC 8901. Spec Prob-Build Construc. 1-21 Credit Hours.

BC 8902. Spec Prob-Build Construc. 1-21 Credit Hours.

BC 8903. Spec Prob-Build Construc. 1-21 Credit Hours.

BC 8997. Teaching Assistantship. 1-9 Credit Hours.
For graduate students holding graduate teaching assistantship.

BC 8998. Research Assistantship. 1-9 Credit Hours.
For graduate students holding graduate research assistantship.

BC 8999. Doctorial Thesis Prep. 1-21 Credit Hours.
This course is designed to synthesize the knowledge and skills developed in previous research courses and apply them to the doctoral dissertation process for students in Building Construction.

BC 9000. Doctoral Thesis. 1-12 Credit Hours.
Preparation of doctoral thesis for Ph.D. in Building Construction.

Building Construction - Professional (BCP)
Center Enhancement-Teach/Learn (CETL)

CETL 2000. Undergraduate TA Prep. 1 Credit Hour.
This course is an introduction to the procedural information and practical skills needed to be an effective undergraduate teaching assistant. May be used as free elective credit with department approval.

CETL 2001. Fund of Peer Tutoring. 1 Credit Hour.
This course is an introduction to the practical skills needed to be an effective peer tutor at Georgia Tech. May not be used towards degree requirements.

CETL 2002. Fund of K-12 Tutoring. 1 Credit Hour.
This course is an introduction to the practical skills needed to be an effective tutor in the K-12 arena. May not be used towards degree requirements.

CETL 2698. Research Assistantship. 1-12 Credit Hours.
Credit hours to be arranged. Independent research conducted under the guidance of a faculty member. May not be used towards degree requirements.

CETL 2699. Undergraduate Research. 1-12 Credit Hours.
Credit hours to be arranged. Independent research conducted under the guidance of a faculty member. May be used as free elective towards BS degrees with department approval.
CETL 3000. Residence Life Seminar. 1 Credit Hour.
This course will provide students with techniques, skills and knowledge necessary to become a successful Residence Life Student Staff member. May not be used towards degree requirements.

CETL 3801. Special Topics. 1 Credit Hour.
Topics of current interest. May not be used towards degree requirements.

CETL 4001. Prin of Learn & Teach I. 3 Credit Hours.
This course focuses on the knowledge and skills necessary for effective classroom instruction and management including: educational psychology, instructional design and delivery techniques. May be used as free elective towards BS degrees with department approval.

CETL 4002. Prin of Learn & Teach II. 3 Credit Hours.
This course focuses on the knowledge and skills necessary for effective classroom instruction and management including instructional planning, assessment, and the teaching professional community. May be used as free elective towards BS degrees with department approval.

CETL 4698. Research Assistantship. 1-12 Credit Hours.
Credit hours to be arranged. Independent research conducted under the guidance of a faculty member. May not be used towards degree requirements.

CETL 4699. Undergraduate Research. 1-12 Credit Hours.
May be used as free elective towards BS degrees with department approval.

CETL 4801. Special Topics. 1 Credit Hour.
Topics of Current Interest. May not be used towards degree requirements. May not be used towards degree requirements.

CETL 4802. Special Topics. 2 Credit Hours.
Topics of Current Interest. May not be used towards degree requirements.

CETL 4803. Special Topics. 3 Credit Hours.
Topics of Current Interest. May not be used towards degree requirements.

CETL 6490. Adv Environ Data Analy. 3 Credit Hours.
A unified view of the theories and applications underlying the statistical analysis of environmental data in the space, time and spectral domain.

CETL 8000. GTA Preparation. 1 Credit Hour.
This course is an introduction to the procedural information and practical skills needed to be an effective graduate teaching assistant.

CETL 8701. Classroom Management. 1 Credit Hour.
A course in which students learn about official Georgia Tech policies impacting instruction and develop skills to resolve problems and enhance classroom learning.

CETL 8711. STEP Summer Training. 1-21 Credit Hours.
Participants attend training sessions on pedagogy, classroom management, educational technology; engage in practice teaching; and design action plans for partnering with local high school teachers.

CETL 8712. STEP Seminar. 1 Credit Hour.
This is the academic year follow-up course for STEP fellows. It is a forum to share and to continue training as the fellows work in their STEP high schools.

CETL 8713. Teach&Learn-Higher Edu. 3 Credit Hours.
This course focuses on learner-centered teaching and educational research. Students design lesson plans, practice teaching, self-reflect, give and receive peer feedback, and write a teaching philosophy.

CETL 8714. Teach Practicum-HigherEd. 2 Credit Hours.
Apprentice to faculty mentor and help teach a college course. Get feedback from mentor, CETL, and a peer learning community. Explore types of academic careers.

CETL 8715. Teach Practicum-HigherEd. 3 Credit Hours.
Apprentice to faculty mentor and help teach a college course. Get feedback from mentor, CETL, and a peer learning community. Explore types of academic careers.

CETL 8717. Course Design-Higher Edu. 3 Credit Hours.
Application of learner-centered teaching paradigm and educational research to create a course syllabus and design other course elements for a college-level course of their choosing.

CETL 8719. Teach Immersion-HigherEd. 1 Credit Hour.

CETL 8721. Academic Writing. 1 Credit Hour.
Through examination of writing samples and practice, students learn techniques for enhancing proposal preparation and methods for evaluating writing as future instructors and thesis directors.

CETL 8722. Int’l Academic Writing. 1 Credit Hour.
This course aids international graduate students in enhancing their academic writing skills in English through exposure to, and practice of producing examples of academic writing. Credit will not be awarded for both CETL 8722 and CETL 8723.

CETL 8723. Acad Writ Intl Grads. 2 Credit Hours.
This course helps international graduate students enhance their academic writing skills in English through analysis and production of academic writing samples. Credit not awarded for both CETL 8723 and CETL 8722.

CETL 8731. Academic Professional. 1 Credit Hour.
Participants in this course work through numerous exercises and scenarios in order to prepare them professionally and personally for a future career in academics.

CETL 8741. Academic Presentations. 1 Credit Hour.
An examination and practice of oral presentations in a variety of academic scenarios: e.g., conference talks, proposal presentations, discussion facilitation, job talks, and oral exams/defenses.

CETL 8791. Instruc Practice-Intl TA. 2 Credit Hours.
Enhancement of English pronunciation and instructional skills for international teaching assistants. In-class and small-group language practice; discussion of teaching methodology.

CETL 8792. Engl/Pedegogy-Intl TAs. 2 Credit Hours.
Enhancement of English pronunciation and instructional skills for international teaching assistants. In-class and small-group language practice; discussion of teaching methodology; individual tutoring.

CETL 8793. English for Intl Grads. 2 Credit Hours.
An oral skills class designed to help graduate students become more accurate and fluent in both verbal and nonverbal skills. In addition to working on acquiring an American accent and body language when speaking English, students will work on basic presentation skills. Credit will not be awarded for CETL 8793 and CETL 8797.

CETL 8794. Academic English. 1 Credit Hour.
Enhancement of English pronunciation for international teaching assistants. In-class and small group language practice.

CETL 8795. Adv English - Intl Grads. 2 Credit Hours.
An advanced oral skills class designed to help graduate students improve their verbal ability in English for teaching, making presentations, and interacting in academic and professional situations. Credit will not be awarded for both CETL 8796 and CETL 8795.
CHBE 1750. Intro to Bioengineering. 3 Credit Hours.
An introduction to the field of bioengineering, including the application of
engineering principles and methods to problems in biology and medicine,
the integration of engineering with biology, and the emerging industrial
opportunities. Crosslisted with AE, BMED, ECE, ME, and MSE 1750.
CHBE 1801. Special Topics. 1 Credit Hour.
Special Topics in CHBE.
CHBE 1XXX. Chem Engr Elective. 1-21 Credit Hours.
CHBE 2100. Chem Process Principles. 3 Credit Hours.
Material and energy balances for single-phase and multi-phase processes
common to chemical engineering. Phase equilibrium and analysis of
reacting systems.
CHBE 2110. Chem Engr. Thermo I. 3 Credit Hours.
Elements of engineering thermodynamics. First and second laws.
Analysis of engineering machinery: compressors, turbines, engines,
refrigeration. Credit not allowed for both CHBE 2110 and CHBE 2130.
CHBE 2120. ChE Numerical Mthds. 3 Credit Hours.
Numerical methods are introduced and applied to the solution of
chemical engineering problems. An introduction to chemical process
simulation, and the appropriate software is provided.
CHBE 2130. Chem Eng Thermo I. 2 Credit Hours.
Basic principles of chemical engineering thermodynamics including first
and second laws, equations of state, PVT properties, power cycles and
refrigeration. Credit not allowed for both CHBE 2130 and CHBE 2110.
CHBE 2698. Research Assistantship. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.
CHBE 2699. Undergraduate Research. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.
CHBE 2801. Special Topics. 1 Credit Hour.
Topics relevant to chemical engineering not currently covered in the
undergraduate curriculum are presented as demand or interest warrants.
CHBE 2803. Special Topics. 3 Credit Hours.
Topics relevant to chemical engineering not currently covered in the
undergraduate curriculum are presented as demand or interest warrants.

Chemical & Biomolecular Engr (CHBE)

CHBE 3110. Chem Engr. Thermo II. 3 Credit Hours.
Phase and chemical reaction equilibria. Vapor-liquid, liquid-liquid,
and solid-vapor phase equilibrium Fugacity and activity coefficients.
Multi-reaction equilibrium. Credit not allowed for both CHBE 3110 and
CHBE 3130.
CHBE 3130. Chem Eng Thermo II. 3 Credit Hours.
Basic principles of chemical engineering solution and phase equilibrium
thermodynamics, including ideal and non-ideal solution models and
phase equilibria calculations (VLE, SLE, LLE). Credit not allowed for both
CHBE 3130 and CHBE 3110.
CHBE 3200. Transport Processes I. 3 Credit Hours.
Fundamentals of fluid mechanics and heat transfer. The design and
analysis of equipment using the principles of fluid mechanics and heat
transfer.
CHBE 3210. Transport Processes II. 3 Credit Hours.
Fundamental principles and applications of mass transfer. The analysis
of chemical engineering processes and operations involving mass
transfer.
CHBE 3225. Separations Processes. 3 Credit Hours.
Fundamentals of equilibrium-stage and continuous contacting
operations. Applications of principles to distillation, absorption/stripping,
extraction, absorption, and other separation technologies.
CHBE 3600. Engineering Ethics. 3 Credit Hours.
Development of quantitative and qualitative assessment tools to resolve
moral and ethical dilemmas that arise in the performance of engineering
duties.
CHBE 3XXX. Chem Engr Elective. 1-21 Credit Hours.
CHBE 4020. Chem Eng-Nanoscale Sys. 3 Credit Hours.
Application of chemical processing fundamentals, fabrication, and
characterization to design and analyze technologically important
nanoscale systems. The course emphasizes an integrated engineering
and science approach.
CHBE 4050. Microelec Fabrication. 3 Credit Hours.
An elective class for students interested in fabrication of semiconductor
devices focusing on the fundamentals of materials synthesis, chemical
and mechanical properties, and chemical reactions. Credit will not be
awarded for both CHBE 4050 and CHBE 6050.
CHBE 4200. Unit Operations Lab. 3 Credit Hours.
This course illustrates engineering/scientific principles and physical
models important to the data collection/interpretation of processes
important to the practice of chemical engineering.
CHBE 4210. Bioprocess Unit Ops. 3 Credit Hours.
This course illustrates engineering/scientific principles and physical
models important to the data collection/interpretation of processes
important in biotechnology.
CHBE 4300. Kinetics&Reactor Dsgn. 3 Credit Hours.
Reacting systems are analyzed in terms of reaction mechanisms,
kinetcs, and reactor design. Both homogeneous and heterogeneous
reactions are considered.
CHBE 4310. Bioprocess Engineering. 3 Credit Hours.
Integrating several ChBE core concepts, bioprocess engineering applies
the material to biological systems. Items covered are enzyme kinetics,
fertilmentation, downstream processing, and integrated bioprocesses
important to the biotech industries.
CHBE 4400. Chemical Process Control. 4 Credit Hours.
Dynamics of chemical processes and their control. Techniques of conventional process control as well as digital control. Laboratory experiments to illustrate these concepts.

CHBE 4411. Process Control. 3 Credit Hours.
Dynamics of chemical processes and their control. Techniques of conventional process control as well as digital control.

CHBE 4412. Process Control Lab. 1 Credit Hour.
Dynamics of chemical processes and their control. Techniques of conventional process control as well as digital control. Laboratory experiments would illustrate these concepts.

CHBE 4505. Process Design & Economics. 3 Credit Hours.
Principles of flowsheet synthesis and economic analysis and optimization. A complete design on a chemical process will be undertaken, including concepts of unit operations, design, economics, and safety. Credit not allowed for both CHBE 4505 and CHBE 4530 (or CHBE 4520).

CHBE 4510. Proc & Prod Design & Econ. 2 Credit Hours.
Basic principles of chemical process and product design including heuristic design approaches, heat exchanger network design, optimization, and economic evaluation. Credit not allowed for both CHBE 4510 and CHBE 4505 (or CHBE 4525).

CHBE 4515. Chemical Process Safety. 1 Credit Hour.
Fundamental sources of chemical hazards and degree of risk. Process design and hazard avoidance are used to reduce risk.

CHBE 4520. Capstone CHBE Design. 2 Credit Hours.
Basic principles of chemical process and product design including heuristic design approaches heat exchanger network design, optimization, and economic evaluation. Credit not allowed for both CHBE 4520 and CHBE 4505 (or CHBE 4525).

CHBE 4525. Bioprocess Design & Econ. 3 Credit Hours.
Principles of flowsheet synthesis and economic analysis and optimization. A complete design of a biochemical process will be undertaken, including concepts of unit operations, design, economics, and safety. Credit not allowed for both CHBE 4525 and CHBE 4530 (or CHBE 4520).

CHBE 4530. Capstone ChBe Bio-Design. 2 Credit Hours.
Basic principles of chemical process and product design including heuristic design approaches, heat exchanger network design, optimization, and economic evaluation. Credit not allowed for both CHBE 4530 and CHBE 4505 (or CHBE 4525).

CHBE 4535. Chemical Product Design. 3 Credit Hours.
Chemical engineering principles applied to the design of products.

CHBE 4573. Pulping & Bleaching Lab. 2 Credit Hours.
Experiments of pulp preparation, refining, paperforming, handsheet testing, deinking, and recycled pulp processing are performed. Small paper machine operation will be taught.

CHBE 4600. Engineer Communication. 3 Credit Hours.
How engineers communicate with engineering and non-engineering professionals. Industry speakers from different fields. Engineering case study. Weekly written and/or oral presentations.

CHBE 4698. Research Assistantship. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

CHBE 4699. Undergraduate Research. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

CHBE 4710. Microfluidics & Bio Appl.. 3 Credit Hours.

CHBE 4720. Pulp Paper Manufacturing. 3 Credit Hours.
The course provides comprehensive foundational knowledge of the industry enabling the student to understand the role of diverse manufacturing operations and to strategically plan improvements.

CHBE 4730. Emg Tech Forest Bioprods. 3 Credit Hours.
The course provides comprehensive knowledge of the manufacture of nontraditional products from forest biomaterials. It analyzes and assesses emerging manufacturing technologies, materials and products.

CHBE 4752. IC Fabrication. 3 Credit Hours.
The objective of this course is to give students exposure to the various steps involved in the fabrication of integrated circuits and devices. This course will include a laboratory segment in which students fabricate MOS transistors, diffused resistors, and MOS capacitors from a bare silicon substrate. Crosslisted with ECE 4752.

CHBE 4755. Packaging Substrate Fab. 3 Credit Hours.
This course provides hands-on instruction in basic packaging substrate fabrication techniques, including interconnect design and testing, dielectric deposition, via formation, and metallization. Crosslisted with ECE 4755.

CHBE 4757. Biofluid Mechanics. 3 Credit Hours.

CHBE 4758. Biosolid Mechanics. 3 Credit Hours.

CHBE 4759. Electrochem Storage. 3 Credit Hours.
An elective class for senior-level students interested in electrochemical storage and conversion, including the fundamentals of electrochemistry and practical battery and fuel cells.

CHBE 4760. Biocatalysis. 3 Credit Hours.
This course provides an in-depth coverage of various topics in biocatalysis and metabolic engineering. Goals of this course are the development of an understanding of proteins as catalysts, their functioning in metabolic networks, their application in various industries, recognition of their potential for addressing future challenges in science and engineering. Crosslisted with CHEM 4760.

CHBE 4763. Pulping & Chem Recovery. 3 Credit Hours.
Pulping and chemical recovery processes are studied on the reaction, delignification, energy, and liquor reuse. The process optimization, air and water pollution minimization are taught. Crosslisted with ME 4763.

CHBE 4764. Bleaching & Papermaking. 3 Credit Hours.
Pulp bleaching and formation of paper/board products are studied along with testing, end uses, chemical and mechanical treatment of pulp, non-wood and recycled fiber utilization. Crosslisted with ME 4764.
CHBE 4765. Drug Design, Devlpmnt&Delivery. 3 Credit Hours.
Introduction to the pharmaceutical development process, including design of new drugs, synthesis and manufacturing issues, and methods for delivery into the body. Includes student presentations. Crosslisted with CHEM and BMED 4765.

CHBE 4767. Pulp And Paper Lab. 3 Credit Hours.
Fundamentals of pulp and paper testing procedures.

CHBE 4770. Nuclear Chemical Engr. 3 Credit Hours.
This course surveys the chemical engineering aspects of nuclear power. Topics include nuclear reactions, fuel cycles, solvent extraction of metals, the properties of actinides and other irradiated fuel materials, fuel reprocessing, and radioactive waste management. Crosslisted with NRE 4770.

CHBE 4775. Polymer Science & Engr I. 3 Credit Hours.
An introduction to the chemistry, structure, and formation of polymers, physical states and transitions, physical and mechanical properties to polymer fluids and solids. Crosslisted with CHEM, ME, MSE, and PTFE 4775.

CHBE 4776. Polymer Science & Engr II. 3 Credit Hours.
Polymer fabrication processes and methods of characterization and identification of polymers are presented. Experiments in polymerization, processing and property evaluation of polymers. Crosslisted with CHEM, ME, MSE, and TFE 4776.

CHBE 4781. Biomed Instrumentation. 3 Credit Hours.
A study of medical instrumentation from a systems viewpoint. Pertinent physiological and electro-physiological concepts will be covered. Credit not allowed for both CHBE 4781 and (CHE 4781 or ECE 4781 or BMED 4781 or ME 4781).

CHBE 4782. Biosystems Analysis. 3 Credit Hours.
Analytical methods for modeling biological systems, including white-noise protocols for characterizing nonlinear systems. Crosslisted with BMED, ECE and ME 4782.

CHBE 4791. Mech Behavior-Composites. 3 Credit Hours.
Stress-strain behavior of composites, property of matrix and reinforcing materials, mechanics of fiber-reinforced composites, lamina and laminate analysis, and mechanical performance. Crosslisted with AE, CEE, ME, MSE, and PTFE 4791.

CHBE 4793. Composite Mater& Process. 3 Credit Hours.
Basic principles of selection and design of composite materials and their manufacturing and testing. Cost factors. Laboratory exercises on manufacturing and tests. Crosslisted with AE, CEE, ME, MSE, and PTFE 4793.

CHBE 4794. Composite Materials & Mfg. 4 Credit Hours.
Basic principles of selection and design of composite materials and their manufacturing and testing. Cost factors. Laboratory exercises on manufacturing and tests. Crosslisted with AE, CEE, ME, MSE, and PTFE 4794.

CHBE 4801. Spec Topic-Chemical Engr. 1 Credit Hour.
Topics relevant to chemical engineering not currently covered in the undergraduate curriculum are presented as demand or interest warrants.

CHBE 4802. Spec Topic-Chemical Engr. 2 Credit Hours.
Topics relevant to chemical engineering not currently covered in the undergraduate curriculum are presented as demand or interest warrants.

CHBE 4803. Spec Topic-Chemical Engr. 3 Credit Hours.
Topics relevant to chemical engineering not currently covered in the undergraduate curriculum are presented as demand or interest warrants.

CHBE 4804. Spec Topic-Chemical Engr. 4 Credit Hours.
Topics relevant to chemical engineering not currently covered in the undergraduate curriculum are presented as demand or interest warrants.

CHBE 4805. Spec Topic-Chemical Engr. 5 Credit Hours.
Topics relevant to chemical engineering not currently covered in the undergraduate curriculum are presented as demand or interest warrants.

CHBE 4806. Spec Topic-Chemical Engr. 6 Credit Hours.
Topics relevant to chemical engineering not currently covered in the undergraduate curriculum are presented as demand or interest warrants.

CHBE 4853. Special Topics. 3 Credit Hours.
Topics relevant to chemical engineering not currently covered in the undergraduate curriculum are presented as demand or interest warrants.

CHBE 4873. Spec Topic-Chemical Engr. 3 Credit Hours.
Topics relevant to chemical engineering not currently covered in the undergraduate curriculum are presented as demand or interest warrants.

CHBE 4901. Spec Probs-Chemical Engr. 1-21 Credit Hours.
The student is given an opportunity to develop initiative and to apply fundamental principles by doing semioriginal laboratory or theoretical investigation of a chemical engineering problem.

CHBE 4902. Spec Probs-Chemical Engr. 1-21 Credit Hours.
The student is given an opportunity to develop initiative and to apply fundamental principles by doing semioriginal laboratory or theoretical investigation of a chemical engineering problem.

CHBE 4903. Spec Probs-Chemical Engr. 1-21 Credit Hours.
The student is given an opportunity to develop initiative and to apply fundamental principles by doing semioriginal laboratory or theoretical investigation of a chemical engineering problem.

CHBE 4XXX. Chem Engr Elective. 1-21 Credit Hours.
This course introduces ChBE graduate students to topics that will be encountered in research and fulfills RCR (responsible conduct of research) in-person training requirements.

CHBE 6001. Introduction to Research. 1 Credit Hour.
The course introduces ChBE graduate students to topics that will be encountered in research and fulfills RCR (responsible conduct of research) in-person training requirements.

CHBE 6003. Chem Process Safety. 1 Credit Hour.
The course focuses on risk reduction through design and hazard avoidance. Sources of chemical hazards and risks are discussed.

CHBE 6004. Communication Skills. 1 Credit Hour.
Applications of both written and oral communication skills to the solution of technical problems. Includes focus, audience analysis, visual aids, and organization.

CHBE 6020. Chem Eng in Nanosystems. 3 Credit Hours.
Application of chemical processing fundamentals, fabrication, and characterization to design and analyze technologically important nanoscale systems. The course emphasizes an integrated engineering and science approach.

CHBE 6050. Microelec Fabrication. 3 Credit Hours.
An elective class for students interested in fabrication of semiconductor devices focusing on the fundamentals of materials synthesis, chemical and mechanical properties, and chemical reactions. Credit will not be awarded for both CHBE 6050 and CHBE 4050.

CHBE 6100. Adv CHE Thermodynamics. 3 Credit Hours.
Equations of state, corresponding states, and activity coefficient models and their relationship to intermolecular forces. Phase and chemical equilibria in chemical engineering.

CHBE 6110. Thermo-Large Molecules. 3 Credit Hours.
Classical and statistical thermodynamics of systems that are important in chemical, biochemical, and polymer processing.
CHBE 6120. Molecular Modeling. 3 Credit Hours.
Introduction to computational chemistry techniques for modeling substances at the molecular level, including: ab initio and semiempirical quantum methods, molecular dynamics, and Monte Carlo methods.

CHBE 6130. Electrochemical Engr. 3 Credit Hours.
Electrochemical thermodynamics and kinetics. Corrosion. Applications to semiconductor devices, fuel cells, and batteries.

CHBE 6200. Transport Phenomena. 3 Credit Hours.
Transfer Viscous fluid mechanics and convective heat transfer. Scaling analysis and lubrication. Stokes, and boundary layer flows. Transport about solid bodies. Linear stability theory.

CHBE 6210. Fluid Mech Two-Phase Flow. 3 Credit Hours.
Two-phase flow of nondeformable particles in Newtonian fluids. Rigorous results in the limit of small Reynolds number motions and applications to suspensions and colloids.

CHBE 6220. Computational Fluid Dyn. 3 Credit Hours.
Applications in Environmental and Chemical Processes. Introduction to numerical methods for solving transport problems. Applications to problems of interest in environmental and chemical processes.

CHBE 6229. Intro to MEMS. 3 Credit Hours.
Introduction to Micro-Electro-Mechanical Systems: Microfabrication techniques including: photolithography, etching, physical and chemical vapor deposition, electroplating, bonding and polymer processing. Application to sensors and actuators.

CHBE 6230. Industrial Emission Ctrl. 3 Credit Hours.
Analysis of air quality criteria, ambient and emission standards, and industrial pollution sources. Recovery and utilization of waste gases and particulate matter.

CHBE 6231. Env Modeling-Forest Ind. 3 Credit Hours.
The science and engineering of waste treatment processes in the pulp and paper industry.

CHBE 6232. ChemE Process Pulp Paper. 3 Credit Hours.
To study the details of some of the major unit operations in pulp and paper manufacturing.

CHBE 6240. Separation Processes. 3 Credit Hours.
This course provides an advanced analysis of separation process technology, with special emphasis on new separation techniques and their applications.

CHBE 6250. Mass Transport. 3 Credit Hours.
An in-depth introduction to transport of penetrants in and through solids. Convective flow through porous media, and conductive flow through homogenous solids. Membrane separations.

CHBE 6260. Mass Transfer. 3 Credit Hours.
Mass transport processes and material properties that affect them. Principles of both steady- and unsteady-state molecular diffusion are developed and transfer mechanisms examined.

CHBE 62X0. Xfer-Separation Process. 2 Credit Hours.
CHBE 62X1. Xfer-Env Mod Forest Ind. 2 Credit Hours.

CHBE 6300. Kinetics & Reactor Dsgn. 3 Credit Hours.
A study of chemical kinetics and mechanisms in complex homogeneous and heterogeneous reaction systems. Design and analysis of chemical reactors for such systems.

CHBE 6310. Chemical Kinetics. 3 Credit Hours.
Applications of chemical kinetics to homogeneous and heterogeneous gas and liquid reactions, including techniques and analyses.

CHBE 6320. Heterogeneous Catalysis. 3 Credit Hours.
Physics and chemistry of surfaces; thermodynamics, kinetics, and mechanism of adsorption and surface reactions; modern instrumental analyses; and industrial catalysis.

CHBE 6400. Adv Process Control. 3 Credit Hours.
Fundamentals of multivariate control theory as applied to chemical processes.

CHBE 6410. Dyn Behavior-Process Sys. 3 Credit Hours.

CHBE 6460. MEMS Devices. 3 Credit Hours.
Introduces fundamental concepts and tools needed for the design, simulation and analysis of MEMS devices. These include electrical, mechanical, radiant, thermal, magnetic and chemical domains. Credit not allowed for both CHBE 6460 and ME 6460 or ECE 6460.

CHBE 6500. Math Model-Chem Process. 3 Credit Hours.
Formulation and solution of mathematical models of a range of chemical processes with an emphasis on differential balances and incorporation of uncertainty.

CHBE 6600. Polymer Reaction Engr. 3 Credit Hours.
Polymerization processes are analyzed with regard to reaction mechanism, kinetics, and reactor design. Control of polymer structure during polymerization is emphasized.

CHBE 6608. Microlithography. 3 Credit Hours.
The study of fundamental issues from physics, chemistry, chemical engineering, and electrical engineering inherent in semiconductor microlithography, encompassing both materials and processes used for pattern definition.

CHBE 6609. Polym-Micorelectronics. 3 Credit Hours.
Use of polymers in microelectronics applications such as photolithography, interlevel dielectrics, encapsulation, packaging, magnetic media, and optical storage.

CHBE 6634. Wet End Processing-Paper. 3 Credit Hours.
Wet end colloidal and polymer science of papermaking processes. Processing with fiber, mineral fillers, brighteners, and polymer additives.

CHBE 66X0. Xfer-Pulp-Paper Mfg I. 2 Credit Hours.
CHBE 66X1. Xfer-Pulp-Paper Mfg II. 2 Credit Hours.
CHBE 66X4. Xfer-Wet End Proc-Paper. 2 Credit Hours.
CHBE 66X7. Transfer-Bioprocessing. 3 Credit Hours.

CHBE 6701. Found Forest Bioproducts. 3 Credit Hours.
The course provides comprehensive foundational knowledge of the industry enabling the student to understand the role of diverse manufacturing operations and to strategically plan improvements. Course is cross-listed with MLDR 6701, CHBE 6741, ME 6741, CHEM 6741, MSE 6741, CHBE 6742, ME 6742, CHEM 6742, MSE 6742.

CHBE 6710. Microfluidics & Appl. 3 Credit Hours.
This course explores the fundamentals of microfluidics and nanofluidics, and their applications, primarily in biological and medical sciences (e.g. biomolecular separations). Credit not allowed for both CHBE 6710 and CHBE 4710.
CHBE 6741. Pulp & Paper Mfg I. 3 Credit Hours.
The fundamentals of pulp and paper technology are presented. Applications to the several unit operations used are explored and augmented by field trips and recent case studies. Crosslisted with ME 6741, CHBE 6701 and MLDR 6701.

CHBE 6742. Pulp & Paper Mfg II. 3 Credit Hours.
Papermaking technology is covered from a multidisciplinary engineering perspective with fundamental and practical considerations being addressed. Students participate in groups to run a pilot papermaking trial at the Henry Foundation in Savannah. Crosslisted with ME 6741, CHBE 6701 and MLDR 6701.

CHBE 6750. Prep&Reactions-Polymers. 3 Credit Hours.
A detailed treatment of the reactions involved in the synthesis of both human-made and natural polymers, including preparation and degradative reactions of polymer systems. Crosslisted with CHEM and PTFE 6750.

CHBE 6751. Phys Chem-Poly Solutions. 3 Credit Hours.
Study of polymer solutions, polymer miscibility, adsorption, sorption, plasticization, molecular weights, molecular weight distributions, and interfacial phenomena using thermodynamics and statistical mechanics. Crosslisted with CHEM and PTFE 6751.

CHBE 6752. Polymer Characterization. 4 Credit Hours.
This course introduces the student to surface, near-surface and structural methods of polymer characterization. Specialized techniques critical to physical structure are emphasized. Crosslisted with CHEM, MSE, and PTFE 6752.

CHBE 6759. Plasma Processing. 3 Credit Hours.
Fundamental physics, chemistry, chemical engineering, and electrical engineering principles inherent in plasma processes. Includes etching, deposition, diagnostic methods, and control schemes. Crosslisted with ECE 6759.

CHBE 6760. Biocatalysis. 3 Credit Hours.
This course provides in-depth coverage of various topics in biocatalysis and metabolic engineering. Goals of this course are the development of an understanding of proteins as catalysts, their functioning in metabolic networks, their application in various industries, and recognition of their potential for addressing future challenges in science and engineering. Crosslisted with CHEM 6760.

CHBE 6765. Drug Design,Devlpmt&Delivery. 3 Credit Hours.
Introduction to the pharmaceutical development process, including design of new drugs, synthesis and manufacturing issues, and methods of delivery into the body. Includes student presentations. Crosslisted with BMED 6765 and CHBE 6765.

CHBE 6768. Polymer Structure& Props. 3 Credit Hours.
Formulations and analysis of molecular and phenomenological models of elastic and viscoelastic behavior, development and description of structure, and fundamental aspects of structure-property relations. Crosslisted with ME, PTFE, and MSE 6768.

CHBE 6774. Biomaterial:Struct&Func. 3 Credit Hours.
Structure-function relationships of biomaterials and biomaterial characterization will be covered. Materials for medical implants, tissue engineering, biosensing, imaging, and drug delivery will be covered. Crosslisted with BMED, ME, and MSE 6774.

CHBE 6777. Advanced Biomaterials. 3 Credit Hours.
Advanced topics of biomaterial performance and engineering, including biomechanics, host reactions of materials, and bio-inspired/SMART materials strategies. Crosslisted with BMED, ME, and MSE 6777.

CHBE 6778. Intro to Biomaterials. 3 Credit Hours.
Introduction to a variety of biomaterials and their biomedical applications. Crosslisted with BMED and PTFE 6778.

CHBE 6779. Bioprocess Engineering. 3 Credit Hours.
Study of enzymes and microbial and mammalian cells for production of biochemicals and protein therapeutics in bioreactors; downstream separation and purification; integrated view of bioprocesses. Crosslisted with BMED 6779.

CHBE 6782. Cellular Engineering. 3 Credit Hours.
Engineering analysis of cellular systems. Crosslisted with BMED and ME 6782.

CHBE 6784. Cardiovascular Biomech. 3 Credit Hours.
Mechanical analysis of the cardiovascular system emphasizing the normal and pathologic function in relation to clinical cardiovascular medicine. Crosslisted with BMED and ME 6784.

CHBE 6789. Technology Ventures. 3 Credit Hours.
Team discussion and case studies in biomedical engineering technology transfer, including licensing, financial capital, safety and efficacy studies, clinical trials, and strategic planning. Crosslisted with BMED, ECE, ME, and MGT 6789.

CHBE 6793. Systems Pathophysiology. 3 Credit Hours.
Overview of human pathophysiology from a quantitative perspective. A brief introduction to the application of quantitative models to the understanding of biological systems. Crosslisted with BMED, ECE, and ME 6793.

CHBE 6794. Tissue Engineering. 3 Credit Hours.
Biological, engineering, and medical issues in developing tissue-engineered constructs. Emphasis on the integration of these disciplines at a basic molecular and cell biology level. Crosslisted with CHE and ME 6794.

CHBE 6799. Legal Issues-Tech Transf. 3 Credit Hours.
Study and analysis of U.S. law as it applies to the patenting and licensing processes. Crosslisted with BMED, ME, and MGT 6799.

CHBE 6XXX. Chem Engr Elective. 1-21 Credit Hours.

CHBE 7000. Master's Thesis. 1-21 Credit Hours.

CHBE 7650. Chemistry of Polymers. 3 Credit Hours.
Thermodynamics and microscopic dynamics of polymers. Fundamental concepts, including scaling concepts, governing anisotropy of polarizability, phase transitions, morphology, time-dependent correlations, etc.

CHBE 7757. Teaching Practicum. 3 Credit Hours.
Supervised teaching for doctoral students. Teaching techniques, course and curriculum design, student evaluation methods and criteria. Students may, in some instances, prepare and present lectures. Crosslisted with NRE, ME, HP 7757.

CHBE 7771. Mech-Polymer Solid&Fluid. 3 Credit Hours.
Continuum mechanics of solids and fluids; mechanics of deformation of anisotropic polymers; yield, breaking, and fatigue; non-Newtonian viscous and viscoelastic behavior of polymer fluids. Crosslisted with ME, MSE, and PTFE 7771.

CHBE 7772. Fund-Fracture Mechanics. 3 Credit Hours.
Advanced study of failure of structural materials under load, mechanics of fracture, and microscopic and macroscopic aspects of the fracture of engineering materials. Crosslisted with AE, CEE, ME, and MSE 7772.
Chemistry (CHEM)

CHEM 1211K. Chemical Principles I. 4 Credit Hours.
Topics to be covered include atomic structure, bonding, properties of matter, thermodynamics and physical equilibria. Laboratory exercises supplement the lecture material. Credit not allowed for both CHEM 1310 and CHEM 1211K.

CHEM 1212K. Chemical Principles II. 4 Credit Hours.
Topics to be covered include chemical equilibria, acids and bases, aqueous equilibria, electrochemistry, kinetics, main group and transition elements. Laboratory exercises supplement the lecture material. Credit not allowed for CHEM 1311/1312 and CHEM 1212K.

CHEM 1X01. Transfer General Chem. 4 Credit Hours.
CHEM 1310. General Chemistry. 4 Credit Hours.
Fundamental laws and theories of chemical reactions. Topics include atomic structure; bonding theory; stoichiometry; properties of solids, liquids and gases; chemical thermodynamics; electrochemistry; and kinetics. Credit not allowed for both CHEM 1211K and CHEM 1310.

CHEM 1315. Survey of Organic Chem. 3 Credit Hours.
Survey of organic chemistry as the basis for biochemical processes and commercial applications.

CHEM 1801. Special Topics. 1 Credit Hour.
CHEM 1802. Special Topics. 2 Credit Hours.
CHEM 1803. Special Topics. 3 Credit Hours.
CHEM 1XXX. Chemistry Elective. 1-21 Credit Hours.

CHEM 2211. Quantitative Analysis. 3 Credit Hours.
Laboratory experimentation emphasizing quantitative chemical analysis. Credit not allowed for both CHEM 2211 and CHEM 1313.

CHEM 2214. Quantitative Analysis. 4 Credit Hours.
Theory and laboratory of quantitative chemical analysis.

CHEM 2311. Organic Chemistry I. 3 Credit Hours.
An introduction to structure and reactivity of organic molecules.

CHEM 2312. Organic Chemistry II. 3 Credit Hours.
The second course in the series dealing with the structure and reactivity of organic molecules.

CHEM 2313. Organic/Bioorganic Chem. 3 Credit Hours.
A second course in organic chemistry that extends the study to topics in biochemistry.

CHEM 2380. Synthesis Lab I. 2 Credit Hours.
Methods for preparation, isolation, and characterization of complex organic molecules, natural products, and polymers.

CHEM 2694. Intern Assistantship. 1-21 Credit Hours.
Undergraduate Internship for which the student is paid. Freshmen and Sophomores only.

CHEM 2695. Undergraduate Internship. 1-21 Credit Hours.
Undergraduate Internship for academic credit. Freshmen and Sophomores only.

CHEM 2698. Research Assistantship. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

CHEM 2699. Undergraduate Research. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

CHEM 2801. Special Topics. 1 Credit Hour.
Lecture course in current special topics in chemistry and biochemistry. Topics will vary from year to year.

CHEM 2802. Special Topics. 2 Credit Hours.
Lecture course in current special topics in chemistry and biochemistry. Topics will vary from year to year.

CHEM 2803. Special Topics. 3 Credit Hours.
Lecture course in current special topics in chemistry and biochemistry. Topics will vary from year to year.

CHEM 2804. Special Topics. 4 Credit Hours.
Lecture course in current special topics in chemistry and biochemistry. Topics will vary.
CHEM 2812. Special Topics. 2 Credit Hours.
Lecture course in current special topics in chemistry and biochemistry. Topics will vary from year to year.

CHEM 2901. Special Prob - Chemistry. 1-21 Credit Hours.
Course of individual instruction, which will include library conference and laboratory experience.

CHEM 2902. Special Prob - Chemistry. 1-21 Credit Hours.
Course of individuated instruction, which will include library, conference and laboratory experience.

CHEM 2903. Special Prob - Chemistry. 1-21 Credit Hours.
Course of individuated instruction, which will include library conference and laboratory experience.

CHEM 2XXX. Chemistry Elective. 1-21 Credit Hours.

CHEM 3111. Inorganic Chemistry. 3 Credit Hours.
A study of the reactions and structures of inorganic compounds and principles, generalizations and theories that assist in understanding their behavior.

CHEM 3211. Analytical Chemistry. 5 Credit Hours.
Introduction to the theory and practice of modern chemical analysis.

CHEM 3281. Instrumental Analysis. 4 Credit Hours.
Provides a background to modern analytical chemistry and instrumental methods of analysis with applications to engineering and other areas.

CHEM 3371. Organic Chem Lab. 2 Credit Hours.
Multi-step organic synthesis and inorganic synthesis. Use of chemical literature and advanced spectroscopic techniques.

CHEM 3380. Synthesis Lab II. 3 Credit Hours.
Multi-step organic and inorganic synthesis. Use of the chemical literature and advanced spectroscopic techniques.

CHEM 3411. Physical Chemistry I. 3 Credit Hours.
Chemical thermodynamics, energetics of chemical reactions, changes of state, and electrochemistry.

CHEM 3412. Physical Chemistry II. 3 Credit Hours.
Quantum mechanics, atomic and molecular structure, bonding theory, molecular spectroscopy, statistical mechanics.

CHEM 3481. Physical Chem Lab I. 2 Credit Hours.
Laboratory investigations of physical principles applied to chemical systems.

CHEM 3482. Physical Chem Lab II. 2 Credit Hours.
Laboratory investigations of physical principles applied to chemical systems.

CHEM 3511. Survey of Biochemistry. 3 Credit Hours.
Introductory course in biochemistry dealing with the chemistry and biochemistry of proteins, lipids, carbohydrates, nucleic acids, and other biomolecules.

CHEM 3700. Alternative Energy. 3 Credit Hours.
Scientific principles governing the current and future approaches in solar photo-voltaics, fuel cells, biomass conversion, nuclear energy and wind power.

CHEM 3XXX. Chemistry Elective. 1-21 Credit Hours.
CHEM 4113. Inorg Energy Conversion. 3 Credit Hours.
The principles of coordination chemistry applied to theories and mechanisms of energy conversion and storage in chemistry and biology. Students cannot receive credit for CHEM 4113 and CHEM 6171.

CHEM 4311. Adv Organic Chem. 3 Credit Hours.
Construction reactions and functional group interconversions as applied to multistep organic synthesis.

CHEM 4341. Applied Spectroscopy. 3 Credit Hours.
Theory and application of NMR, mass spectrometry, and infrared spectroscopy in the determination of organic structures.

CHEM 4401. Molecular Spectroscopy. 3 Credit Hours.
Introduction to the theory and applications of molecular spectroscopy, including electronic, vibrational, rotational transitions, and selection rules.

CHEM 4452. Solid State Chemistry. 3 Credit Hours.
Application of the concepts of physical and inorganic chemistry to the structure of solids and their chemical and physical properties.

CHEM 4511. Biochemistry I. 3 Credit Hours.
The chemistry and biochemistry of proteins, lipids, carbohydrates, nucleic acids, and other biomolecules.

CHEM 4512. Biochemistry II. 3 Credit Hours.
The chemistry and biochemistry of proteins, lipids, carbohydrates, nucleic acids, and other biomolecules.

CHEM 4521. Biophysical Chemistry. 3 Credit Hours.
The physical chemistry of biological systems, biological macromolecules, and biological aggregates.

CHEM 4581. Biochemistry Lab I. 3 Credit Hours.
Modern biochemical techniques including methods for protein, nucleic acid, and lipid isolation and characterization; enzyme assays; chromatography; electrophoresis; and use of databases.

CHEM 4582. Biochemistry Lab II. 3 Credit Hours.
Laboratory techniques in the isolation and characterization of biological molecules with special emphasis on modern techniques.

CHEM 4601. Chemistry Seminar. 2 Credit Hours.
Student presentations of recent research topics in chemistry or biochemistry based on lab experience and/or literature searches.

CHEM 4684. Advanced Chemistry Lab. 4 Credit Hours.
A modular laboratory involving a series of multipart experiments that build upon chemical principles and experimental techniques introduced in earlier courses and instructional laboratories. Credit not allowed for both CHEM 4684 and CHEM 4681.

CHEM 4694. Intern Assistantship. 1-21 Credit Hours.
Undergraduate Internship for which the student is paid, Juniors and Seniors only.

CHEM 4695. Undergraduate Internship. 1-21 Credit Hours.
Undergraduate Internship for academic credit, Juniors and Seniors only.

CHEM 4698. Research Assistantship. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

CHEM 4699. Undergraduate Research. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

CHEM 4740. Atmospheric Chemistry. 3 Credit Hours.
This course provides a general chemical description of the Earth's atmospheric system with a major focus on the two lowest layers of the atmosphere, i.e., the troposphere and the stratosphere. Crosslisted with EAS 4740.
CHEM 4760. Biocatalysis. 3 Credit Hours.
This course provides an in-depth coverage of various topics in biocatalysis and metabolic engineering. Goals of this course are the development of an understanding of enzymes as catalysts, their functioning in metabolic networks, their application in various industries, recognition of their potential for addressing future challenges in science and engineering. Crosslisted with CHBE 4760.

CHEM 4765. Drug Design, Development, and Delivery. 3 Credit Hours.
Introduction to the pharmaceutical development process, including design of new drugs, synthesis and manufacturing issues, and methods for delivery into the body. Includes student presentations. Crosslisted with CHBE and BMED 4765.

CHEM 4775. Polymer Science & Engineering I. 3 Credit Hours.
An introduction to the chemistry, structure, and formation of polymers, physical states and transitions, physical and mechanical properties of polymer fluids and solids. Crosslisted with CHE, ME, MSE, and PTFE 4775.

CHEM 4776. Polymer Science & Engineering II. 3 Credit Hours.
Polymer fabrication processes and methods of characterization and identification of polymers are presented. Experiments in polymerization, processing, and property evaluation of polymers. Crosslisted with CHE, ME, MSE, and TFE 4776.

CHEM 4801. Special Topics. 1 Credit Hour.
Topics of current interest not included in the regular course offerings.

CHEM 4802. Special Topics. 2 Credit Hours.
Topics of current interest not included in the regular course offerings.

CHEM 4803. Special Topics. 3 Credit Hours.
Topics of current interest not included in the regular course offerings.

CHEM 4804. Special Topics. 4 Credit Hours.
Topics of current interest not included in the regular course offerings.

CHEM 4805. Special Topics. 5 Credit Hours.
Topics of current interest not included in the regular course offerings.

CHEM 4901. Special Problems in Chemistry. 1-21 Credit Hours.
Course of individualized instruction, which will include library, conference, and laboratory investigations.

CHEM 4902. Special Problems in Chemistry. 1-21 Credit Hours.
Course of individualized instruction, which will include library, conference, and laboratory investigations.

CHEM 4903. Special Problems in Chemistry. 1-21 Credit Hours.
Course of individualized instruction, which will include library, conference, and laboratory investigations.

CHEM 4XXX. Chemistry Elective. 1-21 Credit Hours.

CHEM 6170. Inorganic Chemistry I. 3 Credit Hours.
A series of key topics in inorganic chemistry will be reviewed: acids and bases, redox processes, bonding and structure, transition metal chemistry, coordination complexes.

CHEM 6171. Inorganic Chemistry II. 3 Credit Hours.
Contemporary topics in inorganic chemistry including bioinorganic chemistry, reaction mechanisms and kinetics, optical and magnetic properties of molecular species, and inorganic materials.

CHEM 6172. Physical Methods in Inorganic Chemistry. 3 Credit Hours.
An introduction to the use of physical methods in inorganic chemistry including vibrational spectroscopy, multinuclear NMR, EST, Mossbauer, magnetometry, NQR, PES, diffraction, and EXAFS.

CHEM 6181. Chemical Crystallography. 3 Credit Hours.
The collection and interpretation of diffraction data. Single crystal structure analysis, powder diffraction for phase identification and quantitative analysis, and Rietveld refinement.

CHEM 6182. Chem of the Solid State. 3 Credit Hours.
An introduction to the chemistry of the solid state. Synthetic methods, measurement of properties, structure of solids, theory of electrical, optical, and magnetic properties.

CHEM 6183. Organometallic Chemistry. 3 Credit Hours.
The chemistry of main group and transition metal organometallics. Including synthetic methods, homogeneous catalysis and catalytic cycles, and synthetically useful organometallic reagents.

CHEM 6271. Analytical Chemistry I. 3 Credit Hours.
Discussion of chemical equilibrium, separations, and bioanalytical methods.

CHEM 6272. Analytical Chemistry II. 3 Credit Hours.
Topics include experimental design, electronics, and spectroscopy.

CHEM 6281. Mass Spectrometry. 3 Credit Hours.
Topics include sample handling, ionization methods, MS/MS, and quantitative analysis.

CHEM 6282. Chemical Sensors. 3 Credit Hours.
Origins of selectivity, principles of transduction mechanisms, construction and applications of modern chemical sensors.

CHEM 6283. Electroanalytical Chemistry. 3 Credit Hours.
Coulometry, electrolytic separations, polarography chronopotentiometry, coulometric titrations, voltammetry, and hydrodynamic electrochemical methods of analysis.

CHEM 6284. Environmental Analytical Chemistry. 3 Credit Hours.
Application of techniques from analytical chemistry in monitoring the environment.

CHEM 6285. Analytical Spectroscopy. 3 Credit Hours.
Modern analytical spectroscopy and use of analytical techniques in chemistry and chemical engineering.

CHEM 6287. Scanned Probe Techniques. 3 Credit Hours.
An in-depth analysis of the theory, practice and application of scanning probe microscopy techniques.

CHEM 6371. Organic Compounds. 3 Credit Hours.
Description of molecular structure and identification of organic compounds using spectroscopic techniques.

CHEM 6372. Physical Organic Chemistry. 3 Credit Hours.
Physical methods in organic chemistry; determination of reaction pathways.

CHEM 6373. Organic Synthesis. 3 Credit Hours.
Methods and strategy for the preparation of complex organic compounds.

CHEM 6381. Adv Organic Synthesis. 3 Credit Hours.
Advanced topics in the synthesis of complex organic molecules.

CHEM 6382. Comput Methods in Organic Chemistry. 3 Credit Hours.
The development of approximate methods in molecular orbital theory and molecular mechanics and their application to problems in organic and biochemistry.

CHEM 6471. Chem Thermo & Kinetics. 3 Credit Hours.
Laws of classical thermodynamics and their chemical applications. Introduction to statistical mechanics and chemical kinetics.
CHEM 6472. Quant Chem & Molec Spec. 3 Credit Hours.  
Introduction to quantum mechanics and its application to molecular systems, atomic and molecular spectroscopy.

CHEM 6481. Statistical Mechanics. 3 Credit Hours.  
Statistical thermodynamics, lattice statistics, molecular distribution and correlation functions, the theories of liquids and solutions, phase transitions, cluster theory, and measurement.

CHEM 6482. Kinetics&Reaction Dynam. 3 Credit Hours.  
Modern theoretical and experimental methods for studying macroscopic and microscopic bimolecular and unimolecular processes are discussed, as are methods for describing complex kinetic systems.

CHEM 6483. Chem-Electronic Material. 3 Credit Hours.  
This course provides a broad description of the basic chemical and physical concepts that determine the properties of electrically active materials.

CHEM 6484. Chem-Optical Org Mat. 3 Credit Hours.  
Course description includes synthesis, electronic structure, physicochemical characterization, and device applications of optically active organic materials.

CHEM 6485. Computational Chemistry. 3 Credit Hours.  
Introductory course in computational chemistry, discussing electronic structure theory, semimicrohedral methods, molecular mechanics, transition-state searching, and computation of thermodynamic quantities.

CHEM 6491. Quantum Mechanics. 3 Credit Hours.  
Important concepts and applications of quantum mechanics at the intermediate level, including operators, perturbation and variational methods applied to atoms and molecules.

CHEM 6492. Molecular Spectroscopy. 3 Credit Hours.  

CHEM 6501. Biochemistry I. 3 Credit Hours.  
The chemistry and biochemistry of proteins, lipids, carbohydrates, nucleic acids, and other biomolecules.

CHEM 6502. Biochemistry II. 3 Credit Hours.  
The chemistry and biochemistry of proteins, lipids, carbohydrates, nucleic acids, and other biomolecules.

CHEM 6571. Enzymology and Metabolism. 3 Credit Hours.  
Structure and chemistry of enzymes, enzyme mechanism, enzyme kinetics, enzyme inhibitors, and medicinal chemistry.

CHEM 6572. Macromolecular Structure. 3 Credit Hours.  

CHEM 6573. Molecular Biochemistry. 3 Credit Hours.  
Current topics in molecular biology including eukaryotic transcriptions, RNA processing, repair and recombination, immunity, viruses, DNA fingerprinting, and genome sequencing.

CHEM 6581. Protein Crystallography. 3 Credit Hours.  
Application of crystallographic principles to the structure determination of macromolecules by molecular replacement, multiple isomorphous replacements. High-speed data collection methods and cryocystallography.

CHEM 6582. Biophysical Chemistry. 3 Credit Hours.  
Applications of the principles and techniques of physical chemistry in biochemistry, with emphasis in the equilibrium and dynamic behavior of macromolecules in solution.

CHEM 6583. Drug Design & Discovery. 3 Credit Hours.  
Application of principles of chemistry and biology to the creation of knowledge leading to the introduction of new therapeutic agents.

CHEM 6584. Contemporary Biochem. 3 Credit Hours.  
Topics vary from year to year, but will include subjects from the biochemical literature, such as in Journal of Biological Chemistry.

CHEM 6750. Prep&Reactions-Polymers. 3 Credit Hours.  
A detailed treatment of the reactions involved in the synthesis of both human-made and natural polymers, including preparation and degradative reactions of polymer systems. Crosslisted with CHE and PTFE 6750.

CHEM 6751. Phys Chem-Poly Solutions. 3 Credit Hours.  
Study of polymer solutions, polymer miscibility, absorptions, sorptions, plasticization, molecular weights, molecular weight distributions, and interfacial phenomena using thermodynamics and statistical mechanics. Crosslisted with CHE, MSE, and PTFE 6751.

CHEM 6752. Polymer Characterization. 4 Credit Hours.  
This course introduces the student to surface, near-surface, and structural methods of polymer characterization. Specialized techniques critical to physical structure are emphasized. Crosslisted with CHE and PTFE 6752.

CHEM 6755. Theoretical Chem-Polymer. 3 Credit Hours.  
Thermodynamics and microscopic dynamics of polymers. Fundamental concepts, including scaling concepts, governing anisotropy of polarizability, phase transitions, morphology, time-dependent correlations, etc. are discussed. Crosslisted with CHE, CHE, and CHE 6750.

CHEM 6756. Signaling Molecules. 3 Credit Hours.  
The diversity of chemical signals between organisms and their structural specificities will be presented along with chemical and biological methods for isolating signaling molecules. Crosslisted with BIOL 6756 and CEE 6756.

CHEM 6760. Biocatalysis. 3 Credit Hours.  
This course provides in-depth coverage of various topics in biocatalysis and metabolic engineering. Goals of this course are the development of an understanding of proteins as catalysts, their functioning in metabolic networks, their application in various industries, and recognition of their potential for addressing future challenges in science and engineering. Crosslisted with CHBE 6760.

CHEM 6765. Drug Development. 3 Credit Hours.  
Introduction to the pharmaceutical development process, including design of new drugs, synthesis and manufacturing issues, and methods of delivery into the body. Includes student presentations. Crosslisted with BMED 6765 and CHBE 6765.

CHEM 6801. Special Topics. 1 Credit Hour.  
CHEM 6802. Special Topics. 2 Credit Hours.  
CHEM 6803. Special Topics. 3 Credit Hours.  
CHEM 6XXX. Chemistry Elective. 1-21 Credit Hours.  
CHEM 7000. Master's Thesis. 1-21 Credit Hours.  
CHEM 7001. Intro to Research. 3 Credit Hours.  
Introduction to laboratory techniques, experimental design, library and database searching, presentations.
CHEM 8000. Seminar - Chemistry. 1 Credit Hour.
CHEM 8001. Faculty Seminar. 2 Credit Hours.
CHEM 8002. Info Resour-Chem&Biochem. 2 Credit Hours.
CHEM 8003. Student Seminar. 2 Credit Hours.
CHEM 8813. Spec Top-Inorganic Chem. 3 Credit Hours.
Topics from the inorganic chemistry research literature.
CHEM 8823. Spec Top-Analytical Chem. 3 Credit Hours.
Topics from the analytical chemistry research literature.
CHEM 8833. Spec Top-Organic Chem. 3 Credit Hours.
Topics from the organic chemistry research literature.
CHEM 8843. Spec Top-Physical Chem. 3 Credit Hours.
Topics from the physical chemistry research literature.
CHEM 8853. Spec Topics-Biochemistry. 3 Credit Hours.
Topics from the biochemistry research literature.
CHEM 8873. Spec Top-Polymer Chem. 3 Credit Hours.
Topics from the polymer chemistry research literature.
CHEM 88X2. Xfer-Spec Top-Org Chem. 2 Credit Hours.
CHEM 8901. Special Problems. 1-2 Credit Hours.
CHEM 8902. Special Problems. 1-21 Credit Hours.
CHEM 8903. Special Problems. 1-21 Credit Hours.
CHEM 8997. Teaching Assistantship. 1-9 Credit Hours.
For graduate students holding graduate teaching assistantships.
CHEM 8998. Research Assistantship. 1-9 Credit Hours.
For graduate students holding graduate research assistantships.
CHEM 9000. Doctoral Thesis. 1-21 Credit Hours.

Chinese (CHIN)

CHIN 1001. Elementary Chinese I. 4 Credit Hours.
Performance-based training in pronunciation, tones, and sentence structure, developing a baseline for listening, speaking, reading, and writing Chinese, as well as fostering a sensitivity to Chinese culture. Humanities credit awarded for CHIN 1001 upon successful completion of CHIN 1002 or CHIN 2001.

CHIN 1002. Elementary Chinese II. 4 Credit Hours.
Continued performance-based training in phonetics, grammar, sentence structure, and characters; focusing in the similarities and differences between English and Chinese.

CHIN 1011. Accelerated Elem Chin I. 4 Credit Hours.
This is the first of two courses in the basic Chinese sequence geared for heritage learners at the elementary level. The pace is approximately 30% faster than the non-accelerated course.

CHIN 1012. Accelerated Elem Chin II. 4 Credit Hours.
This is the second of two courses in the basic Chinese sequence geared for heritage learners at the elementary level. The pace is approximately 30% faster than the non-accelerated course.

CHIN 10X1. Trans Elementary Chinese I. 3 Credit Hours.
CHIN 10X2. Trans Elementary Chinese II. 3 Credit Hours.

CHIN 1813. Special Topics. 3 Credit Hours.
Topics of current interest in Chinese.

CHIN 1814. Special Topics. 4 Credit Hours.
Topics of current interest in Chinese.
CHIN 3696. Eco Dev & Sustainability. 3 Credit Hours.
Examines the world’s most populous nation’s assault on its environment and resources in the pursuit of rapid economic growth. Taught in Chinese.

CHIN 3813. Special Topics. 3 Credit Hours.
Permits a group of students and a professor to pursue areas of the Chinese language not extensively treated in other courses in the department.

CHIN 3821. Special Topics. 1 Credit Hour.
Topics of current interest in Chinese.

CHIN 3822. Special Topics. 2 Credit Hours.
Topics of current interest in Chinese.

CHIN 3823. Special Topics. 3 Credit Hours.
Topics of current interest in Chinese.

CHIN 3833. Special Topics. 3 Credit Hours.
Topics of current interest in Chinese.

CHIN 3XXX. Chinese Elective. 1-21 Credit Hours.
Permits a group of students and a professor to pursue areas of the Chinese language not extensively treated in other courses in the department.

CHIN 4698. Research Assistantship. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

CHIN 4699. Undergraduate Research. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

CHIN 4813. Special Topics. 3 Credit Hours.
Topics of interest not covered in the regular course offerings.

CHIN 4823. Special Topics. 3 Credit Hours.
Topics of current interest in Chinese.

CHIN 4833. Special Topics. 3 Credit Hours.
Topics of current interest in Chinese.

CHIN 4901. Special Problems. 1-21 Credit Hours.
Provides special instruction according to special needs.

CHIN 4902. Special Problems. 1-21 Credit Hours.
Provides special instruction according to special needs.

CHIN 4XXX. Chinese Elective. 1-21 Credit Hours.

City Planning (CP)

CP 2233. Sustainable Urban Devmt. 3 Credit Hours.
This course introduces students to the theory and practice of sustainability as applied to the built environment at scales from the site to the megaregion.

CP 4010. Found-Urban&Region Devel. 3 Credit Hours.
The course describes the economic function of cities and the significant factors that shape their growth and development.

CP 4020. Intro-Urban&Region Plan. 3 Credit Hours.
This course provides an overview of the planning of cities and metropolitan regions. The legal and historical context as well as substantive areas of urban planning are addressed.

CP 4030. City and Technology. 3 Credit Hours.
This course places urban infrastructure technology within the larger context of planning and development. The social and economic aspects of these systems are highlighted.

CP 4040. City in Fiction & Film. 3 Credit Hours.
Examines images and perceptions of the urban environment as portrayed in literature and cinema. Explores the social, economic, and cultural contexts that impact on conception of the city.

CP 4050. Conflict Management. 3 Credit Hours.
Theoretical and practical instruction on techniques of negotiation and consensus building using case studies and training exercises.

CP 4052. Sustainable Cities Studio. 3 Credit Hours.
This course provides students with a faculty-supervised community engagement experience in developing a sustainability-related project for a non-profit, business, or government agency.

CP 4105. Land Conservation. 3 Credit Hours.
This course considers the distinctive American view of land and history of the conservation movement, then discusses the why and how of modern land conservation.

CP 4190. Intro Climate Chng Plan. 3 Credit Hours.
This course equips students with the knowledge and methods necessary to undertake the next generation of state, local, corporate, and enterprise climate action planning.

CP 4210. Envir Plan&Impact Assess. 3 Credit Hours.
Covers the principles of environmental planning and decision making. Examines the methods and processes, and environmental impact assessment and regulation.
CP 4310. Urban Transportation. 3 Credit Hours.
This course is designed to introduce the fundamentals of urban transportation planning and policy and is applicable to students in a variety of concentrations of study. The purpose of the course will be to acquaint students with transportation planning as a profession and the types of projects that transportation planners are required to conduct.

CP 4510. Geographic Info Sys. 3 Credit Hours.
The course provides a basic understanding of the tools for collecting, storing, and analyzing spatially distributed data. Basic issues of software design and application are covered.

CP 4610. Intro-Real Estate Invest. 3 Credit Hours.
Introduction to real estate analysis and utilization. Subjects include attributes of real property, value determinations, appraisal, investment analysis, market analysis, asset management, and public aspects.

CP 4620. Housing & Real Estate Econ. 3 Credit Hours.
Examination of private and public sector approaches to housing. Economic theory of durable goods, demand elasticities, applied market research analyses, and history of public intervention.

CP 4811. Special Topics. 1 Credit Hour.
Topics of current interest not covered in other courses in the department.

CP 4812. Special Topics. 2 Credit Hours.
Topics of current interest not covered in other courses in the department.

CP 4813. Special Topics. 3 Credit Hours.
Topics of current interest not covered in other courses in the department.

CP 4814. Special Topics. 4 Credit Hours.
Topics of current interest not covered in other courses in the department.

CP 4815. Special Topics. 5 Credit Hours.
Topics of current interest not covered in other courses in the department.

CP 6002. Intro to Planning. 2 Credit Hours.
Introduction to the various subfields of planning through reading, discussion, and guest lectures by practicing planners. Course also covers professional ethics and career planning and development.

CP 6005. Drawing for Planners. 1 Credit Hour.
This course teaches planning students through drawing to record, analyze, conceptualize, and represent commonly recurring physical and diagrammatic relationships that occur in the physical environment.

CP 6006. Visualization for Plan. 1 Credit Hour.
Explores visual and representational techniques and methods for physical planning, introducing a common set of computer applications designed to enhance visual representation and communication.

CP 6012. Planning Theory. 4 Credit Hours.
Examines theories of planning and the public interest. Considers the roles of planners within the American political system and the historical development of the planning profession.

CP 6016. Growth Management Law. 3 Credit Hours.
Study of legal framework of planning focusing on managing development to achieve desired outcomes for the economy, society, and the environment.

CP 6024. Quant & Computer Methods. 4 Credit Hours.
Introduction to computing and quantitative methods in planning. Discusses commonly used data sources, data management, presentation techniques, and planning analytical models.

CP 6025. Adv Planning Methods. 4 Credit Hours.
Analytical methods in planning including inferential statistics, linear regression, and analysis of variance and how they are applied to planning problems.

CP 6031. Econ Analysis-Planning. 3 Credit Hours.
Applications of economic principles to planning, including market theory, public goods, externalities, cost benefit analysis, and project economics.

CP 6032. Urban Regional Develop. 3 Credit Hours.
Study of theories in the structure and function of cities and regions. Emphasis on the economic forces shaping urban development.

CP 6034. Demographic & Econ Analy. 3 Credit Hours.
This course considers the social and economic structure of urban areas from a demographic perspective. Population structure, population change, and migration are explored.

CP 6052. Planning Studio. 4 Credit Hours.
Analysis and preparation of alternatives for an existing neighborhood, community, or region. Emphasis on application of planning skills in a real-world situation.

CP 6053. Planning Studio Urb Des. 6 Credit Hours.
The studio investigates urban physical settings. It emphasizes processes from visual representation, performance evaluations to design decision making of future sustainable urban systems.

CP 6105. Land Conservation. 3 Credit Hours.
This course considers the distinctive American view of land and history of the conservation movement, then discusses the why and how of modern land conservation.

CP 6112. Intro to Land Use. 3 Credit Hours.
This course introduces students to land use planning. The basic rationale for land use planning and its form in different states is covered.

CP 6122. Land Use Planning Method. 3 Credit Hours.
This course explores the techniques of land use planning and applies them to specific land use types.

CP 6190. Intro Climate Chng Plan. 3 Credit Hours.
This course equips students with the knowledge and methods necessary to develop the next generation of state, local, corporate, and enterprise climate action planning.

CP 6213. Urb Env Plan & Design. 3 Credit Hours.
This course introduces students to the basic theoretical and analytical underpinnings of urban environmental planning and design.

CP 6214. Environmental Planning. 3 Credit Hours.
Examines the principles, processes, and methods of environmental planning. Focus on environmental science and its use in impact assessment and project evaluation.

CP 6217. Climate Change & City. 3 Credit Hours.
The course explores land use and urban design strategies for adapting to climate change in cities and on local hazard mitigation policy.

CP 6223. Policy Tools-Environ Mgt. 3 Credit Hours.
The course covers the regulatory, market, and procedural tools used to manage the environment. It examines the strengths and weaknesses of alternative techniques.

CP 6233. Sustainable Urban Dev. 3 Credit Hours.
Explores the principles and practice of sustainable urban development and the role of planning.

CP 6241. Water Resource Plan. 3 Credit Hours.
Fundamentals of water resources planning and watershed management. Emphasis on urban water resources problems, policies, and practices.

CP 6243. Health Impact Assessment. 3 Credit Hours.
Students conduct an HIA, evaluate a completed HIA and propose approaches to institutionalizing HIA in institutions that traditionally do not focus on health outcomes.
CP 6250. Hazardous Waste Plan&Mgt. 3 Credit Hours.
Examines the planning tools and management techniques for the proper use, storage, transport, and disposal of hazardous material and waste products.

CP 6261. Environmental Law. 3 Credit Hours.
This course introduces students to the framework of legislation that shapes environmental planning and policy, including NEPA, Clean Air Act, and Clean Water Act.

CP 6311. Intro to Transport Plan. 4 Credit Hours.
Overview course in transportation planning including basic principles to understanding transportation, current transportation problems, transportation policy, and decision-making processes and methods.

CP 6321. Transport Plan&Invest. 4 Credit Hours.
Review of transportation methods and how they interface with investment decisions. How transportation planners at the local, regional, state, and federal levels employ methods.

CP 6331. Land Use&Transportation. 3 Credit Hours.
Overview of land use and transportation planning principles, how development impacts transportation, how transportation investments impact development patterns and air quality.

CP 6341. Non-Motorized Access. 3 Credit Hours.
Examines role and opportunity to make walking and biking viable travel options in urban environments and how urban environments need to be designed to encourage non-motorized travel.

CP 6351. Transportation&Econ Dev. 3 Credit Hours.
Impact of transportation infrastructure investments on economic outcomes at a range of geographic scales including neighborhood, municipality, regional, and statewide.

CP 6361. Region Trans Plan&Admin. 3 Credit Hours.
This course will address the administrative, political, methodological, and social issues underlying the regional transportation planning process.

CP 6412. Econ Development Plan. 3 Credit Hours.
Policy introduction to local economic development planning, examining theory, process and practice, international and regional factors, public and private roles.

CP 6422. Econ Develop Analysis. 3 Credit Hours.
This course focuses on strategy development, methods of analysis, and approaches to practice for urban and regional economic development policy and planning.

CP 6432. Industrial Restructuring. 3 Credit Hours.
Examines industrial restructuring trends and theoretical frameworks; develops industry case studies; and considers economic development planning’s role in industrial restructuring.

CP 6442. Equity,Justice& Econ Dev. 3 Credit Hours.
Explores concepts and theories of equity and social justice, analysis of indicators of (in)justice/equity, and economic development planning’s role in promoting equity and social justice.

CP 6452. Urban Development Polcy. 3 Credit Hours.
Introduces elements of urban policy and economic development by examining them historically, nationally, and locally. Approaches to urban development and redevelopment are analyzed.

CP 6514. Intro to GIS. 3 Credit Hours.
This course introduces students to spatial analysis using geographic information systems. Fundamentals of software design and geographic data are covered.

CP 6521. Advanced GIS. 3 Credit Hours.
The course provides students with advanced spatial analysis techniques including network analysis, three-dimensional surface modeling, and GIS application development.

CP 6531. Intro to Remote Sensing. 3 Credit Hours.
This course introduces students to the collection and use of satellite imagery and other remote sensing data.

CP 6541. Environmental GIS. 3 Credit Hours.
This course focuses on the application of geographic information systems (GIS) to environmental problems. It highlights the types and sources of data appropriate to those applications.

CP 6542. Transport & GIS. 3 Credit Hours.
Transportation data models, data processing, modeling, and service delivery in geographical information systems.

CP 6551. Spatial Analy-Socioecocon. 3 Credit Hours.
This course provides students with an in-depth study of the spatial distribution of human activity, including population, housing, and employment. Credit not allowed for both CP 6551 and CP 6570.

CP 6561. Geodemographics. 3 Credit Hours.
Explores important secondary data sources used by planners and analysts working with smaller geographic areas. Experience with hardware and software used to analyze data.

CP 6570. Socioeconomic GIS. 3 Credit Hours.
This advanced GIS course addresses the collection, management, analysis, and interpretation of spatial social, economic, housing, and demographic information. Credit not allowed for both CP 6570 and CP 6551.

CP 6591. GIS Prof Seminar. 1 Credit Hour.
This course provides MSGIST students with a bridge from the academic world to the professional GIS world.

CP 6592. Capstone Proj Prep. 1 Credit Hour.
This course allows students to select a MSGIST capstone project topic, conduct a professional and academic literature review, and assemble required spatial datasets.

CP 6611. Real Estate Fin & Dev. 3 Credit Hours.
Introduction to principles of real estate finance, focusing on the role the public sector plays in making desirable development projects financially feasible.

CP 6612. Community Development. 3 Credit Hours.
This course will examine neighborhood-based efforts, public policy, trends and practices that have shaped community development in American inner city communities since 1950.

CP 6621. Real Estate Mkt Research. 3 Credit Hours.
Introduction to real estate market research with particular focus on analyses of housing and office markets.

CP 6630. Govt & Housing Markets. 3 Credit Hours.
Examination of the operation of local housing markets and national, state, regional, and local housing policies.

CP 6640. Real Estate Dev Meth. 3 Credit Hours.
Application of the development process, market and financial feasibility analyses, and public policy to large development projects. Extensive use of case studies involving professional developers.

CP 6680. Citizen Participation. 3 Credit Hours.
This course discusses planners’ reasons for engaging communities in the planning process, evaluates various engagement methods, and produces a guide to direct future practice.
CP 6760. Negotiation&Conflict Mgt. 3 Credit Hours.
Practical and theoretical instruction on techniques of negotiation and consensus building using training exercises and case studies. Emphasizes environmental, policy, planning, and development disputes. Crosslisted with PUBP 6760.

CP 6811. Negotiation&Conflict Mgt. 3 Credit Hours.
Theoretical and practical instruction on techniques of negotiation and consensus building using case studies and training exercises.

CP 6815. Cinema City. 3 Credit Hours.
Explores people's response to cities, augmenting the empirical analysis that is urban studies domain with the subjective perspectives of cinematic artists.

CP 6821. Policy Analysis & Plan. 3 Credit Hours.
Synthesizes elements of the program core's analytic techniques and employs them in a case study context. Cases address urban policy, planning, and management.

CP 6825. Public Sector Fin&Budget. 3 Credit Hours.

CP 6831. Urban Infrastructure. 3 Credit Hours.
This course provides students with a basic understanding of urban infrastructure systems and their role in shaping urban growth and development.

CP 6832. Intro to Urban Design. 3 Credit Hours.
An introduction to the study, research, and practice of urban design examining traditional design principles and their application to the contemporary city.

CP 6834. Urban Design Policy. 3 Credit Hours.
Urban design policy making and its implementation including an analysis of the behavioral basis for policies that promote quality in built form. Credit not allowed for both CP 6834 and ARCH 6303.

CP 6836. Urban Ecological Design. 3 Credit Hours.
This course engages the contemporary issues of urban ecology and its articulation to design. It explores relationship between urban forms, and flows of ecology, energy, material, water and information. Credit not allowed for both CP 6836 and ARCH 6447.

CP 6850. Publ Health & Builtin Env. 2 Credit Hours.
This interdisciplinary course examines how cities and neighborhoods can have both positive and adverse effects on human health, and produces recommendations to improve these outcomes.

CP 6950. GIS Capstone Project. 6 Credit Hours.

CP 6XXX. City Planning Elective. 1-21 Credit Hours.

CP 7000. Master's Thesis. 1-21 Credit Hours.
Provides students with an opportunity to pursue advanced research under the guidance of a faculty committee.

CP 7999. Prep-Doctoral Qual Exam. 1-21 Credit Hours.
Preparation for the Ph.D. Qualification Exam.

CP 8000. Doctoral Planning Sem. 1 Credit Hour.
This course provides students and faculty an opportunity to present and discuss planning research.

CP 8012. PhD Foundations Seminar. 1 Credit Hour.
Incoming City and Regional Planning doctoral students reflect upon research, assess opportunities afforded by doctoral education, and develop a plan of study for the program.

CP 8022. PhD Sem Rsrch & Pedagogy. 1 Credit Hour.
Students conceptualize and share ongoing research with their peers, develop professional and pedagogical skills, and explore issues of student and career development.

CP 8200. Adv Planning Theory. 3 Credit Hours.
Seminar on planning theory, including philosophy of science, political philosophy and ethical theory. The course explores the theoretical basis for planning as a social activity. Credit not allowed for both CP 8200 and COA 8520.

CP 8300. Adv Urban&Regional Thry. 3 Credit Hours.
Examines principal urban-regional economic, and spatial theories for explaining economic, social and physical forces influencing locations, growth and decline of cities and regions. Credit not allowed for both CP 8300 and COA 8540.

CP 8400. Rsrch Design & Qual Mthd. 3 Credit Hours.
Examines issues associated with the design and methodological implementation of planning and applied social research, with a focus on techniques for qualitative inquiry. Credit not allowed for both CP 8400 and COA 8510.

CP 8505. Adv Quant Resrch Methods. 3 Credit Hours.
This course addresses two complementary topics: the design of quantitative research related to planning, design, and policy; and advanced statistical techniques for accomplishing such research. Credit not allowed for both CP 8505 and COA 8510.

CP 8813. Spec Topic-Land Use Plan. 3 Credit Hours.
Topics of current interest in land use planning.

CP 8823. Spec Topic-Environ Plan. 3 Credit Hours.
Topics of current interest in environmental planning.

CP 8833. Spec Top-Transport Plan. 3 Credit Hours.
Topics of current interest in transportation planning.

CP 8843. Spec Topic-Economic Dev. 3 Credit Hours.
Topics of current interest in economic development.

CP 8851. Special Topics in GIS. 1 Credit Hour.
Topics of current interest in Geographic Information Systems.

CP 8852. Special Topics in GIS. 2 Credit Hours.
Topics of current interest in Geographic Information Systems.

CP 8853. Spec Topics in GIS. 3 Credit Hours.
Topics of current interest in geographic information systems.

CP 8863. Spec Topics-Land Develop. 3 Credit Hours.
Topics of current interest in land development.

CP 8873. Spec Topics-Urban Dsgn. 3 Credit Hours.
Topics of current interest in urban design.

CP 8876. Spec Topics:Urban Dsgn. 6 Credit Hours.
Special Topics.

CP 8881. Spec Top-Cty&Region Plan. 1 Credit Hour.
Topics of current interest in city and regional planning.

CP 8882. Spec Top-Cty&Region Plan. 2 Credit Hours.
Topics of current interest in city and regional planning.

CP 8883. Spec Top-Cty&Region Plan. 3 Credit Hours.
Topics of current interest in city and regional planning.

CP 8900. Special Problems. 1-21 Credit Hours.
Special problems of current interest.

CP 8901. Special Problems. 1-21 Credit Hours.
Special problems of current interest.
Civil and Environmental Engr (CEE)

CEE 1770. Intro to Engr Graphics. 3 Credit Hours.
Engineering graphics and visualization including sketching, line drawing, and solid modeling. Development and interpretation of drawings and specifications for product realization. Crosslisted with AE and ME 1770.

CEE 1XXX. Civil/Env Engr Elective. 1-21 Credit Hours.

CEE 2040. Dynamics. 2 Credit Hours.
Kinematics and kinetics of particles and rigid bodies in one and two dimensions; principles of work/energy and impulse/momentum.

CEE 2300. Environmental Engr Prin. 3 Credit Hours.
Introduction to chemical, biological, and physical processes in the environment. Discussion of the basic processes governing air, water, and land quality, and the behavior and impacts of contaminants associated with human and industrial activities.

CEE 2698. Research Assistantship. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

CEE 2699. Undergraduate Research. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

CEE 2XXX. Civil/Env Engr Elective. 1-21 Credit Hours.

CEE 3000. Civil Engr Systems. 3 Credit Hours.
Infrastructure viewed from a systems perspective; analytical approaches and modeling of civil-engineered facilities; sustainability; engineering economy applications.

CEE 3010. Geomatics. 3 Credit Hours.
Spatial data collection methods including surveying, photogrammetry, remote sensing, and global positioning systems; management, manipulation, and analysis of spatial and associated attribute data.

CEE 3020. Civil Engr Materials. 3 Credit Hours.
Physical, mechanical, and durability properties of concrete, metals, unreinforced and reinforced plastics, timber, asphalt, and asphalt concrete.

CEE 3040. Fluid Mechanics. 3 Credit Hours.
Elementary mechanics of fluids with emphasis on hydrostatics, control volume analysis of flowing fluids using kinematics, continuity, energy, and momentum principles; similitude, pipe flow.

CEE 3051. Intro to Structural Eng. 3 Credit Hours.
Concepts in structural engineering related to the analysis and design of various types of structures such that they behave as intended throughout their lifetime.

CEE 3055. Structural Analysis. 3 Credit Hours.
Determination of internal forces and deflection in statically determinate trusses, beams, and frames. Introduction to analysis of statically indeterminate structures.

CEE 3340. Environ Engr Laboratory. 3 Credit Hours.
Theory and application of environmental laboratory methods for measurement of fundamental properties and characteristics of dissolved and particulate constituents in water, air and soil systems.

CEE 3770. Statistics & Applications. 3 Credit Hours.
Introduction to probability, probability distributions, point estimation, confidence intervals, hypothesis testing, linear regression, and analysis of variance. Example applied to the field of civil and environmental engineering. Crosslisted with MATH 3770 and ISYE 3770. Also, credit not awarded for both CEE 3770 and MATH 3670.

CEE 3XXX. Civil/Env Engr Elective. 1-21 Credit Hours.

CEE 4000. Global Eng Leadership. 3 Credit Hours.
Addresses skills necessary for the global engineer-leader: creating an engineering firm and evaluating its global viability; written, oral, and cross-cultural communication; collaboration; ethics; strategic planning.

CEE 4050. Infrastructure Sys Mgmt. 3 Credit Hours.
Introduction to general concepts and advanced topics in infrastructure systems management applied to manage large-scale infrastructure assets.

CEE 4090. Capstone Design. 3 Credit Hours.
An interdisciplinary civil and environmental design experience. Problem definition, data acquisition, modeling and analysis, evaluation of design alternatives, oral and written presentation of final design.

CEE 4100. Construction Engr & Mgt. 3 Credit Hours.
Fundamental concepts in planning, design, and construction of civil engineering projects. Introduction to project scheduling, cost estimating, controls, procurement, value engineering, quality assurance, and safety.

CEE 4101. Construction Seminar. 1 Credit Hour.
The seminar provides a platform for students to engage with construction industry companies and experts, to learn about different construction disciplines, their projects, and experiences.

CEE 4110. Construction Plan & Est. 3 Credit Hours.
An integrated approach to planning, estimating, and scheduling of construction projects, including basic and advanced concepts, applications, and tools for developing plans, estimates, and schedules.

CEE 4120. Construction Operations. 3 Credit Hours.
An integrated approach to construction methods, including basic and advanced concepts, applications, and tools for planning, analysis, and assessment of construction methods and equipment.

CEE 4130. Constr. Safety & Health. 3 Credit Hours.
Fundamentals to safety and health as they apply to civil infrastructure and building construction. Topics include planning, design, management, rules and guidelines, best practices, and inspection of safety and health.

CEE 4140. Bldg Info Model Constr. 3 Credit Hours.
Theory and Application of Building Information Modeling (BIM) in the Architecture/Engineering/Construction (A/E/C) industry with emphasis on Constructability, Scheduling. Front End Planning (FEP) and Construction monitoring.

CEE 4200. Hydraulic Engineering. 3 Credit Hours.
Applications of fluid mechanics to engineering and natural systems including fluid drag, open channel flow, turbomachinery, and environmental hydraulics; laboratory experiments; computational hydraulics.
CEE 4210. Hydrology. 3 Credit Hours.
Global circulation and the hydrologic cycle, precipitation mechanisms and analysis, evaporation and other losses, streamflow, hydrographs, river and reservoir routing, and frequency analysis.

CEE 4225. Coastal Engineering. 3 Credit Hours.
Introduction to coastal engineering processes and problems. Topics include: water wave mechanics, nearshore hydromechanics, astronomical tides, sediment transport, beach nourishment, and coastal structures.

CEE 4230. Environ Transport Model. 3 Credit Hours.
Introduction to mixing of pollutants and natural substances in the surface water environment. Use of mathematical models for mixing zones and water quality.

CEE 4300. Environmental Engr Sys. 3 Credit Hours.
Environmental engineering issues associated with water, air, and land pollution, including risk assessment, groundwater contamination, global climate change, and sustainable technologies.

CEE 4310. Water Quality Engr. 3 Credit Hours.
Reclamation of water and wastewater for potable and industrial uses, groundwater remediation. Principles of physical, chemical, and biological treatment processes.

CEE 4320. Hazardous Substance Engr. 3 Credit Hours.
Technical aspects of hazardous waste management and treatment including legislation, exposure and risk assessment, contaminant fate and transport, waste treatment methods, and remediation technologies.

CEE 4330. Air Pollution Engr. 3 Credit Hours.
Introduction to the physical and chemical processes affecting the dynamics and fate of air pollutants at the local, regional, and global scales. Particular emphasis is on tropospheric pollutant chemistry and transport.

CEE 4340. Env Modeling & Health. 3 Credit Hours.
This course provides an introduction to modeling techniques used in the environmental health field, with emphasis on three different exposure pathways introduced as the air pathway, groundwater pathway, and surface water pathway.

CEE 4350. Env Tech Developing Wrld. 3 Credit Hours.
Approaches, methods, and practical aspects of employing technologies for improving environmental quality in low and middle income countries. Team project-based course with field component.

CEE 4395. Environmental Sys Design. 3 Credit Hours.
Design and assessment of an environmental system, component or process, including problem definition, data acquisition, modeling and analysis, evaluation of alternatives, and presentations.

CEE 4405. Geotechnical Engineering. 3 Credit Hours.
Introduction to soil as an engineering material, with a focus on the mechanics of soil strength and compressibility, and fluid flow through soils.

CEE 4406. Applied Geotechnics. 3 Credit Hours.
Geotechnical principles applied to civil engineering construction, including evaluation of soil and rock properties, shallow foundations, drive and bored pilings, liquefaction, and ground modification. Credit not allowed for both CEE 4406 and CEE 4410.

CEE 4410. Geosystems Engr Design. 3 Credit Hours.
Analysis and design in geosystems engineering projects, including the evaluation of pile foundations, slope stability, earth-retaining structures, and embankments. Credit not allowed for both CEE 4410 and CEE 4406.

CEE 4420. Subsurface Character. 3 Credit Hours.
Introduction to field and laboratory methods for characterizing subsurface geological, hydrological, geotechnical, and contaminant conditions.

CEE 4430. Environmental Geotechnic. 3 Credit Hours.
Chemical equilibria and partitioning in subsurface systems; hazardous waste site assessment technologies and data; including soil gas data, monitoring wells, and direct-push technology.

CEE 4450. Intro Petroleum Geomech. 3 Credit Hours.
Introduction to the basic concepts of geomechanics and their engineering applications with a focus on the petroleum- and energy-related applications.

CEE 4510. Structural Steel Dsgn. 3 Credit Hours.
Principles of behavior of tension and compression members, beams, and connections with application to the design of elementary structures.

CEE 4520. Reinforced Concrete Dsgn. 3 Credit Hours.
Principles of behavior of reinforced concrete beams, short columns, and slabs, with application to the design of elementary concrete structures, foundation, and earth-retaining structures.

CEE 4530. Timber & Masonry Design. 3 Credit Hours.
Stress-based design of tension, compression, and flexural members; design of building systems, unreinforced and reinforced walls using timber and masonry construction materials and techniques.

CEE 4540. Infrastructure Rehab. 3 Credit Hours.
Rehabilitation of civil infrastructure systems including aspects of deterioration science, nondestructive assessment, renewal engineering, construction planning and management, and public policy and finance.

CEE 4550. Structural Analysis II. 3 Credit Hours.
Analysis of two- and three-dimensional statically indeterminate structures by classical and matrix methods of solution. Flexibility and stiffness techniques, influence lines, approximate analysis, and nonlinear analysis.

CEE 4600. Transportation Plan&Dsgn. 3 Credit Hours.
Introduction to transportation engineering with specific emphasis on the planning, design, and operation of transportation facilities.

CEE 4610. Multimodal Transport. 3 Credit Hours.
Planning, design, and operation of systems of air, rail, water, and highway facilities, including those for bicycles and pedestrians.

CEE 4620. Environ Impact Assess. 3 Credit Hours.
Key policy, planning, and methodological issues in the environmental impact assessment of engineering systems including the regulatory framework and analytical techniques.

CEE 4630. Computer-Aided Site Dsgn. 3 Credit Hours.
Site development principles and application to a comprehensive design project using computer-based digital terrain model software tools.

CEE 4640. Freeway & Interch Design. 3 Credit Hours.
An introduction to the planning and design of freeways and interchanges. Topics include various interchange forms, HOV lanes, ramp metering, tolling, and truck by-pass ramps.

CEE 4650. Site Design In Transport. 3 Credit Hours.
An introduction to the planning and design of site developments. Topics include site traffic analysis and driveway, parking lot, drive-thru facility, site circulation, delivery facility and residential neighborhood design.

CEE 4698. Research Assistantship. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.
CEE 4699. Undergraduate Research. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

CEE 4791. Mech Behavior-Composites. 3 Credit Hours.
Stress-strain behavior of composites, property of matrix and reinforcing materials, mechanics of fiber-reinforced composites, lamina and laminate analysis, and mechanical performance. Crosslisted with AE, CHE, ME, MSE, and PTFE 4791.

CEE 4793. Composite Mater & Process. 3 Credit Hours.
Basic principles of selection and design of composite materials and their manufacturing and testing. Cost factors. Laboratory exercises on manufacturing and tests. Crosslisted with AE, CHE, ME, MSE, and PTFE 4794.

CEE 4794. Composite Materials & Mfg. 4 Credit Hours.
Basic principles of selection and design of composite materials and their manufacturing and testing. Cost factors. Laboratory exercises on manufacturing and tests. Crosslisted with AE, CHE, ME, MSE, and PTFE 4794.

CEE 4795. Groundwater Hydrology. 3 Credit Hours.
Dynamics of flow and solute transport in groundwater, including theory, implementation, and case studies. Crosslisted with EAS 4795.

CEE 4801. Special Topics. 1 Credit Hour.
CEE 4802. Special Topics. 2 Credit Hours.
CEE 4803. Special Topics. 3 Credit Hours.
CEE 4804. Special Topics. 4 Credit Hours.
CEE 4805. Special Topics. 5 Credit Hours.
CEE 4806. Special Topics. 6 Credit Hours.

CEE 4900. CEE Honors Research. 1-21 Credit Hours.
Individual research projects conducted in conjunction with and under the direction of a CEE faculty member. Participation by invitation, and agreement with individual faculty members. Project culminates in a thesis and presentation.

CEE 4901. Special Problems. 1-21 Credit Hours.
CEE 4902. Special Problems. 1-21 Credit Hours.
CEE 4903. Special Problems. 1-21 Credit Hours.
CEE 4XXX. Civil/Env Engr Elective. 1-21 Credit Hours.

CEE 6100. Construction Project Pln. 3 Credit Hours.
Introduction to project planning concepts including organization development, computer-based scheduling, computer-based estimating, regulatory agencies, and project financing.

CEE 6110. Computer Apps-Construct. 3 Credit Hours.
Introduction to computing tools impacting the construction industry and the analysis techniques used to determine company automation requirements.

CEE 6120. Env Conscious-Dgn&Const. 3 Credit Hours.
Introduction to framework, concepts, principles, strategies, and tools for environmentally conscious design and construction of facilities and civil infrastructure systems.

CEE 6130. Construction Proj Ctrl. 3 Credit Hours.
Introduction to project control concepts and advanced implementation techniques. Project control concerns including project budgeting, project productivity, cash flow, and resource allocation will be introduced.

CEE 6140. Adv Plan&Estimating Meth. 3 Credit Hours.
Overview of advanced methods for planning and estimating construction projects including resource allocation/management, project control techniques, interpretation of schedules and estimates, and value engineering.

CEE 6150. Construction Law. 3 Credit Hours.
Overview of construction law and legal issues encountered by the construction engineer and manager.

CEE 6170. Proj Deliver&Procurement. 3 Credit Hours.
Analysis of construction project delivery including traditional, design-build, construction management, multiple prime contractors, and related financing. The course focuses on the owner's role in construction.

CEE 6180. Construction Orgs. 3 Credit Hours.
Introduction to organizational concepts of the construction industry including strategic management, company financing, human resources, and market analysis.

CEE 6190. Construction Field Engr. 3 Credit Hours.
Introduction to construction engineering techniques and practices including site excavation, shoring structures, heavy equipment, site layout, and temporary facility construction.

CEE 6215. Coastal Structures. 3 Credit Hours.
Introduction to coastal structures with a focus on the hydrodynamic loading and the resulting analysis, design and potential failure mechanisms during extreme events.

CEE 6221. Physical Hydrology. 3 Credit Hours.
Occurrence, movement, and distribution of water. Topics: hydrologic cycle, global circulation, climate, atmospheric water vapor, thermodynamics, precipitation, evaporation, snowmelt, soil moisture, unsaturated flow, infiltration, geomorphology, runoff, and routing.

CEE 6222. Hydrometeorology. 3 Credit Hours.
Estimation of hydrologic variables from on-site and remote sensors; operational hydrologic models; parameter estimation; operational forecasting.

CEE 6231. Probability & Statistics. 3 Credit Hours.
Engineers Probability distributions applicable to civil engineering Systems; function of random variables; regression and correlation analysis; parameters estimation and statistical hypothesis tests.

CEE 6232. Stochastic Hydrology. 3 Credit Hours.
Stochastic modeling of hydrologic processes. Problems of model specifications and parameter identification, and validation. Application to forecasting and synthetic events.

CEE 6241. Water Resources Mgt I. 3 Credit Hours.
Operations research methodologies, including linear and nonlinear programming, and their applications to water resources systems.

CEE 6242. Water Resources Mgt II. 3 Credit Hours.
Design of decision support systems for water resources planning and management.

CEE 6244. Random Fields & Geostatist. 3 Credit Hours.
Probability density function; moments; scales of fluctuations; spectral representation; simulation of random fields; cross-correlated random fields; vector fields; kriging; conditional simulation.

CEE 6251. Fluid Mechanics. 3 Credit Hours.
Concepts of linear and angular deformation, vorticity, and conservation of mass. Development of Navier-Stokes with solutions: steady and unsteady uniform laminar, vortex, creeping, and potential flow.
CEE 6252. Adv Fluid Mechanics. 3 Credit Hours.
Theory of three-dimensional turbulent boundary layers with application to environmental flows in rivers, estuaries, and the atmosphere of interest in water resources engineering.

CEE 6261. Environ Fluid Mechanics. 3 Credit Hours.
Dynamics, mixing, and contaminant transport in surface water bodies, including lakes, rivers, estuaries, and coastal waters. Introduction to numerical models. Prediction of mixing zones.

CEE 6262. Adv Environ Fluid Mech. 3 Credit Hours.
Buoyancy modifications to the mixing and dynamics of pollutant discharges and surface water bodies. Gathering and analysis of laboratory and field data for mixing problems.

CEE 6263. Fluid Mech of Organisms. 3 Credit Hours.
Principles of fluid mechanics are applied in the context of biology. Discussion of transport of chemical and mechanical signals and fluid forces affecting organisms.

CEE 6268. Water resources engineering.

CEE 6271. Flow-Porous Media I. 3 Credit Hours.
Basic principles governing ground water flow. Topics covered: fundamental principles of saturated and unsaturated ground water flow, contaminant transport, and salt water intrusion.

CEE 6272. Flow-Porous Media II. 3 Credit Hours.
Principles of numerical methods used in solving ground water flow, contaminant transport models, building on materials covered in CEE 6271. Topics: finite element, difference methods, saturated/unsaturated ground water flow, and contaminant transport.

CEE 6274. Flow-Heterogeneous Media. 3 Credit Hours.
Advanced treatment of transport processes in natural porous media: classical description; stochastic description of variability; dynamic models; flow and transport in aquifers; model uncertainty.

CEE 6280. Open Channel Hydraulics. 3 Credit Hours.

CEE 6282. Sediment Transport. 3 Credit Hours.
Engineering importance of erosion and sedimentation problems. Topics: properties of non-cohesive/cohesive sediments including specific weight/gravity/shape/size/ size distribution/fall velocity/mineral structure/ rheological properties.

CEE 6284. Hydraulic Transients. 3 Credit Hours.
Transient flow of liquids in piping systems. One-dimensional wave equations and method of characteristics. Effects of valves and pumps on water hammer. Cavitation and liquid-column separation.

CEE 6293. Hydrodynamic Stab&Turb. 3 Credit Hours.
Flow in stability and turbulence are important in virtually all environmental flows. Fundamental stability, transition, and turbulent concepts along with their engineering relevance will be introduced.

CEE 6310. Process Principles-EnvE. 3 Credit Hours.
Principles that can be used in the analysis and modeling of environmental engineering processes, including material and energy balances, mass transfer, and reaction engineering.

CEE 6311. Microbial Principles. 3 Credit Hours.
Microbiological principles with emphasis on microbial nutrition and growth, inhibition and control of growth, biochemical thermodynamics, metabolic pathways, enzyme and microbial kinetics.

CEE 6312. Chemical Principles-EnvE. 3 Credit Hours.
Fundamental principles of chemical equilibria and environmental organic chemistry in dilute aqueous systems with emphasis on chemical speciation and environmental engineering applications.

CEE 6313. Fate of Contaminants. 3 Credit Hours.
effects of physical, chemical, and biological processes on the fate and transport of contaminants in unsaturated and saturated porous media.

CEE 6314. Environmental Modeling. 3 Credit Hours.
This course is designed to provide an understanding of fundamental principles and approaches used in modeling environmental systems, as well as the necessary mathematical techniques.

CEE 6319. Environmental Laboratory. 3 Credit Hours.
Laboratory exercises and discussions for the understanding of fundamental chemical analytical, physicochemical, and applied microbiological principles in environmental engineering.

CEE 6320. Legal Inst Poll Frame. 3 Credit Hours.
Fundamental principles of national and international water policy, legislation and management frameworks for transboundary water resources management.

CEE 6321. Water Quality & Ecology. 3 Credit Hours.
Mixing/transport of pollutants and natural substances in surface waters, lakes, rivers, estuaries, coastal waters. Application of mathematical models of hydrodynamics and water quality to these water bodies.

CEE 6322. Water Res Sys Analy. 3 Credit Hours.
The policy, legal, and institutional contexts of water resources planning and management, information and modeling systems, modeling tools, and the practical experience with the use of decision support systems.

CEE 6323. Natri Res Envr Econ. 3 Credit Hours.
Relation between economic and ecological systems, case studies and examples, tools of environmental policy, environmental economic evaluation.

CEE 6324. Water Supply and Sanit. 3 Credit Hours.
Sanitation, wastewater characterization, wastewater treatment process analysis and selection, pre-treatment options, biological treatment, removal of pollutants biosolids treatment and disposal, and safe water systems.

CEE 6325. River Hydraulics. 3 Credit Hours.
Open channel hydraulics, fluvial geomorphology, flood control structures, culverts, bridge openings, river bed and bank stability control measures.

CEE 6326. Hydr Princ & Pract. 3 Credit Hours.
Hydrologic cycle, global circulation, climate, atmospheric water vapor, thermodynamics, precipitation, evaporation, snowmelt, soil moisture, unsaturated flow, infiltration, geomorphology, runoff, and routing.

CEE 6327. Stat Meth Envr Data. 3 Credit Hours.
Provide a good understanding of the fundamental principles of probability/statistics, and demonstrate the application of these principles to environmental data analysis and prediction problems.

CEE 6330. Physicochemical Process. 3 Credit Hours.
Theory and application of the physical and chemical processes of coagulation, flocculation, sedimentation, softening, filtration, and disinfection in water and wastewater treatment.

CEE 6331. Biological Processes. 3 Credit Hours.
Microbial growth kinetics and bioenergetics, theory, modeling, and application of biological processes employed in water, wastewater, and hazardous waste treatment systems as well as subsurface bioremediation.
CEE 6332. Separation Processes. 3 Credit Hours.
Theory and applications of the physical and chemical processes of sorption, membrane separation, and absorption in both gas-phase and liquid-phase environmental engineering systems.

CEE 6333. Hazard Waste Remediation. 3 Credit Hours.
Selection, design and implementation of hazardous waste site remediation technologies including pump-and-treat, soil vapor extraction, thermal processes, bioremediation, surfactant flushing, and barrier-treatment walls.

CEE 6340. Solid-Liquid Separations. 3 Credit Hours.
Characterization, stabilization, conditioning, thickening, dewatering, conversion, recovery, transportation, and disposal of air, water, and wastewater treatment residues.

CEE 6341. Industrial Wastes. 3 Credit Hours.
A review of current policies and approaches in industrial waste treatment, and application of engineering principles and processes for waste treatment, recovery, and disposal.

CEE 6342. Solid Wastes. 3 Credit Hours.
An introduction of the current regulations and fundamentals of solid waste management, characterization, handling, recycling, transportation, and final disposal systems.

CEE 6343. Membrane Processes. 3 Credit Hours.
An introduction of the theories of membrane separation processes with special emphasis on desalination, softening, THM precursors reduction using reverse osmosis and nanofiltration.

CEE 6345. Sustainable Engineering. 3 Credit Hours.
The course is intended to introduce students to the interaction between human and natural environment and provide an overview on the emerging science of sustainability.

CEE 6350. Adv Environmental Chem. 3 Credit Hours.
Chemical behavior of inorganic and organic compounds in natural waters. Topics include chemistry of metal ions, partitioning and distribution of organic pollutants, surface reactions.

CEE 6351. Biotransformations. 3 Credit Hours.
Biotransformation pathways and kinetics of anthropogenic recalcitrant compounds and biological, biochemical, and environmental factors affecting these transformations in natural and engineered systems.

CEE 6355. Industrial Ecology-EnvE. 3 Credit Hours.
Introduces the principles of environmentally conscious products, processes, and manufacturing systems.

CEE 6360. Dgn-Treatment Facilities. 3 Credit Hours.
Theory and design of process tanks and equipment for capture, purification, conditioning, storage, and distribution of safe drinking water.

CEE 6361. Model&Sim-Biol Treat Sys. 3 Credit Hours.
Theory and design of biological treatment systems for water reclamation, nutrient removal, and integrated process design and optimization using advanced computer models.

CEE 6390. Air Pollutant:Form&Ctrl. 3 Credit Hours.
Analysis of air pollutants through the study of radical reaction pathways, combustion processes, and removal of particles and gaseous pollutants from exhaust gas streams.

CEE 6391. Adv Topics-Air Pollution. 1 Credit Hour.
Current topics in air pollution engineering presented and discussed.

CEE 6402. Soil Mechanics. 3 Credit Hours.
Fundamental concepts related to the mechanical behavior of soils, including: effective stress, strength, stiffness, permeability, time-dependent behavior.

CEE 6403. Environmental Geotechnic. 3 Credit Hours.
Evaluation of equilibria and partitioning as applied to site assessment techniques including soil gas data, monitoring wells, soil samples, and direct-push technology.

CEE 6421. Lab Charact-Geomaterials. 3 Credit Hours.
Instruction in the procedures, methods of interpretation and apparatus limitations and influences for geotechnical laboratory index, strength, deformation, and permeability tests.

CEE 6422. Soils& Experimental Meth. 3 Credit Hours.
Macrobondary and microlevel phenomena in particulate media are experimentally studied. Topics in experimental research include: scale effects, similarity, falsification, errors, transducers, design of experiments.

CEE 6423. In-Situ Testing. 3 Credit Hours.
Field testing and sampling of geomaterials, primarily soils and rocks. Introduces methods of drilling, probing, and in-situ measurement of soils for determining stratigraphy and engineering parameters for analysis, including soil borings, cone penetration tests, pressuremeter, dilatometer, and other tests.

CEE 6424. Engineering Geophysics. 3 Credit Hours.
Geophysical techniques used to characterize near-surface soils and rocks including seismic, magnetic, electromagnetic, radar, and resistivity methods.

CEE 6431. Plasticity Geomaterials. 3 Credit Hours.

CEE 6441. Analysis-Earth Structure. 3 Credit Hours.
Instruction in techniques for assessing the stability of earth-retaining structures including unreinforced slopes, reinforced slopes, free-standing retaining structures, and reinforced retaining structures.

CEE 6442. Dyn Analy-Geotech Engr. 3 Credit Hours.
Dynamic soil properties; response of foundations to dynamic loads; construction and blast vibration criteria; dynamic analysis of pile driving; introduction to liquefaction potential.

CEE 6443. Foundation Systems. 3 Credit Hours.
Evaluation and design of foundations for civil engineering structures, including the settlement and bearing capacity of shallow spread footings, mats, and deep foundations. Footings, driven piles, bored piles, and drilled shafts analyzed using elastic continuum theory, limit plasticity, and cavity expansion solutions, supplemented with numerous case studies. Ancillary topics include axial load transfer, pile group interaction, lateral and moment loading, and pile dynamics.

CEE 6444. Geosynthetics in CE. 3 Credit Hours.
Development, fabrication, design, and applications of geotextiles, geogrids, geonets, and geomembranes.

CEE 6445. Geotech Earthquake Engr. 3 Credit Hours.
Earthquake magnitude and intensity, seismic hazard evaluation using deterministic and probabilistic approaches, site response analyses and ground motion amplification liquefaction, and response of earth structures.

CEE 6446. Geotech Seepage Analysis. 3 Credit Hours.
Seepage and its effects on engineering behavior of soils and its consequences for design of geoinfrastructure.

CEE 6447. Ground Modification. 3 Credit Hours.
Methods for improving marginal construction sites for geotechnical engineering projects and rehabilitation of geoinfrastructure.
CEE 6448. Landfill Design & Mgmt. 3 Credit Hours.
The course deals with geospatial selection and characterization, chemical compatibility, placement procedures (including compaction), design strategies, seepage issues, instrumentation, and environmental monitoring.

CEE 6449. Remediation Systems. 3 Credit Hours.
Design of remediation systems and management approaches for the petrochemical, power generation, metals finishing, and mining industries are emphasized. Risk analysis and case histories are presented.

CEE 6450. Pavement Design. 3 Credit Hours.
Analysis and design of flexible and rigid pavement for highway and airfield runway, evaluation of pavement performance and distress, and pavement rehabilitation strategy and techniques.

CEE 6451. Rock Mechanics. 3 Credit Hours.
Rock characterization, scale effect, in-situ stresses, mechanisms of rock deformation and fracture, rock engineering; special attention to common principles unifying presented set of topics.

CEE 6460. Theoretical Geomechanics. 3 Credit Hours.

CEE 6461. Math Applications in CEE. 3 Credit Hours.
Mathematical techniques are reviewed in the context of CEE problems. The simplified yet mathematically rigorous approach highlights the internal mathematical connections between different engineering problems.

CEE 6462. Signals & Inverse Problems. 3 Credit Hours.

CEE 6463. Constitutive Model-Soils. 3 Credit Hours.
Fundamental concepts in modeling behavior of soils. Implementation of models into numerical solution codes. Evaluation of models used in practice.

CEE 6464. Unsat Soil Mech. 3 Credit Hours.
This course presents many of the fundamental concepts behind the mechanical behavior of unsaturated soils.

CEE 6468. Applied Fracture Mech. 3 Credit Hours.
Application of fracture mechanics toward practical problems. General fracture behavior studied in the context of a variety of applied topics. Computer and experimental demonstrations.

CEE 6483. Geo Spatial Image Analy. 3 Credit Hours.
Presentation of techniques for spatial and image processing and analysis of subsurface data at micro and macro scales.

CEE 6484. Industrial Byproduct. 3 Credit Hours.
Explores more fully the interface between geotechnology, geochemistry, and sustainable engineering to develop new applications using industrial byproducts.

CEE 6485. Waves & Particulate Mater. 3 Credit Hours.
Characterization of materials with mechanical and electromagnetic waves. Emphasis on particulates with extensions to other materials. Laboratory and field applications.

CEE 6481. Unsaturated Soil Mech. 3 Credit Hours.
Static analysis of framed structures by flexibility and stiffness methods; computer models and solution for applied loads, temperature, support settlement, and member prestrain effects.

CEE 6482. Applied Fracture Mech. 3 Credit Hours.
Stochastic processes as tools for modeling time-dependent structural excitations; random dynamic response of structural systems to time-dependent forces; reliability of dynamic structural systems.

CEE 6483. Geo Spatial Image Analy. 3 Credit Hours.
Overview of advanced dynamics and smart structures. Topics include vibration modal analysis, signal processing, modern sensors technologies, structural monitoring, and structural control.

CEE 6484. Industrial Byproduct. 3 Credit Hours.
Generalization of finite element concepts; Galerkin-weighted residual and variational approaches; mixed and hybrid finite element formulations, applications, transient dynamic analysis; software implementation.

CEE 6485. Waves & Particulate Mater. 3 Credit Hours.
Behavior and design of RC members; ductility and inelastic response; deep beams; corbel and torsion design; column biaxial bending; shearwalls; effects of creep and shrinkage.

CEE 6486. Reinf Concrete Slab Sys. 3 Credit Hours.
Analysis and design of two-way slab systems, structural walls, and complex building configurations. Equivalent frame and analysis, strip and yield-line technique, application of finite element method to design of slab and wall systems.

CEE 6487. Prestressed Concrete. 3 Credit Hours.
Principles and practice of prestressed concrete. Analysis and design of statically determinate and indeterminate beams, and one-way and two-way slabs; precast pretensioned, posttensioned.

CEE 6488. Structural Steel Design. 3 Credit Hours.
Stress, behavior, and design of steel structures according to WSD and LRFD. Plate girders, composite beams, bolted and welded connections, beam-columns, and torsion.

CEE 6489. Structural Dynamics. 3 Credit Hours.
Introduction to loads, methods of analysis, design, fabrication and construction of girder bridges.

CEE 6501. Matrix Structural Analy. 3 Credit Hours.
Behavior and design of steel and concrete building and bridge systems. Introduction to structural planning with emphasis on economics, structural behavior, serviceability, and strength considerations.

CEE 6501. Matrix Structural Analy. 3 Credit Hours.
Strength, behavior, and design of polymeric composites, structural members, and connections for civil engineering applications.
CEE 6536. Rehab-Existing Structure. 3 Credit Hours.
Deterioration science; corrosion of steel, alkali-silica reaction, freezing and thawing. Assessment and evaluation of existing structures, nondestructive testing, and nondestructive evaluation.

CEE 6538. Intro NDE & Forensics. 3 Credit Hours.
Introduction to the theoretical basis and practical application of nondestructive testing with complementary analytical and destructive testing for the forensic investigation of engineering materials and structures.

CEE 6541. Earthquake Engineering. 3 Credit Hours.
Characteristics of earthquakes; design and rehabilitation of civil engineering structures for earthquake ground motion; code provisions; case studies.

CEE 6542. Consequence-Based EQ Eng. 3 Credit Hours.
This course will provide focused instruction on earthquake engineering within a Consequence Based Engineering (CBE) framework. The course will reflect the cross-disciplinary nature of earthquake engineering practice and research, and will provide an overview on diverse topics in hazard definition, vulnerability assessment, mitigation measures and societal impact.

CEE 6544. Structural Modeling. 3 Credit Hours.
Modeling of structures for static, dynamic, and nonlinear analysis using finite elements. Effects of parameters on the structural behavior.

CEE 6548. Inelastic Design. 3 Credit Hours.
Application of fundamental theorems of plastic design to beam, frame, and plate structures. Design based on ultimate strength, ductility and capacity design principles.

CEE 6549. Structural Reliability. 3 Credit Hours.
Concepts and applications of probability and statistics for analysis of risk and reliability of structures subjected to natural and man-made hazards; stochastic load and strength modeling; probabilistic risk assessment; introduction to stochastic computational mechanics.

CEE 6551. Strength of Materials. 3 Credit Hours.
Study of advanced topics from mechanics of materials with application to structures. Typical topics: energy methods, failure theories, post-yield behavior, generalized bending and torsion.

CEE 6554. Theory-Elastic Stability. 3 Credit Hours.
Concepts of elastic stability, simple mechanical models, buckling of beam-columns and frames, beams on elastic foundation, and plates energy methods, torsional and lateral buckling.

CEE 6557. Theory-Plates and Shells. 3 Credit Hours.
Plate bending, approximate methods, nonlinearity, stiffened and anisotropic plates. Stress and deformation of shells with and without bending, surfaces of revolutions, and shallow shells.

CEE 6560. Applied Elasticity. 3 Credit Hours.
Introduction to traction, stress, and equilibrium; deformations, strain compatibility; constitutive equations; two-dimensional problems in Cartesian and polar coordinates; application to extension, bending, and torsion.

CEE 6563. Energy Methods-Mechanics. 3 Credit Hours.
Virtual work, principles of potential energy and complementary energy. Castigliano's theorems, generalized and stationary variational principles, energy methods, structural applications, nonlinear problems, Hamilton's principle.

CEE 6566. Plasticity & Viscoelastic. 3 Credit Hours.
Plastic deformation, yield conditions, flow rules and normality, relaxation and creep, viscoelasticity, tubes and spheres, torsion and bending, slip line fields, viscoelastic boundary value problems.

CEE 6569. Wave Propagation-Solids. 3 Credit Hours.
Plane waves in elastic half-spaces, reflection and refraction; Rayleigh and Stonely waves; waveguides, Love waves, Rayleigh-Lamb modes; Cagniard-de Hoop method; in anisotropic media.

CEE 6571. Experiment Stress Analy. 3 Credit Hours.
Study of surface stress and strain using brittle coatings and strain gauges. Strain gauge circuits, static and dynamic problems, transducer design and circuits.

CEE 6581. Eng Programming Meth. 3 Credit Hours.
Engineering programming concepts through the application of numerical solution techniques including program development, efficiencies, documentation, and testing using formal data structures and algorithms.

CEE 6582. Eng Knowledge-based Prog. 3 Credit Hours.
The usage and development of knowledge-based computer systems in engineering is studied. Topics include knowledge acquisition, representation, and verification.

CEE 6583. Object-oriented Prog-Eng. 3 Credit Hours.
Coverage of object-oriented and multimedia technologies is presented for their proper development and utilization in solving engineering problems.

CEE 6585. Materials Sci Concrete. 3 Credit Hours.
This course integrates fundamental science-based concepts with engineering-based design of concrete toward the development of a more complete understanding of the relationships between materials design and multi-scale behavior.

CEE 6590. Durability Cem Materials. 3 Credit Hours.
Develop fundamental understanding of the chemical, physical, and mechanical aspects surrounding the durability of cement-based materials.

CEE 6601. Statistics in Transport. 4 Credit Hours.
Theory of simple and multivariate regression and analysis of variance models. Assessment of modeling assumptions and remedial measures. Applications in the field of transportation planning.

CEE 6602. Urban Transport Planning. 4 Credit Hours.
An overview course on the history, finance, operations, modeling, politics, environmental impacts, and planning of urban transportation systems in the United States.

CEE 6603. Traffic Engineering. 3 Credit Hours.

CEE 6604. Transportation Design. 3 Credit Hours.
Geometric configurations of streets, expressways, bus ways, railways, and their terminals to meet characteristics of vehicle performance and operator limitations.

CEE 6605. Transport Admin & Policy. 3 Credit Hours.
Overview of institutions and policy processes in the transportation sector: organizational analysis and implementation; policy analysis.

CEE 6621. GIS in Transportation. 3 Credit Hours.
Theory and application of GIS applied to transportation engineering and planning (GIS-T). Laboratory focuses on GIS-T development.
CEE 6622. Travel Demand Analysis. 3 Credit Hours.
Examination of methods for forecasting future site and regional-level travel demand. Model specification, calibration, and validation.

CEE 6623. Survey Design and Analy. 3 Credit Hours.
Design of telephone, mail out, and personal interview survey instruments. Subsequent estimation of choice-based models from cross-sectional and panel survey data.

CEE 6624. Land Use& Transportation. 3 Credit Hours.
Overview of land use and transportation planning principles, how development impacts air transportation, how transportation investments impact development patterns and air quality.

CEE 6625. Transpor,Energy&Air Qual. 3 Credit Hours.
Students investigate relationships between transportation demand, energy supply and consumption, fuel types, greenhouse gas emissions, and relationships between vehicle technology, pollutant emissions, modeling techniques, and air quality.

CEE 6631. Signalized Intersections. 3 Credit Hours.

CEE 6632. Simulation in Transport. 3 Credit Hours.
Simulation models in transportation: development, calibration, applications, and analysis of outputs.

CEE 6633. Traffic Control. 3 Credit Hours.

CEE 6634. Transportation Safety. 3 Credit Hours.
Understanding the human factors elements of transportation safety, and how to appropriately model the highly complex and stochastic occurrence of accidents on a transportation network.

CEE 6635. Tech Innovation-Transpor. 3 Credit Hours.
Technology innovations in transportation including Intelligent Transportation Systems. Planning and design of ITS systems.

CEE 6636. Traffic Flow Theory. 3 Credit Hours.
Advanced study of underlying principles and analytical procedures used in performing capacity analyses of transportation facilities. Highway Capacity Manual procedures and other analytical techniques presented.

CEE 6641. Transport Infrastructure. 3 Credit Hours.
Transportation infrastructure traffic control and safety-related issues are addressed for initial implementation of transportation facilities as well as daily operational aspects.

CEE 6642. Transit Sys Plan&Design. 3 Credit Hours.
Introduction to transit system planning and design concepts. Course will discuss the planning, design, and operations of transit systems, and the operations of intermodal terminals.

CEE 6644. Airport Planning&Design. 3 Credit Hours.
Airport site selection, runway length and orientation, traffic control, drainage and lighting, long-range planning, government responsibility for air transportation.

CEE 6650. Discrete Choice Modeling. 3 Credit Hours.

CEE 6651. Infrastructure Systems. 3 Credit Hours.
Analytical approaches and tools for infrastructure and asset management, sustainable systems development.

CEE 6652. Infrastru Mgmt IT Applic. 3 Credit Hours.
Introduction to information technologies (programming, database, GPS/GIS, etc.) and their applications to the life-cycle activities (e.g., design, construction, etc.) of CEE engineered systems.

CEE 6720. Env Microbial Genomics. 3 Credit Hours.
To introduce advanced concepts and principles of contemporary environmental microbiological research and associated bioinformatics techniques through representative examples from recent literature.

CEE 6751. Phys Prop&Rheology-Rocks. 3 Credit Hours.
Structure, properties, and rheology of minerals and rocks with applications to engineering structures and natural phenomena in the Earth. Fundamentals of rock mechanics and crack propagation. Crosslisted with EAS 6751.

CEE 6754. Engr Communication. 3 Credit Hours.
Writing and editing engineering documents; designing and explaining visuals; creating and delivering electronic presentations. Crosslisted with MSE 6754.

CEE 6756. Signaling Molecules. 3 Credit Hours.
The diversity of chemical signals between organisms and their structural specificities will be presented along with chemical and biological methods for isolating signaling molecules. Crosslisted with BIOL 6756 and CHEM 6756.

CEE 6761. Contaminated Sed Geochem. 3 Credit Hours.
Acquaints students with fate of major pollutants, nutrients, organic compounds, such as pesticides, PAHs, and trace metals in sedimentary systems. Crosslisted with EAS 6761.

CEE 6764. Biol-Env Fluid Mech Lab. 1 Credit Hour.
Provides students with hands-on experimental demonstrations of the basic principles of environmental fluid mechanics regarding chemical and hydrodynamic signals produced and sensed by organisms.

CEE 6790. Air Pollution:Phys&Chem. 3 Credit Hours.
Introduction to physical and chemical processes affecting dynamics and fate of air pollutants at local, regional, and global scales; emphasis on tropospheric pollutant chemistry and transport. Crosslisted with EAS 6790.

CEE 6792. Air Pollut'n Meteorology. 3 Credit Hours.
Vertical temperature and wind structure, topographic effects, natural removal processes, atmospheric dispersion of stack effluents, air pollution climatology, meteorological management of air pollution. Crosslisted with EAS 6792.

CEE 6793. Atmos Boundary Layer. 3 Credit Hours.
Structure and dynamics of atmospheric boundary layer. Introduction to turbulence and turbulent transport. Crosslisted with EAS 6793.

CEE 6794. Atmos Chem Modeling. 3 Credit Hours.
Application of modern numerical methods to the prediction of atmospheric chemical and physical compositions; specific applications using computer models developed by the students are included. Crosslisted with EAS 6794.

CEE 6795. Atmospheric Aerosols. 3 Credit Hours.
Chemical and physical properties of natural and anthropogenic aerosols. Sources, transport, transformation, and fate of primary/secondary, organic/inorganic, atmospheric semi-volatiles and aerosols. Crosslisted with EAS 6795.
CEE 6810. Linear Wave Mechanics. 3 Credit Hours.
Introduction to linear wave mechanics with emphasis on boundary value problems. Topics include wavemakers, boundary layers, wave/current interactions, long waves, edge waves and wave forces.

CEE 6811. Nonlinear Wave Mech. 3 Credit Hours.
Advanced solutions of nonlinear wave equations including introduction to perturbation methods, shallow and deep water solutions, nonlinear wave interactions and stream function solutions.

CEE 6821. Nearshore Hydrodynamics. 3 Credit Hours.
Introduction to surfzone hydrodynamics including properties of breaking waves, undertow, longshore currents, wave setup, rip currents, infragravity waves, shear waves, and combined wave/current boundary layers.

CEE 6840. Coastal Sediment Trans. 3 Credit Hours.
Transport of cohesive and non-cohesive sediments in tidal and surf zone environments, measurement of sediment transport, numerical modeling of sediment transport and beach evolution.

CEE 6842. Coastal Eng Measurements. 3 Credit Hours.
Measurement of scalars (temperature, concentration), and vectors (velocity, waves), with emphasis on water and sediments. Acoutical and optical sensors. Quantitative use of digital video/photographic data.

CEE 6XXX. Civil/Env Engr Elective. 1-21 Credit Hours.

CEE 7000. Master's Thesis. 1-21 Credit Hours.

CEE 7310. Master's Thesis&Research. 1 Credit Hour.
Oral presentation of master's thesis and research projects.

CEE 7751. Computational Fluid Mech. 3 Credit Hours.
Numerical methods for solving the time-dependent Navier-Stokes equations in complex geometrics, including theory, implementation, and applications. Crosslisted with ME 7751.

CEE 7772. Fund-Fracture Mechanics. 3 Credit Hours.
Advanced study of failure of structural materials under load, mechanics of fracture, and microscopic and macroscopic aspects of the fracture of engineering materials. Crosslisted with AE, CHE, ME, and MSE 7772.

CEE 7773. Adv Fracture Mechanics. 3 Credit Hours.
Nonlinear fracture mechanics including elastic-plastic and time-dependent fracture, advanced test methods, J-integral theory, and extensions. Crosslisted with AE, CHE, ME, and MSE 7773.

CEE 7774. Fatigue-Materials&Struct. 3 Credit Hours.
Mechanical and microstructural aspects of nucleation and growth of cracks under cyclic loading conditions, notch effects, cumulative damage, multiaxial loading, and fatigue crack propagation. Crosslisted with AE, CHE, ME, and MSE 7774.

CEE 7779. Damage & Fail-Composites. 3 Credit Hours.
Provide knowledge of the fundamental concepts and methods related to analysis and assessment of damage, failure and durability of composite materials. Crosslisted with AE, CHE, ME, MSE, and PTFE 7791.

CEE 7792. Mechanics of Composites. 3 Credit Hours.
Anisotropic elasticity, failure theories, hygrothermal behavior, 3-D analysis of laminates, thick laminates, free edge effects, stress concentrations, joints, creep and fracture of composites. Crosslisted with AE, CHE, ME, MSE and PTFE 7792.

CEE 7793. Manufacture-Composites. 3 Credit Hours.
Major manufacturing techniques for metal-, ceramic-, and polymer-matrix composites. Modeling of processes with emphasis on fundamental mechanisms and effects. Crosslisted with AE, CHE, ME, MSE and PTFE 7793.

CEE 7799. Doctoral Comp Exam Prep. 1-21 Credit Hours.
For students preparing for the doctoral qualifying examination.

CEE 8091. Construction Seminar. 1 Credit Hour.
Introduction to leading-edge industry practices not part of the regular curriculum using field trips and guest lectures.

CEE 8094. Environment Engr Seminar. 1 Credit Hour.
Developments in environmental engineering science and technology, current practice, current research, and special topics related to environmental quality assessment and control.

CEE 8095. Research Seminar in EnvE. 1 Credit Hour.
Discussion of current research topics in environmental engineering. Presentations by master's and doctoral students.

CEE 8096. EFMWR Seminar. 1 Credit Hour.
Presentation and discussion of current research developments in environmental fluid mechanics and water resources by outside speakers, faculty, and graduate students.

CEE 8097. Intro Transpo Research. 1 Credit Hour.
The planning, organization and execution of professional transportation research. Topics include: human factors, safety, ethics, technical communications and the peer review process. Fulfills RCR requirements.

CEE 8099. SEMM PhD Seminar. 1 Credit Hour.
Seminars for CEE PhD students in Structural Engineering, Mechanics and Materials (SEMM) to improve and practice technical communication skills.

CEE 8111. Special Topics. 1 Credit Hour.
Topics of current interest in civil engineering.

CEE 8112. Special Topics. 2 Credit Hours.
Topics of current interest in civil engineering.

CEE 8113. Special Topics. 3 Credit Hours.
Topics of current interest in civil engineering.

CEE 8114. Special Topics. 4 Credit Hours.
Topics of current interest in civil engineering.

CEE 8115. Special Topics. 5 Credit Hours.
Topics of current interest in civil engineering.

CEE 8223. Special Topics. 3 Credit Hours.
Special Topics for CEE (lecture and supervised lab).

CEE 8224. Special Topics. 4 Credit Hours.
Topics of current interest in civil engineering.

CEE 8900. Special Problems. 1-21 Credit Hours.

CEE 8901. Special Problems. 1-21 Credit Hours.

CEE 8902. Special Problems. 1-21 Credit Hours.

CEE 8903. Special Problems. 1-21 Credit Hours.

CEE 8950. Master's Research Proj. 1-21 Credit Hours.
Master's research project to be scheduled by M.S. students not writing thesis.

CEE 8956. Master's Research Prob. 1-21 Credit Hours.
For nonthesis students performing research.

CEE 8997. Teaching Assistantship. 1-9 Credit Hours.
For students holding graduate teaching assistantships.

CEE 8998. Research Assistantship. 1-9 Credit Hours.
For students holding a graduate research assistantship.
College of Architecture (COA)

COA 1011. Fund Design & Built Env I. 3 Credit Hours.
Introduction to creative problem-solving and the design realization cycle through project-based design exercises that emphasize the role of representation.

COA 1012. Fund Design & Built Env II. 4 Credit Hours.
Introduction to the design of complex problems through an emphasis on integrative and collaborative design strategies, research, critical reflection, and interdisciplinary team work.

COA 1060. Intro-Design & Built Env. 3 Credit Hours.
Introduction to architecture, building construction, and industrial design through case studies that illuminate past and present practices, as well as future possibilities within the disciplines.

COA 2241. History of Art I. 3 Credit Hours.
A survey of artistic manifestations from primitive times to the present. First semester sequence, prehistoric through Renaissance; second semester, Renaissance through contemporary art.

COA 2242. History of Art II. 3 Credit Hours.
A survey of artistic manifestations from primitive times to the present. First semester sequence, prehistoric through Renaissance; second semester Renaissance through contemporary art.

COA 2698. Research Assistantship. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

COA 2699. Undergraduate Research. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

COA 3114. Architecture in Greece. 3 Credit Hours.
An intensive on-site investigation of the role that the arts and architecture have played in the development of classical Greek civilization.

COA 3115. Art & Arch in Italy I. 3 Credit Hours.
Investigations of the painting, sculpture, and architecture of the Classical, Early Christian, Byzantine, and Medieval periods in Italy with special emphasis on Rome.

COA 3116. Art & Arch in Italy II. 3 Credit Hours.
Investigations of the painting, sculpture, and architecture of the Renaissance and Baroque periods in Italy with special emphasis on Rome.

COA 4000. Furniture Workshop. 3 Credit Hours.
The course investigates construction into the design cycle to explore the boundaries between furniture, architecture, and sculpture. Exercises introduce furniture production techniques, material properties, and CNC milling.

COA 4010. Construction Ind History. 3 Credit Hours.
Addresses how today's construction industry is organized and its particular characteristics, how it evolved from early times and where it may be heading in the future.

COA 4698. Research Assistantship. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.
COA 8000. Doctoral Seminar. 1 Credit Hour.
COA 8530. PhD Planning Seminar. 1 Credit Hour.
Discussion of research and pedagogy topics and methodologies for city and regional planning.

COA 8600. Genesis of Architecture. 3 Credit Hours.
The nature of architecture illustrated from those of all cultures; determinist theories; its social values and its meanings to the individual-material, physical, anthropological, and cognitive.

COA 8610. Thought Hellenic-1830's. 3 Credit Hours.
A survey of architectural thought and theory taking account of other fields; paralleled by a review of major critical texts and assessments to the present day.

COA 8612. Thought 1830's-20th Cent. 3 Credit Hours.
A survey of architectural thoughts and theory taking account of other fields; paralleled by a review of major critical texts and assessments to the present day.

COA 8620. Design-American Space. 3 Credit Hours.
Topical seminar on the development of urban, suburban, and rural American spatial forms, with emphasis on the relationship between public order and vernacular settlement.

COA 8625. Theories of Inquiry. 3 Credit Hours.
Introduction to research paradigms and their assumptions. The formulation of questions and frameworks of description, representation, analysis, interpretation, and data control.

COA 8630. Arch, Space & Culture. 3 Credit Hours.
Accounts of the social functions of architectural space and associated design choices, across a variety of building types and scales of environmental design. Credit will not be awarded for both COA 8630 and ARCH 4630.

COA 8635. Architecture and Policy. 3 Credit Hours.
Methods and theories of planning, design, facilities management, and evaluation as they relate to organizational policy and development.

COA 8640. Psy for Architecture. 3 Credit Hours.
An examination of social and psychological theory as it is applied to the creation and use of space.

COA 8645. Analytical Models. 3 Credit Hours.
Introduction to analytical ideas and methodologies for the quantitative description of built space, form, building use, and functions. Layouts as configurations: boundaries, accessibility, visibility, extensions.

COA 8650. Descriptions of Design. 3 Credit Hours.
Introduction to the form and computational description of designs, with an emphasis on spatial patterns. Geometrical constructions, combinatorial approaches, analyses of shape.

COA 8672. Design Computation. 3 Credit Hours.
Seminar review of developments in computing applied to architecture; current major research issues.

COA 8674. Multimedia Design. 3 Credit Hours.
Theories and tools for structuring multimedia knowledge for design and designers.

COA 8676. Design & Engr Databases. 3 Credit Hours.
Survey of database use in design and engineering; surveys relational, object-oriented database technology, and ISO-STEP methods of integration.

COA 8680. Performance Aspects. 3 Credit Hours.
Engineering analysis of building (sub) systems based on a performance ontology. Criteria, metrics, and tools for performance aspect evaluations in different building technology domains.

COA 8685. Building Simulation. 3 Credit Hours.

COA 8690. Building Models. 3 Credit Hours.
Surveys of issues for effective integration of heterogeneous design tools for building; previous efforts, current approaches; advanced techniques, including ISO-STEP and IAI.

COA 8811. Spec Topic-Arch/Planning. 1 Credit Hour.
COA 8812. Spec Topic-Arch/Planning. 2 Credit Hours.

COA 8813. Spec Topic-Arch/Planning. 3 Credit Hours.
COA 8821. Spec Top-Arch & Behavior. 1 Credit Hour.
COA 8822. Spec Top-Arch & Behavior. 2 Credit Hours.
COA 8823. Spec Top-Arch & Behavior. 3 Credit Hours.

COA 8831. Spec Topic-Design & Tech. 1 Credit Hour.
COA 8832. Spec Topic-Design & Tech. 2 Credit Hours.
COA 8833. Spec Topic-Design & Tech. 3 Credit Hours.

COA 8841. Spec Top-Dsgn Computing. 1 Credit Hour.
COA 8842. Spec Top-Dsgn Computing. 2 Credit Hours.
COA 8843. Spec Top-Dsgn Computing. 3 Credit Hours.

COA 8851. Spec Topic-Hist & Theory. 1 Credit Hour.
COA 8852. Spec Topic-Hist & Theory. 2 Credit Hours.

COA 8853. Spec Topic-Hist & Theory. 3 Credit Hours.
COA 8861. Spec Topic-Hist & Theory. 1 Credit Hour.

COA 8862. Spec Topic-Hist & Theory. 2 Credit Hours.
COA 8863. Spec Topic-Hist & Theory. 3 Credit Hours.

COA 8871. Spec Topics - Urb Design. 1 Credit Hour.
COA 8872. Spec Topics - Urb Design. 2 Credit Hours.

COA 8873. Spec Topics - Urb Design. 3 Credit Hours.

COA 8874. Spec Topics - Urb Design. 4 Credit Hours.
COA 8875. Spec Topics - Urb Design. 5 Credit Hours.

COA 8876. Spec Topics - Urb Design. 6 Credit Hours.

COA 8901. Special Problems. 1-21 Credit Hours.

COA 8902. Special Problems. 1-21 Credit Hours.

COA 8903. Special Problems. 1-21 Credit Hours.

COA 8904. Special Problems. 1-21 Credit Hours.

COA 8996. Qualifying Paper. 1-21 Credit Hours.
COA 8997. Teaching Assistantship. 1-9 Credit Hours.
For students holding a graduate teaching assistantship.

COA 8998. Research Assistantship. 1-9 Credit Hours.
For students holding a graduate research assistantship.

COA 8999. Prep-Doctor Dissertation. 1-21 Credit Hours.

COA 9000. Doctoral Thesis. 1-21 Credit Hours.
College of Engineering (COE)

COE 1000. Freshman Engr Seminar. 1 Credit Hour.
An introduction to the engineering profession featuring presentations about the undergraduate degree programs at Georgia Tech with a focus on career options.

COE 2001. Statics. 2 Credit Hours.
Elements of statics in two and three dimensions, free-body diagrams, distributed loads, centroids, and friction.

COE 2701. Startup Lab. 3 Credit Hours.
Elements of technology venture creation including opportunity identification and validation, ideation, customer discovery, market analysis, minimum viable product development, business models, intellectual property, and capital raises.

COE 3001. Deformable Bodies. 3 Credit Hours.
Stress and strain analysis applied to beams, vessels, pipes, and combined loading; stress and strain transformations; beam deflection; column buckling.

COE 3002. Micro/Nano Revolution. 3 Credit Hours.
Introduction to microelectronics and nanotechnology: the communications revolution, Moore’s law, semiconductors, transistors, MEMS, photonics, analysis of common technological objects, global impact on technology and society.

COE 3803. Special Topics. 3 Credit Hours.

COE 4803. Special Topics. 3 Credit Hours.

College of Sciences (COS)

COS 2000. Intro to Research. 1 Credit Hour.
Students will learn ethical guidelines for conducting research, develop skills in reading and writing research articles, and explore careers in research.

Computational Mod, Sim, & Data (CX)

CX 1801. Special Topics. 1 Credit Hour.
Course topics will vary. This course number will be used to prototype new courses and/or offer courses on topics of timely interest. The final digit in the course number indicates the number of units offered awarded for the course.

CX 1802. Special Topics. 2 Credit Hours.
Course topics will vary. This course number will be to prototype new courses and/or offer courses on topics of timely interest. The final digit in the course number indicates the number of units offered awarded for the course.

CX 1803. Special Topics. 3 Credit Hours.
Course topics will vary. This course number will be to prototype new courses and/or offer courses on topics of timely interest. The final digit in the course number indicates the number of units offered awarded for the course.

CX 1804. Special Topics. 4 Credit Hours.
Course topics will vary. This course number will be to prototype new courses and/or offer courses on topics of timely interest. The final digit in the course number indicates the number of units offered awarded for the course.

CX 1805. Special Topics. 5 Credit Hours.
Course topics will vary. This course number will be used to prototype new courses and/or offer courses on topics of timely interest. The final digit in the course number indicates the number of units offered awarded for the course.

CX 2801. Special Topics. 1 Credit Hour.
Course topics will vary. This course number will be used to prototype new courses and/or offer courses on topics of timely interest. The final digit in the course number indicates the number of units offered awarded for the course.

CX 2802. Special Topics. 2 Credit Hours.
Course topics will vary. This course number will be used to prototype new courses and/or offer courses on topics of timely interest. The final digit in the course number indicates the number of units offered awarded for the course.

CX 2803. Special Topics. 3 Credit Hours.
Course topics will vary. This course number will be used to prototype new courses and/or offer courses on topics of timely interest. The final digit in the course number indicates the number of units offered awarded for the course.

CX 2804. Special Topics. 4 Credit Hours.
Course topics will vary. This course number will be used to prototype new courses and/or offer courses on topics of timely interest. The final digit in the course number indicates the number of units offered awarded for the course.

CX 2805. Special Topics. 5 Credit Hours.
Course topics will vary. This course number will be used to prototype new courses and/or offer courses on topics of timely interest. The final digit in the course number indicates the number of units offered awarded for the course.
CX 4010. Computational Prob Solv. 3 Credit Hours.
Computing principles, computer architecture, algorithms and data structures; software development, parallelism. No credit for graduate students or undergraduates in Computer Science or Computational Media.

CX 4140. Comp Model Algorithms. 3 Credit Hours.
Design, analysis and implementation of algorithms for modeling natural and engineered systems; algorithm experimentation, and optimization.

CX 4220. Intro High Perf Comp. 3 Credit Hours.
Design of algorithms and software for high performance computing platforms used in computational science and engineering. Topics include parallelism, locality, machine architectures, and programming.

CX 4230. Computer Simulation. 3 Credit Hours.
Algorithms and techniques for creating computer simulations and their realization in software.

CX 4232. SIM & Military Gaming. 3 Credit Hours.
Creation and use of modeling and simulation tools to analyze and train students regarding strategic events in international relations.

CX 4236. Distributed Simulation. 3 Credit Hours.
Algorithms and techniques used to execute simulations on parallel/distributed computing platforms. Simulations for analysis, virtual environments, and computer gaming.

CX 4240. Computing for Data Analy. 3 Credit Hours.
Computational techniques needed for data analysis; programming, accessing databases, multidimensional arrays, basic numerical computing, and visualization; hands-on applications and case studies.

CX 4242. Data & Visual Analytics. 3 Credit Hours.
Introduction to the analysis of complex data; theory, applications and practical case studies.

CX 4640. Numerical Analysis I. 3 Credit Hours.
Introduction to numerical algorithms for some basic problems in computational mathematics. Discussion of both implementation issues and error analysis.

CX 4641. Numerical Analysis II. 3 Credit Hours.
Introduction to the numerical solution of initial and boundary value problems in differential equations.

CX 4777. Vector&Parallel Sci Comp. 3 Credit Hours.
Scientific computational algorithms on vector and parallel computers. Speed-up and algorithm complexity, interprocess communication, synchronization, modern algorithms for linear systems, programming techniques, code optimization.

CX 4801. Special Topics. 1 Credit Hour.
Course topics will vary. This course number will be used to prototype new courses and/or offer courses on topics of timely interest. The final digit in the course number indicates the number of units offered awarded for the course.

CX 4802. Special Topics. 2 Credit Hours.
Course topics will vary. This course number will be used to prototype new courses and/or offer courses on topics of timely interest. The final digit in the course number indicates the number of units offered awarded for the course.

CX 4803. Special Topics. 3 Credit Hours.
Course topics will vary. This course number will be used to prototype new courses and/or offer courses on topics of timely interest. The final digit in the course number indicates the number of units offered awarded for the course.

CX 4804. Special Topics. 4 Credit Hours.
Course topics will vary. This course number will be used to prototype new courses and/or offer courses on topics of timely interest. The final digit in the course number indicates the number of units offered awarded for the course.

CX 4805. Special Topics. 5 Credit Hours.
Course topics will vary. This course number will be used to prototype new courses and/or offer courses on topics of timely interest. The final digit in the course number indicates the number of units offered awarded for the course.

CX 4893. Special Topics. 3 Credit Hours.
Special Topics for CX (lecture + lab).

CX 4903. Special Problems. 3 Credit Hours.
An investigation of significant areas of computational science and engineering. Guided study and research.

Computational Science & Engr (CSE)

CSE 6001. Intro-Comp Sci & Engr. 1 Credit Hour.
This course will introduce students to major research areas in computational science and engineering.

CSE 6010. Computational Prob Solv. 3 Credit Hours.
Computing principles, computer architecture, algorithms and data structure; software development, parallelism. No credit for graduate students or undergraduates in Computer Science or Computational Media.

CSE 6040. Computing for Data Analy. 3 Credit Hours.
Computational techniques needed for data analysis; programming, accessing databases, multidimensional arrays, basic numerical computing, and visualization; hands-on applications and case studies. Credit is will not be awarded for both CSE 6040 and CX 4240.

CSE 6140. Comp Sci&Eng Algs. 3 Credit Hours.
This course will introduce students to designing high-performance and scalable algorithms for computational science and engineering applications. The course focuses on algorithms design, complexity analysis, experimentation, and optimization, for important science and engineering applications.

CSE 6141. Massive Graph Analysis. 3 Credit Hours.
Algorithms and data structures for massive graphs; programming, parallelism; principles, challenges, opportunities in graph analysis; hands-on application, case studies.

CSE 6220. High Perform Computing. 3 Credit Hours.
This course will introduce students to the design, analysis, and implementation of high performance computational science and engineering applications.

CSE 6221. Multicore Computing. 3 Credit Hours.
This course will introduce students to the design and analysis of real-world algorithms on multicore computers.

CSE 6230. High Perf Parallel Comp. 3 Credit Hours.
Introduction to MIMD parallel computation, using textbook excerpts, research papers, and projects on multiple parallel machines. Emphasizes practical issues in high-performance computing.

CSE 6236. Parallel&Distributed Sim. 3 Credit Hours.
Algorithms and techniques used in parallel/distributed discrete event simulation systems. Synchronization algorithms, data distribution, applications to high performance analytic simulations and distributed virtual environments.
CSE 6240. Web Search & Text Mining. 3 Credit Hours.
Basic and advanced methods for Web information retrieval and text mining: indexing and crawling, IR models, link and click data, social search, text classification and clustering.

CSE 6241. Pattern Matching. 3 Credit Hours.
Foundations and algorithms underlying the development and application of tools for the efficient searching, matching and discovery of discrete.

CSE 6242. Data & Visual Analytics. 3 Credit Hours.
The course introduces students to analysis and visualization of complex high dimensional data. Both theory and applications will be covered including several practical case studies.

CSE 6243. Adv Top Machine Learning. 3 Credit Hours.
Advanced machine learning topics including graphical models, kernel methods, boosting, bagging, semi-supervised and active learning, and tensor approach to data analysis.

CSE 6250. Big Data Health. 3 Credit Hours.
Big data systems, scalable machine learning algorithms, health analytic applications, electronic health records.

CSE 6301. Algor-Bioinfor&Comp Biol. 3 Credit Hours.
Foundations and algorithms underlying the development and application of tools for the efficient management and processing of biomolecular data.

CSE 6643. Numerical Linear Algebra. 3 Credit Hours.
Introduction to numerical solutions of the classical problems of linear algebra including linear systems, least squares, singular value decomposition, and eigen value problems. Crosslisted with MATH 6643.

CSE 6644. Iterative Meth-Sys Eqns. 3 Credit Hours.
Iterative methods for linear and nonlinear systems of equations including Jacobi, G-S, SOR, CG, multigrid, Newton, quasi-Newton, updating, and gradient based methods. Crosslisted with MATH 6644.

CSE 6710. Numerical Methods-CSE I. 3 Credit Hours.
Introduction to numerical algorithms widely used in computational science and engineering. Numerical linear algebra, linear programming, and applications. Crosslisted with MATH 6710.

CSE 6711. Numerical Methods-CSE II. 3 Credit Hours.
Efficient numerical techniques for solving partial differential equations and large-scale systems of equations arising from discretization of partial differential equations or variational problems in applications in science and engineering. Crosslisted with MATH 6711.

CSE 6730. Model&Sim:Found&Implemen. 3 Credit Hours.
Foundations and algorithms concerning the development of conceptual models for systems, and their realization in the form of computer software; discrete and continuous models. Crosslisted with ECE 6730.

CSE 6740. Computational Data Analy. 3 Credit Hours.
Theoretical/computational foundations of analyzing large/complex modern datasets, including the fundamental concepts of machine learning and data mining needed for both researcher and practice. Crosslisted with ISYE 6740.

CSE 6742. Mod, Sim&Military Gaming. 3 Credit Hours.
Focuses on the creation and use of modeling and simulation tools to analyze and train students regarding strategic events in international relations. Crosslisted with INTA 6742.

CSE 6748. Appld Analytics Pract. 6 Credit Hours.
Practical analytics project experience applying ideas from the classroom to a significant project of interest to a business, government agency, or other organization.

CSE 7000. Master's Thesis. 1-21 Credit Hours.

CSE 7999. Prep-Doctoral Qual Exams. 1-21 Credit Hours.

CSE 8001. Comp, Sci & Engr Seminar. 1 Credit Hour.
Group discussion concerning advanced topics in Computational Science and Engineering.

CSE 8002. Comp, Sci & Engr Seminar. 2 Credit Hours.
Group discussion concerning advanced topics in Computational Science and Engineering.

CSE 8003. Comp, Sci & Engr Seminar. 3 Credit Hours.
Group discussion concerning advanced topics in Computational Science and Engineering.

CSE 8004. Comp, Sci & Engr Seminar. 4 Credit Hours.
Group discussion concerning advanced topics in Computational Science and Engineering.

CSE 8005. Comp, Sci & Engr Seminar. 5 Credit Hours.
Group discussion concerning advanced topics in Computational Science and Engineering.

CSE 8801. Special Topics. 1 Credit Hour.
Topics of current interest in Computational Science and Engineering.

CSE 8802. Special Topics. 2 Credit Hours.
Topics of current interest in Computational Science and Engineering.

CSE 8803. Special Topics. 3 Credit Hours.
Topics of current interest in Computational Science and Engineering.

CSE 8804. Special Topics. 4 Credit Hours.
Topics of current interest in Computational Science and Engineering.

CSE 8805. Special Topics. 5 Credit Hours.
Topics of current interest in Computational Science and Engineering.

CSE 8901. Special Problems. 1-21 Credit Hours.
Small-group or individual investigation of advanced topics with a faculty member.

CSE 8902. Special Problems. 1-21 Credit Hours.
Small-group or individual investigation of advanced topics with a faculty member.

CSE 8903. Special Problems. 1-21 Credit Hours.
Small-group or individual investigation of advanced topics with a faculty member.

CSE 8997. Teaching Assistantship. 1-6 Credit Hours.
For students holding graduate teaching assistantships.

CSE 8998. Research Assistantship. 1-6 Credit Hours.
For students holding graduate research assistantships.

CSE 9000. Doctoral Thesis. 1-21 Credit Hours.

Computer Science (CS)

CS 1100. Freshman Leap Seminar. 1 Credit Hour.
Small group discussions with first year students are led by one or more faculty members and include a variety of foundational, motivational, and topical subjects for computationalist.

CS 1171. Computing in MATLAB. 1 Credit Hour.
For students with a solid introductory computing background needing to demonstrate proficiency in the MATLAB language.
CS 1301. Intro to Computing. 3 Credit Hours.
Introduction to computing principles and programming practices with an emphasis on the design, construction and implementation of problem solutions use of software tools.

CS 1315. Intro Media Computation. 3 Credit Hours.
Introduction to computation (algorithmic thinking, data structures, data transformation and processing, and programming) in a media and communication context.

CS 1316. Rep Structure & Behavior. 3 Credit Hours.
Modeling the structure of media (e.g., music, graphical scenes) using dynamic data structures. Designing objects as encapsulations of structure and behavior. Algorithms for simulating objects. May not be taken for credit by students who have credit for CS 1322.

CS 1331. Intro-Object Orient Prog. 3 Credit Hours.
Introduction to techniques and methods of object-oriented programming such an encapsulation, inheritance, and polymorphism. Emphasis on software development and individual programming skills.

CS 1332. Data Struct & Algorithms. 3 Credit Hours.
Computer data structures and algorithms in the context of object-oriented programming. Focus on software development towards applications.

CS 1371. Computing for Engineers. 3 Credit Hours.
Foundations of computing with an introduction to design and analysis of algorithms and an introduction to design and construction of programs for engineering problem-solving.

CS 1372. Program Design for Engrs. 3 Credit Hours.

CS 1801. Special Topics. 1 Credit Hour.
Courses of timely interest to the profession, conducted by resident or visiting faculty.

CS 1802. Special Topics. 2 Credit Hours.
Courses of timely interest to the profession, conducted by resident or visiting faculty.

CS 1803. Special Topics. 3 Credit Hours.
Courses of timely interest to the profession, conducted by resident or visiting faculty.

CS 1804. Special Topics. 4 Credit Hours.
Courses of timely interest to the profession, conducted by resident or visiting faculty.

CS 1805. Special Topics. 5 Credit Hours.
Courses of timely interest to the profession, conducted by resident or visiting faculty.

CS 1XXX. Computer Sci Elective. 1-21 Credit Hours.

CS 2050. Intro Discrete Math CS. 3 Credit Hours.

CS 2051. Honors Discrete Math CS. 3 Credit Hours.

CS 2110. Computer Organiz&Program. 4 Credit Hours.
An introduction to basic computer hardware, machine language, assembly language, and C programming.

CS 2200. Systems and Networks. 4 Credit Hours.
A broad exposure to computer system structure and networking including software abstractions in operating systems for orchestrating the usage of the computing resources.

CS 2261. Media Device Architecture. 4 Credit Hours.
Controlling the interface between hardware and software in media devices. Machine-level programming (e.g., in C) to create graphics, generate sound, and support user interaction.

CS 2316. Data Input/Manipulation. 3 Credit Hours.
Reading, manipulating, and exporting data for engineering, business, and scientific applications. Covers GUI’s, File I/O, basic SQL, and web scraping. Emphasis on software development.

CS 2335. Software Practicum. 3 Credit Hours.
Methods for solving large programming problems. Techniques for quality assurance, managing programs, working in teams, analyzing problems, and producing effective solutions.

CS 2340. Objects and Design. 3 Credit Hours.
Object-oriented programming methods for dealing with large programs. Focus on quality processes, effective debugging techniques, and testing to assure a quality product.

CS 2345. Adv Practical O-O Prog. 4 Credit Hours.
This course presents important programming principles that should be considered when using a non-automatic memory management complex language (such as C++). Templating, generic programming, resource acquisition is initialization (RAII), and smart pointers are a few examples. Credit not awarded for both CS 2345 and ECE 2036.

CS 2600. Knowledge Rep & Process. 4 Credit Hours.
Introduction to the representation and manipulation of complex symbolic and sub-symbolic information.

CS 2698. Research Assistantship. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

CS 2699. Undergraduate Research. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

CS 2701. Startup Lab. 3 Credit Hours.
Elements of technology venture creation including opportunity identification and validation, ideation, customer discovery, market analysis, minimum viable product development, business models, intellectual property, and capital raises. Cross-listed with COE 2701.

CS 2801. Special Topics. 1 Credit Hour.
Courses of timely interest to the profession, conducted by resident or visiting faculty.

CS 2802. Special Topics. 2 Credit Hours.
Courses of timely interest to the profession, conducted by resident or visiting faculty.

CS 2803. Special Topics. 3 Credit Hours.
Courses of timely interest to the profession, conducted by resident or visiting faculty.

CS 2804. Special Topics. 4 Credit Hours.
Courses of timely interest to the profession, conducted by resident or visiting faculty.
CS 2805. Special Topics. 5 Credit Hours.
Courses of timely interest to the profession, conducted by resident or visiting faculty.

CS 2XXX. Computer Sci Elective. 1-21 Credit Hours.

CS 3101. Comp Sci Ventures. 3 Credit Hours.
Students will learn how computer-science-based ventures are developed. The course is project-based. Students propose, analyze, pitch, design, implement, package and market web 2.0 and virtual-world-based products and services.

CS 3210. Design-Operating Systems. 3 Credit Hours.
Operating systems concepts, including multi-threading, scheduling, synchronization, communication, and access control. Projects will cover design and implementation of several operating systems components.

CS 3220. Processor Design. 3 Credit Hours.
Principles in pipelined processor design, with emphasis on the need for a close interaction between code generation and architecture.

CS 3240. Languages and Computation. 3 Credit Hours.
Interpreters as abstract machines and the tools used to construct them, such as scanners and parsers. An introduction to models of computation as embodied by different programming languages. Limits of and relationships between these models.

CS 3251. Computer Networking I. 3 Credit Hours.
Introduction to problems in computer networking, including error recovery, medium access, routing, flow control, and transport. Emphasis on current best practice. Includes programming of networked applications.

CS 3300. Intro to Software Engr. 3 Credit Hours.
Team-based project class to introduce and apply software engineering principles and practices.

CS 3311. Project Design. 1 Credit Hour.
Part 1 of a 2 semester project design and implementation sequence conjoined with Technical Communications. Prepare requirements, design and project plans. Develop a basic prototype of the desired system. Project is completed in CS 3312-Project Implementation. Credit will not be awarded for CS 3311 and 4911.

CS 3312. Project Implementation. 2 Credit Hours.
The second part of a 2 semester project design and implementation sequence conjoined with Technical Communications. Implement a project designed in CS 3311. Credit will not be awarded for CS 3312 and 4911.

CS 3451. Computer Graphics. 3 Credit Hours.
Geometric constructions; transformations; perception; reflection models; photorealistic; non-photorealistic, and image-based rendering; rendering software and APIs; triangle-mesh processing; graphic acceleration; user-interaction, design and animation.

CS 3510. Dsgn&Analysis-Algorithms. 3 Credit Hours.
Basic techniques of design and analysis of efficient algorithms for standard computational problems. NP-Completeness. Credit not allowed for both CS 3510 and CS 3511.

CS 3511. Algorithms Honors. 3 Credit Hours.
Techniques of design and analysis of efficient algorithms for standard computational problems. NP-Completeness Project. Credit not allowed for both CS 3511 and CS 3510.

CS 3600. Intro-Artificial Intell. 3 Credit Hours.
An introduction to artificial intelligence and machine learning. Topics include intelligent system design methodologies, search and problem solving, supervised and reinforced learning.

CS 3630. Intro-Perception&Robotic. 3 Credit Hours.
Covers fundamental problems and leading solutions for computer and robot perception and action from the point of view of autonomous robot navigation.

CS 3651. Prototyping Intell Appl. 4 Credit Hours.
Hands-on course teaching the fundamentals of electronics of electrical and mechanical prototyping.

CS 3743. Emerging Technologies. 3 Credit Hours.
Analysis of emerging technologies and their impacts for firm practice, market practice, policy, and society. Credit not allowed for both CS 3743 and MGT 3743 or ME 3743.

CS 3750. User Interface Design. 3 Credit Hours.
Human computer interface is considered in terms of user-system compatibility. Concepts in human factors and interface design are covered in relation to capabilities of both humans and computers. Crosslisted with PSYC 3750.

CS 3790. Intro-Cognitive Science. 3 Credit Hours.
Multidisciplinary perspectives on cognitive science. Interdisciplinary approaches to issues in cognition, including memory, language, problem solving, learning, perception, and action. Crosslisted with PST, PSYC, and ISYE 3790.

CS 3801. Special Topics. 1 Credit Hour.
Courses of timely interest to the profession, conducted by resident or visiting faculty.

CS 3802. Special Topics. 2 Credit Hours.
Courses of timely interest to the profession, conducted by resident or visiting faculty.

CS 3803. Special Topics. 3 Credit Hours.
Courses of timely interest to the profession, conducted by resident or visiting faculty.

CS 3804. Special Topics. 4 Credit Hours.
Courses of timely interest to the profession, conducted by resident or visiting faculty.

CS 3805. Special Topics. 5 Credit Hours.
Courses of timely interest to the profession, conducted by resident or visiting faculty.

CS 3XXX. Computer Sci. 1-21 Credit Hours.

CS 4001. Computing & Society. 3 Credit Hours.
Examines the role and impact of information and communication technology in society, with emphasis on ethical, professional, and public policy issues. Credit not allowed for both CS 4001 and 4002.

CS 4002. Robots and Society. 3 Credit Hours.
Examines the role and impact of robotics, distributed sensing and actuation, ubiquitous computing and related technology in society, emphasizing ethical, professional and public policy issues. Credit not allowed for both CS 4001 and 4002.

CS 4005. Next Gen Computing Tech. 3 Credit Hours.
Students will explore new paradigms in how content is created, distributed, and consumed, with hands-on demos of next-generation computing technologies.

CS 4010. Intro to Computer Law. 3 Credit Hours.
Provides an introduction to copyrights, patents, trade secrets, trademarks, and commercial law pertaining to computer software and hardware.
CS 4052. Systems Analysis & Design. 3 Credit Hours.
An introductory course on the development life cycle of business information systems. It covers analysis and design tools and methodology. Credit not allowed for both CS 4052 and MGT 4045.

CS 4057. Bus Process Analy & Design. 3 Credit Hours.
Business processes are the mechanisms by which work is organized and performed. This course covers the analysis of business technology. Credit will not be awarded for both CS 4057 and MGT 4057.

CS 4210. Adv Operating Systems. 3 Credit Hours.
Operating system abstractions and their implementations, multi-threading, efficient inter-address communication, high-level synchronization, introduction to multi-processor and distributed operating systems, real-time systems.

CS 4220. Embedded Systems. 3 Credit Hours.
Design principles, programming techniques, and case studies of embedded real-time systems. Interface techniques and devices. Representations and reasoning about physical processes.

CS 4233. Parallel Comp Arch. 3 Credit Hours.
The objective of this course is to develop an in-depth understanding of the design, implementation, and evaluation of modern parallel computers. Credit not allowed for both CS 4233 and CS 7110.

CS 4235. Intro to Info Security. 3 Credit Hours.
Terms/concepts, threats, controls; problem definition; comprehensive information security model; security for operating systems, databases, network/distributed systems; administering security; legal/ethical/policy issues. Credit not allowed for both CS 4235 and CS 6035.

CS 4237. Comp & Network Security. 3 Credit Hours.
Fundamental concepts and principles of computer security, operating system and database security, secret key and public key cryptographic algorithms, hash functions, authentication, firewalls and intrusion detection systems, IPSec ad VPN, and wireless security.

CS 4240. Compilers & Interpreters. 3 Credit Hours.
Study of techniques for the design and implementation of compilers, interpreters, and program analyzers, with consideration of the particular characteristics of widely used programming languages.

CS 4245. Intro Data Mining & Anal. 3 Credit Hours.
Computational techniques for analysis of large, complex datasets, covering fundamental aspects as well as modern data mining and analysis techniques. Cross-listed with ISYE 4245.

CS 4251. Computer Networking II. 3 Credit Hours.
Principles of computer networks, including medium access, ARQ protocols, routing, congestion avoidance, and control. Emphasis on design options and tradeoffs. Includes significant network application programming.

CS 4255. Intro-Network Management. 3 Credit Hours.
Introduction to SNMP-based network management. Practical application to network and system management including hands-on lab practice.

CS 4260. Telecommunications Sys. 3 Credit Hours.
Study of telecommunication systems emphasizing functional roles of the various portions of the system and how various functional components support and interact with one another.

CS 4261. Mobile Apps & Svcs. 3 Credit Hours.
This course provides an introduction to mobile applications and services with an emphasis on voice and data service integration in modern commercial networks.

CS 4270. Data Communications Lab. 3 Credit Hours.
Detailed study of the principles of data transmission systems and their performance, reinforced by laboratory exercises.

CS 4280. Survey-Telecom & the Law. 3 Credit Hours.
Overview of telecommunication regulation at the federal, state, and judicial levels; review of FCC policies and restrictions on Bell operating companies under the AT&T Consent Agreement.

CS 4290. Advanced Computer Org. 3 Credit Hours.
Topics concerning the hardware design of computer systems. Advanced techniques in high-performance pipelined central processing units. Memory and I/O systems. Parallel processors including shared-memory multiprocessors and cluster computers. Credit is not allowed for both CS 4290 and any of the following courses: CS 6290, ECE 4100, ECE 6100.

CS 4320. Software Processes. 3 Credit Hours.
The course will provide students with an overall context in which software systems are developed from the viewpoint of processes that support development. Software engineering is described as the set of activities developers engage in to create high-quality products within schedule and budget constraints.

CS 4330. Software Applications. 3 Credit Hours.
Software engineering methods specific to classes of applications or systems, including information systems and embedded, real-time systems.

CS 4342. Software Generation. 3 Credit Hours.
Methods and principles for program generation, testing, and managing the evolution of software systems.

CS 4365. Intro Enterprise Comp. 3 Credit Hours.
A survey of basic software tools and techniques used in mission-critical systems and applications, combined with in-depth study of fundamental principles underlying enterprise computing. Credit not allowed for both 4365 and CS 6365.

CS 4392. Programming Languages. 3 Credit Hours.
CS 4400. Intr to Database Systems. 3 Credit Hours.
Comprehensive coverage of mainstream database concepts such as the entity-relationship model, relational databases, query languages, and database design methodology. Includes a project. Credit not allowed for both CS 4400 and CS 6402.

CS 4420. Database Sys Implement. 3 Credit Hours.
Study of fundamental software components/algorithms of a database system, including the file manager, query engine, lock manager, and recovery manager. Includes a project component. Credit not allowed for both CS 4420 and CS 6422.

CS 4432. Information Systems Dsgn. 3 Credit Hours.
The analysis, design, and implementation of information systems. Topics include requirements analysis, design representations, implementation techniques, and evaluation of systems.

CS 4440. Database Technologies. 3 Credit Hours.
The course will cover current developments including distributed, object-oriented, temporal-spatial, Web-based, mobile, and active database technologies, and data warehousing and mining applications.

CS 4452. Human-Centered Computing. 3 Credit Hours.
Introduction to programming and human-centered principles of computing based on a communications and media computation context. Introduces user interface programming.
CS 4455. Video Game Design. 3 Credit Hours.
Techniques for electronic game design and programming, including graphics game engines, motion generation, behavioral control for autonomous characters, interaction structure, social and interface issues of multi-user play, and the business aspects of game development. Credit not allowed for both CS 4455 and CS 6457.

CS 4460. Intro Info Visualization. 3 Credit Hours.
Introduction to principles and techniques of information visualization, the presentation of primarily abstract data to help people understand, analyze and make sense of data. Students will not receive credit for both CS 4460 and CS 7450.

CS 4464. Computational Journalism. 3 Credit Hours.
A study of computational and technological advancements in journalism with emphasis on technologies for developing new tools and their potential impact on news and information. Credit not allowed for both CS 4464 and CS 6465.

CS 4470. User Interface Software. 3 Credit Hours.
Concepts, techniques, structures, and strategies for implementation of interactive software.

CS 4472. Design of Online Comm. 3 Credit Hours.
Introduction to the design of online communities. Students study an existing community in depth. Credit not allowed for both CS 4472 and CS 6470.

CS 4475. Comp Photography. 3 Credit Hours.
An introductory course on the scientific, technical, perceptual, and aesthetic principles of pictures. Emphasis is on the techniques of image formation, analysis, merging, modification and their use for depiction of reality on a 2D medium of photographs.

CS 4476. Intro to Computer Vision. 3 Credit Hours.
Introduction to computer vision including fundamentals of image formation, camera imaging geometry, feature detection and matching, stereo, motion estimation and tracking, image classification and scene understanding. Credit will not be awarded for both CS 4476 and CS 4495 or CS 6476.

CS 4480. Digital Video Special FX. 3 Credit Hours.
A study of digital multimedia and the analysis and synthesis of digital video. Special attention paid to techniques for generating video special effects.

CS 4495. Computer Vision. 3 Credit Hours.
An introduction to computer vision and machine perception. An intensive study of the process of generating a symbolic description of the scene by interpretation of images(s). Credit not awarded for both CS 4495 and CS 6476.

CS 4496. Computer Animation. 3 Credit Hours.
Motion techniques for computer animation and interactive games (keyframing, procedural methods, motion capture, and simulation) and principles for storytelling, composition, lighting, and interactivity.

CS 4510. Automata and Complexity. 3 Credit Hours.
Computational machine models and their language classes. Undecidability. Resource-bounded computations. Central complexity-theoretic concepts such as complexity classes, reducibility and completeness.

CS 4520. Approximation Algs. 3 Credit Hours.
Approximation algorithms for NP-hard optimization problems, design and analysis techniques for such algorithms. Credit not allowed for both CS 4520 and CS 7520.

CS 4530. Randomized Algs. 3 Credit Hours.
Efficient randomized algorithms with improved performance over deterministic algorithms, or for NP-hard optimization problems, design and analysis techniques for such algorithms. Credit not allowed for both CS 4530 and CS 7530.

CS 4540. Advanced Algs. 3 Credit Hours.
Advanced techniques for designing and analyzing efficient algorithms for combinatorial, algebraic, and number theoretic problems. Credit not allowed for both CS 4540 and CS 6550.

CS 4550. Scientific Visualization. 3 Credit Hours.
Foundations and algorithms underlying the development and application of tools for the efficient transmission, analysis, filtering, and visualization of large scientific data sets.

CS 4560. Verification of Systems. 3 Credit Hours.
Technique for verifying, validating and testing software and hardware systems. Topics covered will include modeling, abstraction methods, evaluation and certification, and computer-aided verification methods.

CS 4590. Computer Audio. 3 Credit Hours.
A well-rounded exploration of digital audio and its importance in current research and applications. Exposes students to the principles, technology, and current research of computer audio.

CS 4605. Mobile&Ubiquitous Comp. 3 Credit Hours.
Investigates the infrastructure required to develop mobile and ubiquitous computing applications and establishes major research themes and experimental practices.

CS 4611. AI Problem Solving. 3 Credit Hours.
Basic concepts and methods of AI problem solving, knowledge representation, reasoning, and learning.

CS 4613. Knowledge Systems Engr. 3 Credit Hours.
Techniques for constructing large knowledge-based systems. Advanced symbolic AI techniques. Constraint systems.

CS 4615. Knowledge-Based Modl&Dgn. 3 Credit Hours.
Information-processing theories of modeling and design; topics include design decision-making, problem-solving and learning, and knowledge-based modeling and design.

CS 4616. Pattern Recognition. 3 Credit Hours.
An introductory course on pattern classification and decision problems with applications to character recognition, image analysis, and speech recognition.

CS 4622. Case-Based Reasoning. 3 Credit Hours.
Based on human problem-solving, CBR has had many successes in industry and research. Topics include case representation, indexing and retrieval, similarity assessment, adaptation, learning. Credit not allowed for both CS 4622 and CS 7620.

CS 4625. Intel & Interactive Sys. 3 Credit Hours.
Explores how human-computer interaction and machine learning can interact to create personalized information environments. Emphasis on current research efforts from both fields.

CS 4632. Adv Intelligent Robotics. 3 Credit Hours.
Hands-on course in which students program autonomous mobile robots and solve complex tasks for robot teams.

CS 4635. Knowledge-Based AI. 3 Credit Hours.
Structured knowledge representation; knowledge-based methods of reasoning and learning; problem-solving, modeling and design.
CS 4641. Machine Learning. 3 Credit Hours.
Machine learning techniques and applications. Topics include foundational issues; inductive, analytical, numerical, and theoretical approaches; and real-world applications.

CS 4646. Mach Learn for Trading. 3 Credit Hours.
This course introduces students to the real world challenges of implementing machine learning based strategies including the algorithmic steps from information gathering to market orders.

CS 4649. Robot Intell Planning. 3 Credit Hours.
We investigate algorithms for robots and complex systems that make intelligent decisions. Emphasis on the theoretical and empirical properties of classical, geometric, stochastic/dynamic planning.

CS 4650. Natural Language. 3 Credit Hours.
Methodologies for designing systems that comprehend natural language. Topics include lexical analysis, parsing, interpretation of sentences, semantic representation, organization of knowledge, and inference mechanisms. Credit not allowed for both CS 4650 and CS 7650.

CS 4660. Educational Technology. 3 Credit Hours.
Introduction to the theory and practice of educational technology. Covers learning theory applicable to educational technology, explains major research findings.

CS 4665. Educ Tech: Dsgn & Eval. 3 Credit Hours.
Intensive project class in which students design, implement, and evaluate a piece of educational technology, applying the theory learned in Introduction to Educational Technology.

CS 4670. CSCL. 3 Credit Hours.
Research and practice in computer-supported collaborative learning. Review of existing systems and research, as well as evaluation and design methods.

CS 4675. Internet Sys & Services. 3 Credit Hours.
Focusing on fundamental issues, concepts, techniques, and technical challenges that are critical for designing and developing Internet systems, services and applications. Credit not allowed for both CS 4675 and CS 6675.

CS 4685. Pervasive Sys Networking. 3 Credit Hours.
In-depth study of systems and wireless networking issues in enabling pervasive computing environments and applications using a hand-on approach.

CS 4690. Empirical Methods in HCI. 3 Credit Hours.
Introduction to empirical methods for gathering requirements and evaluating the end-user and usability of software systems.

CS 4698. Research Assistantship. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

CS 4699. Undergraduate Research. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

CS 4710. CS for Bioinformatics. 4 Credit Hours.
Introduction to programming concepts and computing tools such as formal models and algorithms with applications from conceptual biology. May not be used by computer science majors for degree credit.

CS 4725. Info Security Policies. 3 Credit Hours.
Information security vulnerabilities and risks; legal, cost, privacy, and technology constraints; derivation of strategies; technical and procedural means of achieving desired results. Credit will not be awarded for both CS 4725 and CS 6725 or MGT 4725 or MGT 6726.

CS 4726. Privacy Tech Policy Law. 3 Credit Hours.
This course takes a multi-disciplinary approach to privacy, a topic of great interest in the technology, policy, ethics, law, and business realms. Credit will not be awarded for both CS 4726 and MGT 4726 or MGT 6726 or CS 6726.

CS 4731. Game AI. 3 Credit Hours.
Examines the expressive possibilities of artificial intelligence techniques in computer games. Students learn AI programming techniques, and how they strongly interface with game design.

CS 4741. Int Mgt Dev - Proj Prep. 3 Credit Hours.
Individual and group-based experiential learning activities to develop integrated human system management skills that prepare students for more successful capstone collaboration and learning. Credit not allowed for both CS 4741 and MGT 4741 or ME 4741.

CS 4742. Comp & Mgt Cap Proj. 4 Credit Hours.
Project-based course for students in Computing and Management minor to work in interdisciplinary teams on projects provided by corporate affiliates. Credit not allowed for both CS 4742 and MGT 4742 or ME 4742.

CS 4745. Info&Com Tech&Global Dev. 3 Credit Hours.
Focus on technology design, adoption, and use as seen through the lens of global development.

CS 4752. Phil Issues-Computation. 3 Credit Hours.
Metaphysical and epistemological issues in the foundations, methods, and implications of computing. Issues include: minds, brains, and machines; representation and language; simulating nature. Crosslisted with PST 4752.

CS 4770. Mixed Reality Design. 3 Credit Hours.
Focuses on informal design, integration of media theory, HCI and technology issues. Significant group design projects.

CS 4791. Integrative Proj-Cog Sci. 3 Credit Hours.
An integrative course in cognitive science focusing on the integration and use of concepts and skills from cognitive science. A different integrative project or set of projects will be taken on each semester; students will contribute on the basis of their background and skill. Crosslisted with PST, PSYC, and ISYE 4791.

CS 4792. Dsgn Proj-Cognitive Sci. 3 Credit Hours.
Individual project with a cognitive science faculty member, designed as a supplement to the student's senior design project or thesis in their major area. Crosslisted with PST, PSYC, and ISYE 4792.

CS 4793. Perspectives-Cog Science. 3 Credit Hours.
An integrative course in cognitive science which uses a focus topic to deepen interdisciplinary perspective and develop cognitive science knowledge and skills.

CS 4801. Special Topics. 1 Credit Hour.
Courses of timely interest to the profession, conducted by resident or visiting faculty.

CS 4802. Special Topics. 2 Credit Hours.
Courses of timely interest to the profession, conducted by resident or visiting faculty.

CS 4803. Special Topics. 3 Credit Hours.
Courses of timely interest to the profession, conducted by resident or visiting faculty.

CS 4804. Special Topics. 4 Credit Hours.
Courses of timely interest to the profession, conducted by resident or visiting faculty.
CS 4805. Special Topics. 5 Credit Hours.
Courses of timely interest to the profession, conducted by resident or visiting faculty.

CS 4853. Special Topics. 3 Credit Hours.
Special Topics in CS (lecture and supervised lab)

CS 4893. Special Topics. 3 Credit Hours.
Special Topics for CS (lecture + lab)

CS 4901. Spec Prob-Computer Sci. 1-21 Credit Hours.
An investigation of significant areas of information in computer science. Guided study and research.

CS 4902. Spec Prob-Computer Sci. 1-21 Credit Hours.
An investigation of significant areas of information and computer science. Guided study and research.

CS 4903. Spec Prob-Computer Sci. 1-21 Credit Hours.
An investigation of significant areas of information and computer science. Guided study and research.

CS 4911. Design Capstone Project. 1-21 Credit Hours.
Team-based capstone experience allowing students to analyze a problem for a customer and manage the solution development through the full project life cycle.

CS 4912. Design Capstone Project. 3 Credit Hours.
Team-based capstone experience allowing students to analyze a problem for a customer and manage the solution development through the full project life cycle.

CS 4980. Research Capstone Proj. 1-21 Credit Hours.

CS 4XXX. Computer Sci Elective. 1-21 Credit Hours.

CS 6010. Principles of Design. 3 Credit Hours.
This is an interactive hands-on course that will teach students the principles of design at the individual level.

CS 6035. Intro To Info Security. 3 Credit Hours.
A broad spectrum of information security: threats, basic cryptography, software vulnerabilities, programming for malicious operating system protections, network security, privacy, data mining, computer crime.

CS 6150. Computing For Good. 3 Credit Hours.
Exploring challenges faced by underserved populations and developing countries from a computing perspective.

CS 6200. Graduate Intro to OS. 3 Credit Hours.
This course teaches operating system abstractions, mechanisms, and their implementations, including for concurrency (threads) and synchronization, resource management (CPU, memory, I/O), and distributed services.

CS 6210. Adv Operating Systems. 3 Credit Hours.
Introduction to graduate-level topics in operating systems using research papers, textbook excerpts, and projects. Provides students thorough comprehension of distributed and parallel computer systems.

CS 6220. Big Data Sys & Analytics. 3 Credit Hours.
This course will cover the concepts, techniques, algorithms, and systems of big data systems and data analytics, with strong emphasis on big data processing systems, fundamental models and optimizations for data analytics and machine learning, which are widely deployed in real-world big data analytics and applications.

CS 6230. High Perf Parallel Comp. 3 Credit Hours.
Introduction to MIMD parallel computation, using textbook excerpts, research papers, and projects on multiple parallel machines. Emphasizes practical issues in high-performance computing.

CS 6235. Real-Time Systems. 3 Credit Hours.
Principles of real-time systems, as occurring in robotics and manufacturing, interactive, and multimedia applications. Reviews and uses real-time operating systems.

CS 6238. Secure Computer Systems. 3 Credit Hours.
Design principles of secure systems, authentication, access control and authorization, discretionary and mandatory security policies, secure kernel design, and secure databases.

CS 6241. Compiler Design. 3 Credit Hours.
Design and implementation of modern compilers, focusing upon optimization and code generation.

CS 6245. Parallelizing Compilers. 3 Credit Hours.
Design and implementation of compilers for parallel and distributed computers, focusing upon optimization and code generation.

CS 6246. Object-Oriented Systems. 3 Credit Hours.
Design and implementation of object-oriented systems. Aspect-oriented programming, type systems, OOP language implementation (virtual dispatch, GC), OOP language design (genericity, reflection, mixins).

CS 6250. Computer Networks. 3 Credit Hours.
Principles and practice of computer networks, including signaling and framing, error control, medium access, routing, congestion control, end-to-end transport, and network APIs.

CS 6255. Network Management. 3 Credit Hours.
Focus on network, system, and applications management. Principles and practice of various network management standards will be presented. Course includes project assignment.

CS 6260. Applied Cryptography. 3 Credit Hours.
Cryptographic algorithms, cryptanalysis, symmetric cryptography, public key cryptography, DES, AES, RSA, hash and MAC functions, digital signatures, pseudo-random generators, cryptographic protocols, SSL/TLS, SET. Credit not allowed for both CS 6260 and ECE 6280.

CS 6262. Network Security. 3 Credit Hours.
Design principles of secure network protocols and systems, authentication, integrity, confidentiality, privacy, information hiding, digital watermarking, access control, firewall, intrusion detection, and case studies.

CS 6263. Intro Cyber Phys Sys Sec. 3 Credit Hours.
This course provides an introduction to security issues relating to various cyber-physical systems including industrial control systems and those considered critical infrastructure systems.

CS 6265. Information Security Lab. 3 Credit Hours.
Computer systems and network vulnerabilities, information warfare, network and operating system security techniques, security analysis tools.

CS 6266. Info Security Practicum. 5 Credit Hours.
Capstone independent study placing each student in a commercial, industrial, academic, or government setting where they must solve real-world security problems.

CS 6269. Formal Info Assur Model. 3 Credit Hours.
Logical foundations of high-assurance systems, formal models for access control, authentication, and trust; techniques for constructing high-assurance systems.

CS 6280. Eval Communication Nets. 3 Credit Hours.
Methods for evaluating the performance of communication networks with emphasis on modeling, mathematical analysis, computer simulation, and measurement.
CS 6290. High Perform Comput Arch. 3 Credit Hours.
Topics concerning very high-performance computers including techniques exploiting parallelism in single and multiple processor systems. Credit not allowed for both CS 6290 and any of the following courses: CS 4290, ECE 4100, ECE 6100.

CS 6291. Embedded Software Opt.. 3 Credit Hours.
First, this course introduces the student to embedded domain-specific processor and instruction set design issues. Next, machine-specific optimizations for performance and for energy consumption are discussed.

CS 6300. Software Dev Process. 3 Credit Hours.
The process of developing software systems. Includes development and assessment of processes, their instantiation in actual product development, and techniques ensuring quality of developed products.

CS 6301. Adv Software Engineering. 3 Credit Hours.
This project-based course will cover fundamental principles, advanced techniques, and tools for the development of high-quality, industrial-strength software.

CS 6310. Software Arch & Design. 3 Credit Hours.
Principles and concepts involved in the design and analysis of large software systems.

CS 6320. Requirements Analysis. 3 Credit Hours.
Methods and principles for determining, documenting, analyzing, and formally specifying requirements for software systems.

CS 6330. Software Generation&Test. 3 Credit Hours.
Introduction to methods and principles for programming, testing, and managing the evolution of software systems.

CS 6340. Software Analysis & Test. 3 Credit Hours.
Fundamental principles and advanced techniques for static and dynamic program analysis and software testing. Software reliability, resilience, and trustworthiness.

CS 6365. Intro Enterprise Comput.. 3 Credit Hours.
Survey of basic software concepts and techniques used in mission-critical systems and applications, combined with in-depth study of fundamental principles underlying enterprise computing. Credit not allowed for both CS 6365 and CS 4365.

CS 6390. Programming Languages. 3 Credit Hours.
Design, structure, and goals of programming languages. Object-oriented, logic, functional, and traditional languages. Semantic models. Parallel programming languages.

CS 6400. DB Sys Concepts&Design. 3 Credit Hours.
Study of fundamental concepts with regard to relational databases. Topics covered include database design, query processing, concurrency control, and recovery. Credit not given for both CS 6400 and CS 6754.

CS 6402. Databases and Infosec. 3 Credit Hours.
Fundamentals of designing and using databases: conceptual data models to database-specific models, SQL, storage structures. Security-related topics include privacy, access control, backup, recovery, SQL injection. Credit not allowed for both CS 6402 and CS 4400.

CS 6411. O-O Database Model & Sys. 3 Credit Hours.
Study of advanced database concepts as they apply to object-oriented database systems. Topics include semantic data models, object-oriented query languages, tools, and applications.

CS 6421. Tempor, Spatial&Active DB. 3 Credit Hours.
Study of advanced database concepts for temporal databases with emphasis on storage structure, processing and query languages, as well as active database concepts and implementation.

CS 6422. Database System Implemnt. 3 Credit Hours.
Design and implementation of a database system covering: storage manager, query optimizer, transaction manager, and recovery manager. Study of the advantages of different implementation algorithms. Credit not allowed for both CS 6422 and CS 4420.

CS 6430. Parallel&Distributed DB. 3 Credit Hours.
Study of algorithms and performance in advanced databases. Systems include parallel, distributed, and client-server databases. Applications include data mining and on-line analytical processing.

CS 6440. Intro Health Informatics. 3 Credit Hours.
A broad review of the US health system and the application of informatics to the clinical practice of medicine, digital imaging, public health and bioinformatics.

CS 6451. Human-Centered Computing. 3 Credit Hours.
Introduction to the range of issues across the HCC disciplines, including design and research methodologies: cognitive, social, and cultural theories; assessment and evaluation: ethical issues.

CS 6452. Prototyping Interact Sys. 3 Credit Hours.
Introduction to design, prototyping and implementation of systems for human-centered computing. Focuses on core concepts in computer science and implications for interactive systems.

CS 6455. User Interface Dsgn&Eval. 3 Credit Hours.
Examines usability in the software development process with an emphasis on usability, requirements, methodology, design, and evaluation.

CS 6456. Principles-UI Software. 3 Credit Hours.
Considers the architectural and algorithmic principles behind the implementation of interactive software systems and the tools that support them.

CS 6457. Video Game Design. 3 Credit Hours.
Techniques for electronic game design and programming, including graphics, game engines, animation, behavioral control for autonomous characters, interaction, social and interface issues of multi-user play. Credit not allowed for both CS 6457 and CS 4455.

CS 6460. Educ Tech-Foundations. 3 Credit Hours.
Introduction to educational technology, with an emphasis on theoretical foundations. Introduces basic philosophies, approaches, and technologies. Analyzes issues surrounding technology's impact on education.

CS 6461. Computing Ed Research. 3 Credit Hours.
Introduction to computing education research (CER). History and influential early work. Learning goals for different populations. Design of research studies in CER.

CS 6465. Computational Journalism. 3 Credit Hours.
Technology is rapidly affecting how news information is gathered, reported, visualized, aggregated, summarized, distributed, and consumed. This class studies the computational technologies that impact journalism. Credit not allowed for both CS 6465 and CS 4464.

CS 6470. Online Communities. 3 Credit Hours.
Introduction to the design of online communities. Students study an existing community in depth, and then develop a new community design. Credit not allowed for both CS 6470 and CS 4472.

CS 6471. Comp Social Science. 3 Credit Hours.
This graduate seminar focuses on text and network analysis of data with applications to domains such as political science, sociolinguistics, and public health.
CS 6474. Social Computing. 3 Credit Hours.
Design and prototype new social computing systems, as well as analyze social media data.

CS 6475. Comp. Photography. 3 Credit Hours.
This class explores the impact of computation on the entire workflow of photography, from how light is captured by a camera, to how the images are processed, enhanced, and improved to generate novel photographs.

CS 6476. Computer Vision. 3 Credit Hours.
Introduction to computer vision including fundamentals of image formation, camera imaging geometry, feature detection and matching, stereo, motion estimation and tracking, image classification and scene understanding. Credit not awarded for both CS 6476 and CS 4495 or CS 4476.

CS 6480. Comp Visualiz Techniques. 3 Credit Hours.
Principles, techniques, and practice in data, information, multivariate, and scientific visualization. Includes visualization methods, data structures, examples, and tools.

CS 6485. Visual Meth-Sci & Engr. 3 Credit Hours.
Algorithms, software, and practical applications of visualization techniques in science, engineering, business, and medicine. Includes data structures, multivariate visualization, interactive visualization, and visual representations and examples. Computer science students cannot receive credit for this course.

CS 6491. Computer Graphics. 3 Credit Hours.
Mathematical/physical/perceptual principles and modeling/rendering techniques used to create, represent, display, and animate models of 3D shapes and their properties.

CS 6505. Computability&Algorithms. 3 Credit Hours.
Important concepts from computability theory; techniques for designing algorithms for combinatorial, algebraic, and number-theoretic problems; basic concepts such as NP-Completeness from computational complexity theory.

CS 6520. Computational Complexity. 3 Credit Hours.
Introduction to resource-bounded computations, central complexity-theoretic concepts such as complexity classes, reducibility, completeness, and intractability.

CS 6550. Design& Analy-Algorithms. 3 Credit Hours.
Advanced techniques for designing and analyzing efficient algorithms for combinatorial, algebraic, and number-theoretic problems. Credit not allowed for both CS 6550 and CS 4540.

CS 6601. Artificial Intelligence. 3 Credit Hours.
Basic concepts and methods of artificial intelligence including both symbolic/conceptual and numerical/probabilistic techniques.

CS 6670. Distrib Cntrl Algorithms. 3 Credit Hours.
Algorithms for synchronous, asynchronous, and partially synchronous networks; analysis, control, and implementation of distributed systems such as robot fleets, animal groups.

CS 6675. Advance Internet Comput. 3 Credit Hours.
Survey of basic Internet computing concepts and techniques used in Internet systems and applications, combined with in-depth study of fundamental principles underlying Internet computing. Credit not allowed for both CS 6675 and CS 4675.

CS 6705. Applications of AI. 3 Credit Hours.
A study of the principles and practice of artificial intelligence in areas other than computer science, with particular focus on engineering, science, and business applications. Computer science majors cannot receive credit for this course.

CS 6725. Info Security Policies. 3 Credit Hours.
Information security vulnerabilities and risks; legal, cost, privacy, and technology constraints; derivation of strategies; technical and procedural means of achieving desired ends.

CS 6726. Privacy Tech Policy Law. 3 Credit Hours.
This course takes a multi-disciplinary approach to privacy, a topic of great interest in the technology, policy, ethics, law, and business realms. Credit will not be awarded for both CS 6726 and CS 4725 or MGT 4726.

CS 6745. Info&Com Tech&Global Dev. 3 Credit Hours.
Focus on technology design, adoption, and use as seen through the lens of global development.

CS 6750. Human-Computer Interact. 3 Credit Hours.
Describes the characteristics of interaction between humans and computers and demonstrates techniques for the evaluation of user-centered systems. Crosslisted with PSYC 6750.

CS 6753. HCI Prof Prep & Practice. 1 Credit Hour.
Preparation for a professional career in HCI. Speakers. Atlanta-area lab visits. Career trajectories. Project presentations. Technical, resume and interviewing skills. Credit not allowed for both CS 6753 and PSYC 6753 or LCC 6753.

CS 6754. Engr Database Mgt System. 3 Credit Hours.
Modeling and managing engineering information systems, integration of design and manufacturing functions in engineering product development, logical models of engineering product and processes. Credit not given for CS 6400 and CS 6754. Crosslisted with ME 6754.

CS 6755. HCI Foundations. 3 Credit Hours.
Describes the theory and practice of designing effective and efficient interactions between people and technology. Students do not receive credit for both CS 6755 and PSYC 6755.

CS 6763. Design of Environments. 3 Credit Hours.
Analysis of design processes; analysis of current design tools at both the user interface and functional levels; procedures for developing better design tools. Credit not allowed for both CS 6763 and ID 6763 or COA 6763.

CS 6764. Geometric Modeling. 3 Credit Hours.
Software development course focusing on 3D geometric constructions and modeling; emphasizes solid modeling and its role in design. Crosslisted with COA 6764.

CS 6770. Mixed Reality Design. 3 Credit Hours.
Introduction to the design of Mixed Reality experiences. Focuses on informal design, integration of media theory, HCI and technology issues. Significant group design projects.

CS 6780. Medical Image Processing. 3 Credit Hours.
A study of methods for enhancing, analyzing, interpreting, and visualizing information from two- and three-dimensional data obtained from a variety of medical image modalities. Crosslisted with ECE and BMED 6780.

CS 6795.Intro-Cognitive Science. 3 Credit Hours.
Multidisciplinary perspectives on cognitive science. Interdisciplinary approaches to issues in cognition, including memory, language, problem solving, learning, perception, and action. Crosslisted with ISYE and PSYC 6795.

CS 6998. HCI Master's Project. 1-9 Credit Hours.
Final project for students completing a master's degree in the College of Computing. Repeatable for multi-semester projects.
CS 6XXX. Computer Sci Elective. 1-21 Credit Hours.

CS 7000. Master's Thesis. 1-21 Credit Hours.

CS 7001. Grad Studies-Computing. 5 Credit Hours.
Research tools including computer systems, as well as fundamental problem-solving skills, are introduced. Lectures on current computing research are presented and projects are required. Credit not allowed in a program of study for a graduate degree.

CS 7110. Parallel Computer Arch. 3 Credit Hours.
Issues in the design, implementation, and programming of parallel machines. Credit not allowed for both CS 7110 and CS 4233.

CS 7210. Distributed Computing. 3 Credit Hours.
Fundamental concepts in distributed systems, including global states, logical clocks, and failure models. Distributed algorithms and their implementations using advanced distributed programming systems.

CS 7230. Software Dsgn,Impl& Eval. 3 Credit Hours.
Design, implementation, and evaluation of systems software. Distributed/parallel applications will be constructed and evaluated using the systems support that is developed.

CS 7250. Broadband Networking Sys. 3 Credit Hours.
Focus on the data link layer and its relationship to layers below and above. Gigabit Ethernet, SONTET, fibre channel; media including wireless, satellite, xDSL, cable.

CS 7260. Internet Arch & Protocols. 3 Credit Hours.
Detailed discussion of the problems and solution techniques that arise in internetworking. Topics include routing, addressing, quality of service, and security.

CS 7270. Networked Apps & Services. 3 Credit Hours.
End-to-end functional building blocks and their use in adaptive and non-adaptive applications, including multimedia: coding, compression, security, directory services.

CS 7280. Network Science. 3 Credit Hours.
Characteristics of real networks in nature and technology, network measurement methods, network analysis, evolving networks, dynamic network processes, co-evolution of structure and function.

CS 7290. Adv Microarchitecture. 3 Credit Hours.
Low-level organization and hardware algorithms for the implementation of modern high-performance microprocessors including concept designs and real-world case studies.

CS 7292. Reliable Secure Comarch. 3 Credit Hours.
Hardware support for process isolation, virtualization, debugging, and protection from side-channel attacks. Faults and failures, error tolerance, error rate budgeting, lifetime realiability of devices.

CS 7450. Inform Visualization. 3 Credit Hours.
Study of computer visualization principles, techniques, and tools used for explaining and understanding symbolic, structured, and/or hierarchical information. Includes data and software visualization. Students cannot receive credit for both CS 7450 and CS 4460.

CS 7455. Issues/Human-Center Comp. 3 Credit Hours.
In-depth focus on theoretical, methodological, conceptual, and technical issues across the HCC disciplines associated with humans (cognitive, biological, socio-cultural); design; ethics; and analysis and evaluation.

CS 7460. Collaborative Computing. 3 Credit Hours.
Introduction to computer-supported collaborative work, workflow automation, and meeting augmentation. The course deals with models, enabling technology, systems, and applications.

CS 7465. Edu Tech-Design and Eval. 3 Credit Hours.
Intensive project class in which students design, implement, and evaluate a piece of educational technology, applying the theory learned in Educational Technology: Conceptual Foundations.

CS 7467. Comp Collaborative Learn. 3 Credit Hours.
Computer-supported collaborative learning is the use of Internet-based technologies to support learning in social settings. Focus on issues of implementation and evaluation.

CS 7470. Ubiquitous Computing. 3 Credit Hours.
Investigates the infrastructure required to develop mobile and ubiquitous computing applications and establishes major research themes and experimental practices.

CS 7475. Adv Computer Vision. 3 Credit Hours.
Advanced topics in computer vision, which includes a deep dive into both the theoretical foundations of computer vision to the practical issues of building real systems that use computer vision. Credit will not be awarded for both CS 7475 and CS 7495.

CS 7490. Adv Image Synthesis. 3 Credit Hours.
Advanced techniques in realistic image synthesis based on the physics of light. Anti-aliasing, textures, surface reflectance, distribution ray tracing, volume rendering, radiosity, and image-based rendering.

CS 7491. 3D Complexity. 3 Credit Hours.
Multiresolution, compression, collision, morphing, visibility, and computational geometry techniques for accessing, rendering, and animating complex 3D models in engineering, scientific, business, or entertainment applications.

CS 7492. Simulation of Biology. 3 Credit Hours.
Study different computer simulation methods for use in investigating biological systems, including bio-molecules, cells and full organisms.

CS 7495. Computer Vision. 3 Credit Hours.
An introduction to computer vision and machine perception. An intensive study of the process of generating a symbolic description of the scene by interpretation of images(s). Credit will not be awarded for both CS 7495 and CS 7476.

CS 7496. Computer Animation. 3 Credit Hours.
Motion techniques for computer animation and interactive games (keyframing, procedural methods, motion capture, and simulation) and principles for storytelling, composition, lighting, and interactivity.

CS 7497. Virtual Environments. 3 Credit Hours.
An introduction to virtual reality and virtual environments. Issues covered will include VR technology, software design, 3D human-computer interaction, and applications for VR.

CS 7499. 3D Reconstruction. 3 Credit Hours.
In this course we study the principles and algorithms underlying 3D Reconstruction and Mapping in Computer Vision, Robotics, and Augmented Reality.

CS 7510. Graph Algorithm. 3 Credit Hours.
Algorithms for graph problems such as maximum flow, matching, network reliability, minimum cuts, covering, coloring, planarity, shortest paths, and connectivity. Crosslisted with MATH 7510 and ISYE 7510.

CS 7520. Approximation Algorithms. 3 Credit Hours.
Approximation algorithms for NP-hard optimization problems, design and analysis techniques for such algorithms. Credit not allowed for both CS 7520 and CS 4520.
CS 7525. Algorithmic Game Theory. 3 Credit Hours.
Algorithmic aspects of game theory covering topics at the intersection of computer science, economics, and game theory with applications to domains such as internet.

CS 7530. Randomized Algorithms. 3 Credit Hours.
Techniques for designing and analyzing randomized algorithms, derandomization techniques. Credit not allowed for both CS 7530 and CS 4530.

CS 7535. Markov Chain Monte Carlo. 3 Credit Hours.
This course studies Markov Chain Monte Carlo algorithms, widely-used in a variety of scientific fields, focusing on mathematical techniques for analyzing their convergence rates.

CS 7540. Spectral Algorithms. 3 Credit Hours.
Spectral methods mathematics and algorithmic insights driving applications with large data sets in domains such as web-search, information-retrieval, and medical diagnosis and prediction.

CS 7545. Machine Learning Theory. 3 Credit Hours.
This course provides a basic arsenal of powerful mathematical tools for the analysis of learning algorithms, focusing on both statistical and computational aspects.

CS 7560. Theory of Cryptography. 3 Credit Hours.
One-way functions, pseudorandomness, public-key and identity-based cryptography, commitment and zero knowledge.

CS 7610. Modeling and Design. 3 Credit Hours.
Information-processing theories of modeling and design; topics include design decision making, problem solving and learning, and knowledge-based modeling and design.

CS 7611. AI Problem Solving. 3 Credit Hours.
Basic concepts and methods of AI problem solving, knowledge representation, reasoning, and learning.

CS 7612. AI Planning. 3 Credit Hours.
Symbolic numerical techniques that allow intelligent systems to decide how they should act in order to achieve their goals, including action and plan representation, plan synthesis and reasoning, analysis of planning algorithms, plan execution and monitoring, plan reuse and learning, and applications.

CS 7613. Knowledge Systems Engr. 3 Credit Hours.
Techniques for constructing large knowledge-based systems. Advanced symbolic AI techniques. Constraint systems.

CS 7615. Knowledge Agents. 3 Credit Hours.
Knowledge-based interactive systems, knowledge-based autonomous agents, agent architectures, learning and adaptation, agent evolution.

CS 7616. Pattern Recognition. 3 Credit Hours.
This course provides an introduction to the theory and practice of pattern recognition. It emphasizes unifying concepts and the analysis of real-world datasets.

CS 7620. Case-Based Reasoning. 3 Credit Hours.
Topics include case representation, indexing and retrieval, adaptation, interpretive CBR, the cognitive model that CBR implies, and its implications for creativity, decision aiding, and education. Credit not allowed for both CS 7620 and CS 4622.

CS 7626. Behavioral Imaging. 3 Credit Hours.
An introduction to the use of sensor data and machine learning methods to measure and model human behavior objectively and automatically for health applications.

CS 7630. Autonomous Robotics. 3 Credit Hours.
The principles and practice of autonomous robotics including behavior-based design and architectures, adaptive learning and team behavior, and the role of perception within robotic systems.

CS 7631. Multi-Robot Systems. 3 Credit Hours.
In-depth examination of the current research on multi-robot systems. Students develop and critically analyze a multi-robot system.

CS 7632. Game AI. 3 Credit Hours.
An exploration of how artificial intelligence is used in modern digital computer games. Credit will not be awarded for CS 7632 and CS 4731, CS 7632 and LCC 4731 or CS 7632 and LMC 4731.

CS 7633. Human-Robot Interaction. 3 Credit Hours.
Survey of the state of the art in HRI research, introduction to statistical methods for HRI research, research project studio.

CS 7634. AI Storytell In Vir Wrld. 3 Credit Hours.
An exploration of how artificial intelligence can enable us to use stories in virtual worlds for the purpose of entertaining, educating, and training human users.

CS 7636. Computational Perception. 3 Credit Hours.
Study of statistical and algorithmic methods for sensing people using video and audio. Topics include face detection and recognition, figure tracking, and audio-visual sensing.

CS 7637. Knowledge-Based AI. 3 Credit Hours.
Structured knowledge representation; knowledge-based methods of reasoning and learning; problem-solving, modeling and design.

CS 7640. Learning in Auton Agents. 3 Credit Hours.
An in-depth look at agents that learn, including intelligent systems, robots, and humans. Design and implementation of computer models of learning and adaptation in autonomous intelligent agents.

CS 7641. Machine Learning. 3 Credit Hours.
Machine learning techniques and applications. Topics include foundational issues; inductive, analytical, numerical, and theoretical approaches; and real-world applications.

CS 7642. Reinforcement Learning. 3 Credit Hours.
Efficient algorithms for multiagent planning, and approaches to learning near-optimal decisions using possibly partially observable Markov decision processes; stochastic and repeated games; and reinforcement learning.

CS 7643. Deep Learning. 3 Credit Hours.
This course will cover theory and practice of deep learning, including neural network and structured models, optimization algorithms, and applications to perception and Artificial Intelligence.

CS 7645. Num Machine Learning. 3 Credit Hours.
This course explores problems in classification/pattern recognition (OCR, speech, vision, fault detection, medical diagnosis), regression/function approximation, robot control, and reinforcement learning.

CS 7646. Mach Learn For Trading. 3 Credit Hours.
Introduces machine learning based trading strategies. Topics: Information processing, probabilistic analysis, portfolio construction, generation of market orders, KNN, random forests.

CS 7649. Robot Intelli: Planning. 3 Credit Hours.
We investigate algorithms for robots and complex systems that make intelligent decisions. Emphasis on the theoretical and empirical properties of classical, geometric, stochastic/dynamic planning.
CS 7650. Natural Language. 3 Credit Hours.
Topics include lexical analysis, parsing, interpretation of sentences, semantic representation, organization of knowledge, inference mechanisms. Newer approaches combining statistical language processing and information retrieval techniques. Credit not allowed for both CS 7650 and CS 4650.

CS 7695. Phil of Cognition. 3 Credit Hours.
Examines problems in the foundations of cognition in relation to current issues in cognitive sciences. Topics include meaning, mental imagery, consciousness, and mind/body problem.

CS 7697. Cognitive Model Sci&Tech. 3 Credit Hours.
Examines how models of reasoning and representation developed in the cognitive sciences can provide a basis for an enriched understanding of scientific theories and research practices in science and technology.

CS 7785. Intro Robotics Research. 3 Credit Hours.
Familiarizes students with the core areas of robotics; mechanics, control, perception, AI, and autonomy. Provides an introduction to the mathematical tools required in robotics research.

CS 7790. Cognitive Modeling. 4 Credit Hours.
A hands-on course covering a range of cognitive modeling methodologies. It explores the analysis, development, construction, and evaluation of models of cognitive processing. Crosslisted with ISYE and PSYC 7790.

CS 7999. Prep-Doctoral Qual Exams. 1-21 Credit Hours.
Consent of the College required.

CS 8001. Seminar. 1 Credit Hour.
Group discussion of advanced topics in information and computer science. May not be used by computer science majors for degree credit.

CS 8002. Seminar. 2 Credit Hours.
Group discussion of advanced topics in information and computer science. May not be used by computer science majors for degree credit.

CS 8003. Seminar. 3 Credit Hours.
Group discussion of advanced topics in information and computer science. May not be used by computer science majors for degree credit.

CS 8004. Seminar. 4 Credit Hours.
Group discussion of advanced topics in information and computer science. May not be used by computer science majors for degree credit.

CS 8005. Seminar. 5 Credit Hours.
Group discussion of advanced topics in information and computer science. May not be used by computer science majors for degree credit.

CS 8006. Seminar. 6 Credit Hours.
Group discussion of advanced topics in information and computer science. May not be used by computer science majors for degree credit.

CS 8030. Software Engr Seminar. 1 Credit Hour.
This seminar provides students with an opportunity to explore contemporary topics in software engineering.

CS 8750. Robotics Research Fnd I. 3 Credit Hours.
Multidisciplinary research course supervised by two robotics faculty from different schools participating in the robotics Ph.D. program.

CS 8751. Robotics Research Fnd II. 3 Credit Hours.
Continuation of AE 8751 (Robotics Research Foundation I).

CS 8795. Colloquium-Cognitive Sci. 1 Credit Hour.
Reading of research papers by leading cognitive scientists, attendance at their colloquia and meeting with them to discuss research. Crosslisted with ISYE and PSYC 8795.

CS 8801. Special Topics. 1 Credit Hour.
Special topics of current interest. Treatment of new developments in various areas of computing.

CS 8802. Special Topics. 2 Credit Hours.
Special topics of current interest. Treatment of new developments in various areas of computing.

CS 8803. Special Topics. 3 Credit Hours.
Special topics of current interest. Treatment of new developments in various areas of computing.

CS 8804. Special Topics. 4 Credit Hours.
Special topics of current interest. Treatment of new developments in various areas of computing.

CS 8805. Special Topics. 5 Credit Hours.
Special topics of current interest. Treatment of new developments in various areas of computing.

CS 8806. Special Topics. 6 Credit Hours.
Special topics of current interest. Treatment of new developments in various areas of computing.

CS 8893. Spec Top-Cognitive Sci. 3 Credit Hours.
Topics of current interest in cognitive science.

CS 8901. Special Problems. 1-21 Credit Hours.
Small-group or individual investigation of advanced topics in computing. Guided study and research.

CS 8902. Special Problems. 1-21 Credit Hours.
Small-group or individual investigation of advanced topics in computing. Guided study and research.

CS 8903. Special Problems. 1-21 Credit Hours.
Small-group or individual investigation of advanced topics in computing. Guided study and research.

CS 8997. Teaching Assistantship. 1-6 Credit Hours.
For graduate students holding graduate teaching assistantships.

CS 8998. Research Assistantship. 1-6 Credit Hours.
For graduate students holding graduate research assistantships.

CS 8999. Doctoral Thesis Prep. 1-21 Credit Hours.

CS 9000. Doctoral Thesis. 1-21 Credit Hours.

## Cooperative Work Assignment (COOP)

COOP 2000. Co-op Work Assignment. 12 Credit Hours.

COOP 2001. Spring Co-op Assignment. 12 Credit Hours.

COOP 2005. Summer Co-op Assignment. 12 Credit Hours.

COOP 2008. Fall Co-op Assignment. 12 Credit Hours.

COOP 3011. Int'l Co-op. 12 Credit Hours.
Undergraduate Co-op students working outside the United States.

COOP 3015. Mod Language Int'l Co-op. 12 Credit Hours.

COOP 3018. Mod Language Int'l Co-op. 12 Credit Hours.

COOP 3020. Co-op Work Assignment. 6 Credit Hours.
For undergraduate Co-op students majoring in Building Construction.

COOP 3021. Spring Term BC Co-op. 6 Credit Hours.
Spring Term work term for Building Construction majors.

COOP 3028. Fall Term BC Co-op. 6 Credit Hours.
Fall Term work term for Building Construction majors.
COOP 4000. Co-op Work Assignment. 12 Credit Hours.
Co-op Work Assignment For students on Co-op work assignment.

COOP 4001. Spring Co-op Assignment. 12 Credit Hours.

COOP 4005. Summer Co-op Assignment. 12 Credit Hours.

COOP 4008. Fall Co-op Assignment. 12 Credit Hours.

COOP 6003. Co-op Work Assignment. 3 Credit Hours.
For students on Co-op work assignment.

COOP 6006. Co-op Work Assignment. 6 Credit Hours.
For students on Co-op work assignment.

COOP 6009. Co-op Work Assignment. 9 Credit Hours.
For students on Co-op work assignment.

COOP 6012. Co-op Work Assignment. 12 Credit Hours.
For students on Co-op work assignment.

Cross Enrollment (UCGA)

UCGA 1001. Cross Enroll-Agnes Scott. 1-21 Credit Hours.

UCGA 1002. Cross Enroll-Atl Col Art. 1-21 Credit Hours.

UCGA 1003. Cross Enroll-AU Clark. 1-21 Credit Hours.

UCGA 1004. Cross Enroll-AU Morehouse. 1-21 Credit Hours.

UCGA 1005. Cross Enrl-AU Morris Brn. 1-21 Credit Hours.

UCGA 1006. Cross Enroll-AU Spelman. 1-21 Credit Hours.

UCGA 1007. Cross Enroll-Clayton. 1-21 Credit Hours.

UCGA 1008. Cross Enrol-Columbia Sem. 1-21 Credit Hours.

UCGA 1009. Cross Enroll-Emory Univ. 1-21 Credit Hours.

UCGA 1010. Cross Enroll-Ga St Univ. 1-21 Credit Hours.

UCGA 1011. Cross Enroll-Kennesaw. 1-21 Credit Hours.

UCGA 1012. Cross Enroll-Mercer Univ. 1-21 Credit Hours.

UCGA 1013. Cross Enroll-Oglethorpe. 1-21 Credit Hours.

UCGA 1014. Cross Enrl-Southern Poly. 1-21 Credit Hours.

UCGA 1015. Cross Enroll-Univ of Ga. 1-21 Credit Hours.

UCGA 1017. Cross Enrol-West Georgia. 1-21 Credit Hours.


UCGA 2003. Cross Enroll-AU Clark. 1-21 Credit Hours.


UCGA 2006. Cross Enroll-AU Spelman. 1-21 Credit Hours.

UCGA 2007. Cross Enroll-Clayton. 1-21 Credit Hours.


UCGA 2009. Cross Enroll-Emory Univ. 1-21 Credit Hours.

UCGA 2010. Cross Enroll-Ga St Univ. 1-21 Credit Hours.

UCGA 2011. Cross Enroll-Kennesaw. 1-21 Credit Hours.

UCGA 2012. Cross Enroll-Mercer Univ. 1-21 Credit Hours.

UCGA 2013. Cross Enroll-Oglethorpe. 1-21 Credit Hours.

UCGA 2014. Cross Enrl-Southern Poly. 1-21 Credit Hours.

UCGA 2015. Cross Enroll-Univ of Ga. 1-21 Credit Hours.

UCGA 2017. Cross Enrol-West Georgia. 1-21 Credit Hours.

UCGA 2018. Cross Enroll - Brenau. 1-21 Credit Hours.

UCGA 2019. Cross Enroll-Sav Col Art. 1-21 Credit Hours.
CROSS ENROLL-SAVANNAH COLLEGE OF ART.

CROSS-ENROLL-GEORGIA GWINNETT COLLEGE.

UCGA 2110. Cross Enroll-GaGwinnett. 1-21 Credit Hours.
CROSS-ENROLL-GEORGIA GWINNETT COLLEGE.

UCGA 2210. Cross Enroll-GaSt Univ. 1-21 Credit Hours.

UCGA 2310. Cross Enroll-Ga St Univ. 1-21 Credit Hours.

UCGA 3001. Cross Enroll-Agnes Scott. 1-21 Credit Hours.

UCGA 3002. Cross Enroll-Atl Col Art. 1-21 Credit Hours.

UCGA 3003. Cross Enroll-AU Clark. 1-21 Credit Hours.

UCGA 3004. Cross Enroll-AU Morehouse. 1-21 Credit Hours.

UCGA 3005. Cross Enrl-AU Morris Brn. 1-21 Credit Hours.

UCGA 3006. Cross Enroll-AU Spelman. 1-21 Credit Hours.

UCGA 3007. Cross Enroll-Clayton. 1-21 Credit Hours.

UCGA 3008. Cross Enroll-Columbia Sem. 1-21 Credit Hours.

UCGA 3009. Cross Enroll-Emory Univ. 1-21 Credit Hours.

UCGA 3010. Cross Enroll-GaSt Univ. 1-21 Credit Hours.

UCGA 3011. Cross Enroll-Kennesaw. 1-21 Credit Hours.

UCGA 3012. Cross Enroll-Mercer Univ. 1-21 Credit Hours.

UCGA 3013. Cross Enroll-Oglethorpe. 1-21 Credit Hours.

UCGA 3014. Cross Enrl-Southern Poly. 1-21 Credit Hours.

UCGA 3015. Cross Enroll-Univ of Ga. 1-21 Credit Hours.

UCGA 3017. Cross Enrol-West Georgia. 1-21 Credit Hours.

UCGA 3018. Cross Enroll - Brenau. 1-21 Credit Hours.

UCGA 3019. Cross Enroll-Sav Col Art. 1-21 Credit Hours.
CROSS ENROLL-SAVANNAH COLLEGE OF ART.

UCGA 3021. Cross Enroll-GaGwinnett. 1-21 Credit Hours.
CROSS-ENROLL-GEORGIA GWINNETT COLLEGE.
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**Earth and Atmospheric Sciences (EAS)**

**EAS 1600. Intro-Environmental Sci.** 4 Credit Hours.
Introduction to environmental field science. Case study approach. Exposure to basic field equipment and techniques, analysis of data.

**EAS 1601. Habitable Planet.** 4 Credit Hours.
Introduction to the origin and evolution of Planet Earth, creation of the universe and the elements, early history of Earth, radioisotope geochemistry and the timing of events in the universe, the galaxy, and on Earth. Formation of the atmosphere and oceans. Climate.

**EAS 1XXX. Earth&Atmos Sci Elective.** 1-21 Credit Hours.

**EAS 2420. Environmental Measures.** 3 Credit Hours.
Identify and quantify nature's physical and chemical contributions to human-made urban environments, and measure the impacts of urban area feedback on these natural systems.

**EAS 2551. Intro Met Analysis.** 1 Credit Hour.
An introduction to analysis of forecasting data and model output.
EAS 2600. Earth Processes. 4 Credit Hours.
An introduction to earth materials and processes.

EAS 2602. Earth Through Time. 3 Credit Hours.
Dynamic processes affecting the Earth system on all time scales.

EAS 2655. Quantitative Techniques. 3 Credit Hours.
Integrated course in mathematical, physical, and computing techniques for applications in earth and atmospheric sciences.

EAS 2698. Research Assistantship. 1-12 Credit Hours.

EAS 2699. Undergraduate Research. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

EAS 2750. Physics of the Weather. 3 Credit Hours.
An introductory treatment of the application of the basic physical laws to the understanding of weather phenomena. Crosslisted with PHYS 2750.

EAS 2801. Special Topics. 1 Credit Hour.

EAS 2802. Special Topics. 2 Credit Hours.

EAS 2803. Special Topics. 3 Credit Hours.

EAS 2804. Special Topics. 4 Credit Hours.

EAS 2900. Special Problems. 1-21 Credit Hours.

EAS 2XXX. Earth&Atmos Sci Elective. 1-21 Credit Hours.

EAS 3110. Energy, Environ, Society. 3 Credit Hours.
This course analyzes the path towards alternative energy infrastructures for the 21st century with careful consideration of economic, environmental, technological, and political factors.

EAS 3603. Thermodynamics-Earth Sys. 3 Credit Hours.
Introduction to the principles of equilibrium thermodynamics and physical chemistry with applications to the atmosphere, ocean, and solid earth.

EAS 3610. Intro Geophysics. 3 Credit Hours.
An introduction to visualizing and understanding earth history, structure, and dynamics through geophysical methods including seismology, gravity, magnetism, heat flow, geochronology, and geodesy.

EAS 3620. Geochemistry. 4 Credit Hours.
A quantitative treatment of geochemical processes in the Earth and natural waters, with emphasis on chemical reactions among atmospheric gases, minerals, and aqueous solutions.

EAS 3XXX. Earth&Atmos Sci Elective. 1-21 Credit Hours.

EAS 4110. Resources, Energy&Environ. 3 Credit Hours.
Learn about the science behind the nature, occurrence and extraction of minerals, energy resources, and their environmental impacts.

EAS 4200. Structural Geology. 4 Credit Hours.
Structural geology and continuum mechanics for scientists and civil engineers. Stress and strain in rocks; faults, joints, and folds; basic field mapping; laboratory exercises.

EAS 4205. Geomorphology. 4 Credit Hours.
Overview of the mechanical, chemical, and biological processes that shape topography.

EAS 4220. Environ Geochemistry. 3 Credit Hours.
An exploration of the chemical, biological, and geological processes controlling the distribution of chemical nutrients and pollutants in aquatic and soil environments.

EAS 4221. Environ Geochemistry Lab. 1 Credit Hour.
Lab and field exploration of the chemical, biological, and geological processes controlling the distribution of chemical nutrients and pollutants in aquatic and soil environments.

EAS 4224. Mineral Surface Geochem. 3 Credit Hours.
Fundamental principles concerning mineral surface properties, element distribution at the mineral-water interface and analytical techniques relevant to interfacial reactions.

EAS 4300. Oceanography. 3 Credit Hours.

EAS 4305. Phys & Chem Oceanography. 3 Credit Hours.
Study of the dynamics of large-scale ocean circulation, air-sea interaction and their roles in biogeochemical cycling of carbon and nutrients.

EAS 4312. Geodynamics. 3 Credit Hours.
Quantitative discussion of dynamic processes in the solid Earth; lithospheric dynamics, continuum mechanics, lithospheric flexure and elasticity, heat transfer, viscous rheology, fluid mechanics, and earthquake dynamics. Credit not allowed for both EAS 4312 and EAS 6312.

EAS 4313. Tect,Climate,&Landscape. 3 Credit Hours.
Introduction to the interactions and feedbacks between tectonics and climate that act to shape landscapes. Includes field- and computer-based data collection and analysis. Credit not allowed for both EAS 4313 and EAS 6313.

EAS 4314. Seismology. 3 Credit Hours.
Introduction to elastic wave propagation, and studies of the solid Earth's interior and earthquake source from seismic waves. Credit not allowed for both EAS 4314 and EAS 6314.

EAS 4315. Geofluids. 3 Credit Hours.
This course focuses on the fundamental concepts of fluid dynamics merged with geophysical applications.

EAS 4316. Earthquake Physics. 3 Credit Hours.
Fundamental physics of processes that control fault slips and earthquakes with a focus on the latest emerging research topics in the field.

EAS 4331. Physical Volcanology. 3 Credit Hours.
This class examines the dynamics and thermodynamics of planetary volcanism. The course material covers the generation and transport of magma in the mantle and crust, and the fluid dynamics of eruptions and their impact on the landscape and atmosphere. Credit not allowed for both EAS 4331 and EAS 6331.

EAS 4350. Paleoclim & Paleoccean. 3 Credit Hours.
This course will explore the history of the Earth's climate, covering methods for reconstructing past climate and the mechanisms behind climate changes.

EAS 4360. Space Physics & Instrum.. 3 Credit Hours.
This course will explore the interaction of the solar wind with the Earth's magnetosphere using a combination spacecraft observations and fundamental plasma physics. Credit not allowed for both EAS 4360 and EAS 6360.

EAS 4370. Physics of Planets. 3 Credit Hours.
In this course we will study the forces and influences that determine the composition, structure and evolution of the planets in our solar system.
EAS 4375. Earth & Planet Materials. 3 Credit Hours.
Fundamental principles and applications of mineralogy and petrology for understanding the composition of surface and subsurface materials on Earth and other planetary bodies.

EAS 4380. Land Remote Sensing. 3 Credit Hours.
Techniques for making remote measurements of the composition, morphology, and thermophysical properties of solid surfaces on Earth and other planetary bodies.

EAS 4410. Climate & Global Change. 3 Credit Hours.
The physics behind the climate and its potential changes, as well as an introduction to the policy issues in global change.

EAS 4420. Environmental Field Meth. 4 Credit Hours.
Semester-long focus on single environmental project in the local area. Chemical and physical techniques for parameterizing environmental problems, data analysis, report writing, and interpretation of results in societal context.

EAS 4430. Remote Sensing&Data Anly. 3 Credit Hours.
Introduction to the remote sensing of the atmosphere and the Earth. Laboratory examples of data and image analysis for remote sensing applications.

EAS 4440. Environ Data Analysis. 3 Credit Hours.
Data Analysis methods used in environmental research are taught through examples. Students learn to implement these methods to areas of their own interests.

EAS 4450. Synoptic Meteorology. 3 Credit Hours.
A description of physical and mathematical procedures used in weather forecasting. Students will practice forecasting.

EAS 4455. Atmospheric Dynamics. 3 Credit Hours.
An introduction to the atmospheric physical and dynamic processes that control weather and climate.

EAS 4460. Satellite & Radar Met. 3 Credit Hours.
Interpretation of satellite and radar data for meteorological forecasting based on understanding radiative transfer and the resulting strengths and limitations of the imagery.

EAS 4470. Large-Scale Atmos Circ. 3 Credit Hours.
Structure and dynamics of phenomena including weather regimes, storm tracks, El Nino-Southern Oscillations, teleconnections, monsoons, Arctic Oscillation, stratospheric polar vortex, and stratosphere-troposphere coupling.

EAS 4480. Environ Data Analysis. 3 Credit Hours.
Data Analysis methods used in environmental research are taught through examples. Students learn to implement these methods to areas of their own interests.

EAS 4498. Research Assistantship. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

EAS 4499. Undergraduate Research. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

EAS 4501. Exploration Geophysics. 4 Credit Hours.
Methods of exploration geophysics, including refraction and reflection seismology, resistivity, gravity, magnetics, and ground penetrating radar. Includes laboratory work and introduction to operation of field equipment.

EAS 4515. Fluids-Earth's Crust I. 3 Credit Hours.
Fundamentals of porosity and permeability in soils, sediments, and crystalline rocks; basic physics of fluid flow through interconnected pore spaces and cracks; introductory analysis of fluid flow as an agent of heat and chemical transport in geological systems.

EAS 4520. Exploration Seismology. 3 Credit Hours.
A study of seismic reflection exploration methods and theory. Examples are taken from oil industry exploration and production and near-surface environmental imaging.

EAS 4525. Weather Risk. 3 Credit Hours.
Overview of the physics and dynamics behind different types of hazardous weather and the mathematical tools to model the risks associated with these events.

EAS 4602. Biogeochemical Cycles. 3 Credit Hours.
An investigation of global change focusing on the chemical, physical, geological, and biological processes that cycle the elements through the Earth system.

EAS 4610. Earth System Modeling. 3 Credit Hours.
An introduction to computer modeling in Earth system science.

EAS 4625. Water Quality Modeling. 3 Credit Hours.
Gain hands-on experience using geochemical software and understanding governing geochemical principles pertaining to transformation of contaminants and other subsurface species through case studies.

EAS 4630. Physics of the Earth. 3 Credit Hours.
Introduction to methods and observational data used to determine solid Earth structure and to understand the dynamical processes driving surface deformation and plate tectonics.

EAS 4641. Atmospheric Chem Lab. 1 Credit Hour.
A hands-on laboratory course in which students will learn basic concepts and techniques used by atmospheric chemists including analysis, data quality and experimental design.

EAS 4651. Practical Internship. 3 Credit Hours.
Faculty-supervised and approved independent internship, employment, or research project related to earth and atmospheric sciences.

EAS 4655. Atmospheric Dynamics. 3 Credit Hours.
An introduction to the atmospheric physical and dynamic processes that control weather and climate.

EAS 4656. Atmos Dynamics Practicum. 1 Credit Hour.
Students learn to apply meteorological analysis tools to atmospheric observations to interpret the structure and dynamics of historical and real-time weather events.

EAS 4670. Atmospheric Dynamics II. 3 Credit Hours.
This course emphasizes physical concepts and analytic techniques for solving problems in atmospheric instabilities and wave dynamics at various temporal and spatial scales.

EAS 4698. Research Assistantship. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

EAS 4699. Undergraduate Research. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

EAS 4740. Atmospheric Chemistry. 3 Credit Hours.
This course provides a general chemical description of the Earth's atmospheric system with a major focus on the two lowest layers of the atmosphere, i.e., the troposphere and the stratosphere. Crosslisted with CHEM 4740.

EAS 4759. Groundwater Hydrology. 3 Credit Hours.
Dynamics of flow and solute transport in groundwater, including theory, implementation, and case studies. Crosslisted with CEE 4795.

EAS 4801. Special Topics. 1 Credit Hour.

EAS 4802. Special Topics. 2 Credit Hours.

EAS 4803. Special Topics. 3 Credit Hours.

EAS 4804. Special Topics. 4 Credit Hours.

EAS 4813. Special Topics. 3 Credit Hours.
Special Topics in Earth and Atmospheric Sciences.
EAS 4814. Special Topics-Lab. 4 Credit Hours.
EAS 4900. Special Problems. 1-21 Credit Hours.
EAS 4XXX. Earth&Atmos Sci Elective. 1-21 Credit Hours.
EAS 6000. Intro Research & Ethics. 1 Credit Hour. Identify and discuss ethical challenges that will be confronted in research, and give an overview of the research areas of the faculty in EAS.
EAS 6111. The Earth System. 2 Credit Hours. Exploration of processes linking the Earth and atmosphere.
EAS 6120. Environment Field Method. 4 Credit Hours. Environmental site characterization through a field-based project that advances student's research. Theory, field data acquisition, and data fusion using geochemical, geophysical, hydrologic, and related methods.
EAS 6121. Model & Comp Prog Geosci. 3 Credit Hours. This course gives students first-hand experience on the development process of problem solving in Earth and Atmospheric Sciences from mathematically describing a problem to solving it by parallel programming on a high performance computer.
EAS 6122. Biogeochemical Cycles. 3 Credit Hours. A multidisciplinary exploration of the chemical, physical, geological, and biological processes that cycle the nutrient elements through the Earth system and thereby maintain a habitable planet.
EAS 6125. Water Quality Modeling. 3 Credit Hours. Gain hands-on experience using geochemical software and understanding governing geochemical principles pertaining to transformation of contaminants and other subsurface species through case studies.
EAS 6128. Fluids in Earth's Crust. 3 Credit Hours. Advanced treatment of fluid flow, heat transfer, and reactive transport in porous and cracked rocks; stability of flow; double-diffusive systems; evolution of permeability in geologic systems; introduction to multiphase flow.
EAS 6130. Earth System Modeling. 3 Credit Hours. An introduction to computer modeling in earth system science.
EAS 6131. Ocean Modeling. 3 Credit Hours. Developing and using ocean models from the simple shallow water to the full primitive equation model. Includes hands-on programming.
EAS 6132. Intro to Climate Change. 3 Credit Hours. The climate of the Earth, its radiation budget, greenhouse gases and their sources and sinks, potential changes due to anthropogenic activities, detection of climate changes.
EAS 6133. Marine Ecosys Modeling. 3 Credit Hours. Modeling population dynamics in the context of ocean circulation. Numerical techniques and simulation development.
EAS 6134. Inverse Methods in EAS. 3 Credit Hours. Theory of data acquisition, time series analysis, and discrete inverse theory with applications in the earth and atmospheric sciences.
EAS 6135. Intro Complex Environ Sys. 3 Credit Hours. Introduction to the concepts of environmental complexity through the inter-relationships between natural, human, and built systems.
EAS 6136. Paleoclim & Paleocean. 3 Credit Hours. This course will explore the history of the Earth's climate, covering methods for reconstructing past climate and the mechanisms behind these climate changes.
EAS 6140. Thermo of Atmos & Oceans. 3 Credit Hours. The instabilities and flows created by exchanges of heat.
EAS 6145. Remote Sens Atmos&Oceans. 3 Credit Hours. Provides a foundation for understanding the physical principles of remote sensing and its applications to the study of atmospheric gases, clouds, and ocean surfaces.
EAS 6155. Adv Geophys Fluid Dynam. 3 Credit Hours. Fundamental mathematical tools for graduate students interested in Geophysical Fluid Dynamics (GFD) and related disciplines.
EAS 6211. Geochem Thermodynamics. 3 Credit Hours. Fundamental principles of chemical equilibria in geochemical systems with emphasis on solution properties and mineral water equilibria.
EAS 6212. Geochemical Kinetics. 3 Credit Hours. Fundamental principles of biogeochemical kinetics and mathematical treatment of coupled transport and reaction in natural environments. Interpretation of field and experimental data using kinetic theory.
EAS 6214. Aqueous Geochemistry. 3 Credit Hours. Chemical processes that regulate compositions of natural waters at or near the Earth's surface, with emphasis on quantitative calculations of acid-base, solubility, and redox equilibria.
EAS 6216. Isotope Geochemistry. 3 Credit Hours. Biogeochemical significance of nuclear isotopes, both radioactive and stable.
EAS 6240. Organic Geochemistry. 3 Credit Hours. Origin and transformation of organic matter in the Earth's environments, with emphasis on properties and reactions of highly complex mixtures such as humic substances.
EAS 6305. Phys & Chem Oceanography. 3 Credit Hours. Study of the dynamics of large-scale ocean circulation, air-sea interaction and their roles in biogeochemical cycling of carbon and nutrients.
EAS 6311. Physics of the Earth. 3 Credit Hours. Physics of the Earth's interior. Composition and structure of core, mantle, crust. Introduction to seismic wave propagation, gravitational, geomagnetic, and temperature fields.
EAS 6312. Geodynamics. 3 Credit Hours. Quantitative discussion of dynamical processes in the solid Earth; viscous flow, glacial rebound, fluid dynamical instabilities, thermal convection; lithospheric dynamics; evolution of the core.
EAS 6313. Tect,Climate,&Landscape. 3 Credit Hours. Introduction to the interactions and feedbacks between tectonics and climate that act to shape landscapes. Includes field- and computer-based data collection and analysis. Credit not allowed for both EAS 6313 and EAS 4313.
EAS 6314. Seismology. 3 Credit Hours. The propagation of seismic waves, the description of earthquake motion, and evaluation of earthquake damage. Examples provide experience in the interpretation of seismic data.
EAS 6320. Structural Geology. 4 Credit Hours. Structural geology and continuum mechanics for scientists and civil engineers. Stress and strain in rocks; faults, joints, and folds; basic field mapping, laboratory exercises.
EAS 6331. Physical Volcanology. 3 Credit Hours.
This class examines the dynamics and thermodynamics of planetary volcanism. The course material covers the generation and transport of magma in the mantle and crust, and the fluid dynamics of eruptions and their impact on the landscape and atmosphere. Credit not allowed for both EAS 6331 and EAS 4331.

EAS 6360. Space Physics & Instrum.. 3 Credit Hours.
This course will explore the interaction of the solar wind with the Earth’s magnetosphere using a combination spacecraft observation and fundamental plasma physics. Credit not allowed for both EAS 6360 and EAS 4360.

EAS 6370. Physics of Planets. 3 Credit Hours.
In this course we will study the forces and influences that determine the composition, structure, and evolution of the planets of our solar system.

EAS 6401. Intro-Atmospheric Chem. 2 Credit Hours.
Introduction to basic chemical principles related to chemical processes in the atmosphere.

EAS 6405. Intro Atmos&Aqueous Chem. 3 Credit Hours.
An introduction to the basics of atmospheric and aqueous chemistry for first semester graduate students. The class goes over photochemistry, thermodynamics, kinetics, redox systems, carbon chemistry, radioactive and stable isotopes, and gas/solid reactions.

EAS 6410. Atmospheric Chemistry. 3 Credit Hours.
Application of fundamental principles of chemistry to understanding the critical factors controlling the levels and distributions of atmospheric trace gases and their variation in time.

EAS 6412. Physical Meterology. 3 Credit Hours.
Application of the fundamental principles of thermodynamics to the atmosphere; including hydrostatic equilibrium and static stability, derivation of Clausius-Clapeyron Equation, cloud microphysics, radiative transfer, and the Earth’s energy budget.

EAS 6420. Atmos Chem Instrument. 4 Credit Hours.
Introduction to the mechanical, electrical, and optical aspects of modern instrumentation used in atmospheric chemical research.

EAS 6430. Exp Methods Air Quality. 3 Credit Hours.
Presents experimental and field methods through a focus on measurements of atmospheric gases and particulates associated with poor air quality. Experiments will involve laboratory measurements and an air quality filed experiment on the order of one week duration.

EAS 6490. Adv Environ Data Analy. 3 Credit Hours.
A unified view of the theories and applications underlying the statistical analysis of environmental data in the space, time and spectral domain.

EAS 6501. Intro-Atmos Dynamics. 2 Credit Hours.
Introduction to the basic fundamental fluid dynamics that control atmospheric motions.

EAS 6502. Fluid Dynam&Synop Meteor. 3 Credit Hours.
Fundamental principles of atmospheric fluid dynamics, analysis of meteorological codes, weather data and patterns, and numerical weather prediction.

EAS 6512. Dynamic Meteorology. 3 Credit Hours.
An introduction to the use of geophysical fluid dynamics in describing and modeling the atmosphere.

EAS 6522. Dynamics of the Tropics. 3 Credit Hours.
Explores the dynamics of the tropical atmosphere and ocean and how they interact to produce climatic features such as the monsoons, El Nino, and La Nina.

EAS 6532. Large-Scale Atmos Circ. 3 Credit Hours.
Structure and dynamics of phenomena including weather regimes, storm tracks, El Nino-Southern Oscillation, teleconnections, monsoons, Artic Oscillation, stratospheric polar vortex, and stratosphere-troposphere coupling.

EAS 6670. Atmospheric Dynamics II. 3 Credit Hours.
This course emphasizes physical concepts and analytic techniques for solving problems in atmospheric instabilities and wave dynamics at various temporal and spatial scales.

EAS 6672. Ocean Dynamics. 3 Credit Hours.
An advanced class on the ocean circulation as a dynamical system to understand the basic equations governing it, together with its variability.

EAS 6751. Phys Prop&Rheology-Rocks. 3 Credit Hours.
Structure, physical properties, and rheology of minerals and rocks with applications to engineering structures and natural phenomena in the Earth. Fundamentals of rock mechanics and crack propagation. Crosslisted with CEE 6751.

EAS 6761. Contaminated Sed Geochem. 3 Credit Hours.
Acquaints students with fate of major pollutants, nutrients, organic compounds such as pesticides, PAH’s, and trace metals in sedimentary systems. Crosslisted with CEE 6761.

EAS 6765. Geomicrobiology. 3 Credit Hours.
Interactions between microorganisms and the geosphere; microbial energetics and genetics; geochemical controls on microbial diversity and activity; redox and acid-base balances; biogeochemical cycles; evolution. Crosslisted with BIOL 6765.

EAS 6790. Air Pollution:Phys&Chem. 3 Credit Hours.
Interaction to the physical and chemical processes affecting the dynamics and fate of air pollutants at the local, regional, and global scales. Particular emphasis is on tropospheric pollutant chemistry and transport. Crosslisted with CEE 6790.

EAS 6792. Air Pollut'n Meteorology. 3 Credit Hours.
Air pollution history, atmospheric stability and boundary layer dynamics, atmospheric dispersion, atmospheric transport, air pollution modeling. Crosslisted with CEE 6792.

EAS 6793. Atmos Boundary Layer. 3 Credit Hours.
Structure and dynamics of atmospheric boundary layers. Introduction to turbulence and turbulent transport. Crosslisted with CEE 6793.

EAS 6794. Atmos Chem Modeling. 3 Credit Hours.
Application of modern numerical methods to the prediction of atmospheric chemical and physical compositions; specific applications using computer models developed by the students are included. Crosslisted with CEE 6794.

EAS 6795. Atmospheric Aerosols. 3 Credit Hours.
Chemical and physical properties of natural and anthropogenic aerosols. Sources, transport, transformation, and fate of primary/secondary, organic/inorganic, atmospheric semi-volatiles and aerosols. Crosslisted with CEE 6795.

EAS 6XXX. Earth&Atmos Sci Elective. 1-21 Credit Hours.
EAS 7000. Master’s Thesis. 1-21 Credit Hours.
EAS 7999. Prep-Doctori Comp Exams. 1-21 Credit Hours.
EAS 8001. Seminar. 1 Credit Hour.
A forum for graduate students in earth and atmospheric sciences to present and discuss topics related to their research interests.
ECON 101. Economics at Work. 1 Credit Hour.  
Students are introduced to career opportunities in economics and explore/identify how economics is used in different employment contexts.

ECON 1XXX. Economics Elective. 1-21 Credit Hours.

ECON 2100. Economics and Policy. 3 Credit Hours.  
Practice in analysis of decision problems of relevance to students in public policy and personal decision areas. Issues relating to individual decisions to produce, consume, invest, and trade will be explored. Analytical approaches will enable students to use and incorporate basic elements of micro- and macro-economic analysis and to appreciate issues regarding testing and measurements. Students can receive credit for either ECON 2100 or ECON 2101, or for ECON 2105/2106. Students cannot receive credit for ECON 2100 and ECON 2101 or for ECON 2100 and ECON 2105/2106 or for ECON 2101 and ECON 2105/2106.

ECON 2101. The Global Economy. 3 Credit Hours.  
Historical and theoretical understanding of global economy, including international trade, finance, investment production; regional economic integration; economic development; environment, using micro and macro economic principles. Students can receive credit for either ECON 2100 or ECON 2101, or for ECON 2105/2106. Students cannot receive credit for ECON 2100 and ECON 2101 or for ECON 2100 and ECON 2105/2106 or for ECON 2101 and ECON 2105/2106.

ECON 2105. Prin of Microeconomics. 3 Credit Hours.  
This principles of economics course is intended to introduce students to concepts that will enable them to understand and analyze economic aggregates and evaluate economic policies. Students can receive credit for either ECON 2100 or ECON 2101, or for ECON 2105/2106. Students cannot receive credit for ECON 2100 and ECON 2101 or for ECON 2100 and ECON 2105/2106 or for ECON 2101 and ECON 2105/2106.

ECON 2106. Prin of Macroeconomics. 3 Credit Hours.  
This principles of economics course is intended to introduce students to concepts that will enable them to understand and analyze structure and performance of the market economy. Students can receive credit for either ECON 2100 or ECON 2101, or for ECON 2105/2106. Students cannot receive credit for ECON 2100 and ECON 2101 or for ECON 2100 and ECON 2105/2106 or for ECON 2101 and ECON 2105/2106.

ECON 2250. Statistics for Economist. 3 Credit Hours.  
This course provides an introduction to probability theory and statistical inference. Students will explore tools and concepts relevant to the study of economics and gain a familiarity with statistical software widely used by economists.

ECON 2698. Research Assistantship. 1-12 Credit Hours.  
Independent research conducted under the guidance of a faculty member.

ECON 2699. Undergraduate Research. 1-12 Credit Hours.  
Independent research conducted under the guidance of a faculty member.

ECON 2803. Special Topics. 3 Credit Hours.  
Special topic offerings of current interest not included in permanent courses.

ECON 2XXX. Economics Elective. 1-21 Credit Hours.

ECON 3110. Adv Microeconomic Analysis. 3 Credit Hours.  
Review of important mathematical tools and techniques used in advanced microeconomics. Advanced topics include the estimation of demand and cost functions; the role of government in the economy (externalities, property rights, and public goods); public choice theory; factor markets (especially labor and capital markets); models of monopoly; pricing techniques used by firms with market power (monopolies and oligopolies); and game theory.

ECON 3120. Advanced Macroeconomics. 3 Credit Hours.  
Integrates issues arising from international economic relationships with the macroeconomic dynamics of domestic economies. Income determination in the open economy and the effect of stabilization policies on the international monetary system.

ECON 3150. Econ & Finance Modeling. 3 Credit Hours.  
The course develops student ability to model the essential elements of the investment decision through use of a valuation model and spreadsheet analysis. Expands upon basic knowledge of present value analysis to recognize risk, growth, capital markets, and market valuation of ongoing operations.
ECON 3160. Empirical Economics. 3 Credit Hours.
Develops student abilities to logically formulate economic issues; identify and collect data from traditional and Internet sources; analyze data using spreadsheet and presentation software; generate sound and defensible conclusions and recommendations; and make effective presentations of analysis and conclusions.

ECON 3161. Econometric Analysis. 3 Credit Hours.
Econometric techniques and applications in economic and business analysis. Practical issues involving modeling, estimation, hypothesis testing, and emphasizing computer implementation through econometric software.

ECON 3300. Intl Energy Markets. 3 Credit Hours.
Economics of international energy markets and how business and government policy decisions are made. Economic models, and financial, institutional and regulatory aspects of energy markets.

ECON 3XXX. Economics Elective. 1-21 Credit Hours.

ECON 4060. Money & Capital Markets. 3 Credit Hours.
An examination of the role of money in the exchange process, the Federal Reserve's monetary policy strategy, and the impact of monetary policy on financial markets and aggregate economic activity.

ECON 4160. Economic Forecasting. 3 Credit Hours.
An introduction to widely used economic and business forecasting methods, emphasizing quantitative approaches and computer implementation through time-series econometric software.

ECON 4170. Mathematical Economics. 3 Credit Hours.
The application of mathematical tools to economic analysis. Topics include static analysis, comparative-static analysis, optimization, and dynamic analysis.

ECON 4180. Game Theory Economics. 3 Credit Hours.
Course covers static games of complete information, dynamic games of complete information, static games of incomplete information and dynamic games of incomplete information.

ECON 4232. Labor Economics. 3 Credit Hours.
Provides an introduction to the theory and practice of contemporary labor economics. The aim is to understand the forces that influence behavior in the labor market.

ECON 4310. Econ of Contracts. 3 Credit Hours.
Builds from analysis of the individual in a trading or transaction situation to study organizations as groups of affiliated individuals. Assesses the situations when organizations are preferable to markets as forms of organizing economic and social activity. Institutional economics and transaction cost economics are studied. Analysis of corporate restructuring and privatization.

ECON 4311. Global Enterprise. 3 Credit Hours.
This introductory course on the multinational enterprise (MNE) will examine from an economic and interdisciplinary perspective the challenges facing MNE's in a fast-changing international business environment. The emphasis will be on the use of economic tools to analyze these issues and understand their managerial implications.

ECON 4321. Tech & Entrepreneurship. 3 Credit Hours.
Analysis of level and type of entrepreneurial activity. Study of business and economic history, legal, and institutional arrangements.

ECON 4340. Industrial Organization. 3 Credit Hours.
This course examines the theory of the firm, the relationship between market structure, practices, and performance, and the determinants of technological change. The role (and ability) of government policy to solve various market failures, via antitrust enforcement, regulation, etc., is also discussed.

ECON 4345. Economic Regulation. 3 Credit Hours.
This course examines how government economically regulates private industry, how it might regulate more efficiently, and when it should not regulate at all. General theories of antitrust enforcement and economic regulation are developed and applied to a variety of industry cases.

ECON 4350. International Economics. 3 Credit Hours.
This is an introductory course in international economics and will cover important topics in trade theory, trade policy, and international finance. The emphasis will be on using economic tools to analyze a variety of current events in the world economy.

ECON 4351. Intl Financial Econ. 3 Credit Hours.
This course familiarizes students with concepts, models, theories and applications in international markets.

ECON 4355. Global Financial Econ. 3 Credit Hours.
Examines the system of markets and institutions for exchange of capital, money, and goods, in the global marketplace; impact on national economics and fundamental economic global relationships.

ECON 4357. Law&Econ-Global Trading. 3 Credit Hours.

ECON 4360. Network Economics. 3 Credit Hours.
This course will examine alternative network architectures (e.g. simple ring networks, two star networks connected by a trunk line), explore how differences in a network’s economic characteristics have different market structure implications and accordingly, lead to alternative public policy stances.

ECON 4370. Law and Economics. 3 Credit Hours.
To introduce students to economic aspects of legal decision-making and to develop students’ ability to critically analyze the purposes and efficiency of legal decision-making from an economic perspective.

ECON 4411. Economic Development. 3 Credit Hours.
Concepts and studies of developing economies. Selected topics include development experience and theories, growth, agriculture, urbanization, industrialization, and links between trade policy and development.

ECON 4412. Cost-Benefit Analysis. 3 Credit Hours.
This course will acquaint the student with the principles, tools, issues, strengths, and limitations of cost-benefit analysis (CBA); to prepare the student to competently review, criticize, and use CBA studies; and to enable the student to carry out limited CBA studies.

ECON 4415. Confl&Secur in DevCountr. 3 Credit Hours.
This course engages undergraduate students in the analysis of multiple dimensions of contemporary civil conflict and serves as an introduction to economic studies of terrorism.

ECON 4421. Urban & Regional Econ. 3 Credit Hours.
Economics of regions, cities, and space. Theories of growth and location, effects of urbanization, agglomeration, and congestion. Public policy relating to urban and regional problems.

ECON 4430. Transportation Economics. 3 Credit Hours.
Economic analysis for the design, operation, and management of transportation and communication systems. Study of systems analysis and modeling. Application to industry and study of industrial change and dynamics. Special attention to corporate restructuring and industrial consolidation and merger.
ECON 4440. Economics of Environment. 3 Credit Hours.
This course covers three aspects of environmental economics. First, it considers policy interventions appropriate to problems involving environmental externalities. Second, it explains methods used to estimate economic values for environmental goods. Finally, it explains the economics of depletable and renewable resources.

ECON 4450. Afric-Amer Entrepreneur. 3 Credit Hours.

ECON 4460. Public Economics. 3 Credit Hours.
This course focuses on public goods, how public decisions regarding public goods are made, the "free-rider" problem, voting and taxation principles, welfare, the Tiebout Hypothesis, budgeting, and fiscal policies.

ECON 4510. Health Economics. 3 Credit Hours.
This course surveys the theoretical and empirical evidence regarding current issues in health and health care. Individual-level models of health behaviors and the demand for health and medical insurance are presented. The economic behaviors of physicians, hospitals, and insurance companies are also characterized. The possible role of government in encouraging the equitable and efficient performance of health markets is discussed with a particular emphasis on current debates involving individual health decisions, health care reform, and the diffusion of new medical technologies.

ECON 4520. Sports Economics. 3 Credit Hours.
Economic tools will be used to assess the role sports plays in our society.

ECON 4610. Seminar-Economic Policy. 3 Credit Hours.
The objective of the course is to enable students to interpret current economic problems and policies using the economic models learned in their theory courses. Students study the current "Economic Report of the President" and apply analytical tools to the data included in the text. Each student selects a current issue for detailed examination and report.

ECON 4620. History-Economic Thought. 3 Credit Hours.
This course is concerned with the economists who interpreted and influenced the development of capitalism and socialism over the last two centuries.

ECON 4698. Research Assistantship. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

ECON 4699. Undergraduate Research. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

ECON 4740. History-Economic Thought. 3 Credit Hours.
Capstone experience in which students apply the tools of political economy to international issues. Crosslisted with INTA 4740.

ECON 4741. Thesis-Political Economy. 3 Credit Hours.
Individual project applying the tools of political economy to international issues. Crosslisted with INTA 4741.

ECON 4803. Special Topics. 3 Credit Hours.
Courses designed to permit students and a professor to pursue a specialized interest in an area of economics not extensively treated in the offerings of the School.

ECON 4811. Special Topics. 1 Credit Hour.
Courses designed to permit students and a professor to pursue a specialized interest in an area of economics not extensively treated in the offerings of the School.

ECON 4812. Special Topics. 2 Credit Hours.
Courses designed to permit students and a professor to pursue a specialized interest in an area of economics not extensively treated in the offerings of the School.

ECON 4813. Special Topics. 3 Credit Hours.
Courses designed to permit students and a professor to pursue a specialized interest in an area of economics not extensively treated in the offerings of the School.

ECON 4814. Special Topics. 4 Credit Hours.
Courses designed to permit students and a professor to pursue a specialized interest in an area of economics not extensively treated in the offerings of the School.

ECON 4815. Special Topics. 5 Credit Hours.
Courses designed to permit students and a professor to pursue a specialized interest in an area of economics not extensively treated in the offerings of the School.

ECON 4901. Special Problems. 1-21 Credit Hours.
Designed to permit independent study with a faculty member.

ECON 4910. Individual Research. 3 Credit Hours.
Course related to independent student research. Topics determined by instructor and student.

ECON 4990. Econ Internship. 1-21 Credit Hours.
Course projects related to professional internships. Topics and requirements to be arranged by student, instructor, and sponsor.

ECON 4991. Economics Elective. 1-21 Credit Hours.
A survey of microeconomic and macroeconomic concepts essential to the academic preparation of prospective managers. Economic theory used as a framework for contemporary managerial decision making.

ECON 6105. Macroeconomics. 3 Credit Hours.
Macroeconomic theory, including determination of national income, employment, the general price level, and potential for economic growth. Sources of macroeconomic instability and stabilization policies.

ECON 6106. Microeconomic Analysis. 3 Credit Hours.
Microeconomics, resource allocation decisions of households, businesses, and government. Enables the student to understand and apply economic principles to consumer, business, and government decisions.

ECON 6110. Econ-Corporate Strategy. 3 Credit Hours.
Applies microeconomic and macroeconomic theory to the development of modern corporate strategy, including organizational boundaries, market structure and competition, industry analysis, and competitive advantage.

ECON 6121. Research Methods. 3 Credit Hours.
Introduces students to issues related to conducting research in economics. Topics include the derivation of empirical models from theoretical constructs, causality, experimental and non-experimental data, hypothesis testing, and policy analysis. Students also become familiar with electronic data sources and retrieval and are introduced to several professional software packages.

ECON 6130. Quantitative Meth-Econ. 3 Credit Hours.
This course covers fundamental quantitative tools used in economic and econometric analysis, which includes topics in differential calculus, optimization, and linear algebra.
ECON 6140. Probability & Statistics. 3 Credit Hours.
This course gives students the necessary background for taking courses in the econometrics sequence. Topics include descriptive statistics, continuous and discrete probability distributions, parameter estimation, one- and two-sample hypothesis testing, and bivariate regression models.

ECON 6150. Cost Benefit Analysis. 3 Credit Hours.
The application of economic, financial, and quantitative reasoning and tools to issues of resource allocation and policy, primarily in the public sector.

ECON 6160. Econometric Analysis. 3 Credit Hours.
This course introduces advanced econometric methods on estimation and testing, including instrumental variable estimation, panel data analysis, limited dependent variable models, and simultaneous equation system. The course emphasizes applications of these techniques to real-world problems using professional software packages.

ECON 6161. Econometric Modeling. 3 Credit Hours.
This course introduces techniques on economic and business forecasting, focusing on regression analysis and ARIMA models. Testing for unit roots and cointegration are also discussed. Professional software packages for forecasting are used in applications.

ECON 6162. Discrete Choice Econ. 3 Credit Hours.
Focuses on econometric methods for which the dependent variable represents an "either-or" choice. Included in the set of topics are binary and multinomial logic, ordered choice, heteroskedastic extreme value, bivariate and multivariate probit, nested logit structures, discrete/continuous, and Poisson models. The course includes numerous applications using professional software programs.

ECON 6200. Money & Capital Markets. 3 Credit Hours.
The role of money in the exchange process, Federal Reserve strategy, and the impact of monetary policy on financial markets and aggregate economic activity.

ECON 6310. Public Economics. 3 Credit Hours.
An examination of public goods, public decision making, voting, free riders, taxation principles, welfare, the Tiebout Hypothesis, budgeting, and fiscal policy.

ECON 6330. Urban & Regional Econ. 3 Credit Hours.
Economics of regions, cities, and space. Theories of growth and location, effects of urbanization, agglomeration, and congestion. Public policy relating to urban and regional problems.

ECON 6341. Transportation Economics. 3 Credit Hours.
Examines the economics of transportation markets, including resource allocation, economic welfare, government regulation, and public policy. Using an econometric case study approach, the course develops the necessary steps for testing hypotheses, analyzing the finding of recent studies, and exploring implications for the development and implementation of transportation policy.

ECON 6360. Development Economics. 3 Credit Hours.
Concepts and models of development and growth in Third World countries, emphasizing modeling and testing of recent changes in the Third World. Topics include economic growth, trade and globalization, poverty and inequality, migration, population growth, unemployment, agricultural development, the environment, and the role of the market versus the state.

ECON 6380. Economic of Environment. 3 Credit Hours.
Examines the management of natural resources and the environment from an economic perspective. Topics include resource valuation methods, optimal resource management, regulation of pollution and sustainable development. Issues are studied through economic models and empirical testing.

ECON 6431. Global Enterprise. 3 Credit Hours.
This course uses economic tools to examine strategic aspects of competition and collaboration in an integrated global market. Topics include the determinants and changes in the boundaries of global firms, competitive advantage and value creation, the nature of global markets, and strategic positioning in the global market place.

ECON 6440. Economics of Technology. 3 Credit Hours.
This course explores the impact that innovation, technology progress, and R&D activities have upon a firm's pricing and output behavior. Based upon computer case studies, biotechnology, and telecommunications sectors, the course further analyzes the economic role that firm size and entrepreneurial opportunities play in technological development and innovation.

ECON 6450. Black Entrepreneurship. 3 Credit Hours.
Explores African-American entrepreneurship from the ante-bellum period to the present. Implications of economic and socio-political developments are given particular attention, including the urbanization of blacks, the rise of benevolent societies following slavery, institutionalization of Jim Crow segregation, desegregation, and affirmative action's role in an emerging class of black entrepreneurs.

ECON 6460. Industrial Organization. 3 Credit Hours.
This course examines modern theories of the firm, market power, and competitive strategy. Game theory is employed throughout the course.

ECON 6510. Health Economics. 3 Credit Hours.
A critical survey of the current theoretical and empirical issues involving the economics of health and health care.

ECON 6610. Economic Policy. 3 Credit Hours.
Interprets current economic problems and policies using fundamental economic principles.

ECON 6620. Economic Thought. 3 Credit Hours.
Economists who interpreted and influenced the development of capitalism and socialism over the last two centuries.

ECON 6650. International Economics. 3 Credit Hours.
Explores international economic issues. The first part examines aspects of international trade, including specialization and exchange, strategy, labor and capital movements, preferential trading arrangements, and economic development. The second part analyzes international finance, including exchange rates, open economy macro policies, Eurocurrency markets, and the international monetary system.

ECON 6XXX. Economics Elective. 1-21 Credit Hours.

ECON 7000. Master's Thesis. 1-21 Credit Hours.

ECON 7004. Math for Economists. 3 Credit Hours.
Topics include matrix algebra, limits and open sets, implicit functions and their derivatives, quadratic forms and definite matrices, unconstrained and constrained static optimization, dynamic optimization and economic applications.

ECON 7012. Microeconomic Theory I. 3 Credit Hours.
The topics covered in this course are axiomatic theory of consumer behavior, consumer choice, classical demand theory, aggregate demand, choice under uncertainty, producer theory and partial equilibrium analysis.
ECON 7013. Microeconomic Theory II. 3 Credit Hours.
The subject areas in this course are general equilibrium, welfare economics, externalities, public goods, economics of information and inter-temporal dynamic analysis.

ECON 7015. Game Theory. 3 Credit Hours.
Static and dynamic games of complete and incomplete information, and mechanism design. Economic applications include Cournot, Bertrand and Stackelberg duopolies, voluntary provision of public goods, auctions, procurement contracts and time inconsistency issues.

ECON 7022. Econometrics I. 3 Credit Hours.
This course is a comprehensive introduction to mathematical statistics principles underlying statistical analyses in economics. It covers probability theory, expectation, sampling, asymptotic results, the main families of probability distributions studied in economics, estimation and hypothesis testing.

ECON 7023. Econometrics II. 3 Credit Hours.
Linear and nonlinear regression analyses, hypothesis testing, ordinary and generalized least squares, instrumental variables estimation, the generalized method of moments, the method of maximum likelihood, methods for stationary time series, unit roots and cointegration, and specification testing.

ECON 7025. Empirical Res Methods. 3 Credit Hours.
Topics include up-to-date theory for data analysis, including time series, cross section and panel, and empirical applications using panel data, time series data and cross-sectional data.

ECON 7026. Microeconomet Analysis. 3 Credit Hours.
Focus on empirical microeconometric methods, including binary, multinomial, and ordered response models, and event history models. Topics include sampling, estimation, and model interpretation.

ECON 7031. Micro of Innovation. 3 Credit Hours.
Historical evolution of institutions that promote innovation, knowledge as a public good, prizes and intellectual property rights as incentive mechanisms, models of cumulative innovation, patent and copyright enforcement and litigation, private versus public funding, and the effects introduced by network externalities and globalization issues.

ECON 7032. Macro of Innovation. 3 Credit Hours.
Macroeconomic factors that lead to technological change, the roles played by technological innovation and knowledge spillovers as promoters of economic growth, and the scope for fiscal and monetary policies to foment research and development and hence economic growth.

ECON 7102. Environmental Econ I. 3 Credit Hours.
Topics include externalities, property rights, incentive design, emission taxes, tradable emission permits, renewable and nonrenewable resources, innovation incentives originating with environmental regulations and globalization, trans-boundary pollutants within and across nations, international environmental agreements, and the globalization impacts on the environment.

ECON 7103. Environmental Econ II. 3 Credit Hours.
Empirical course, built upon the theoretical topics covered in Environmental Economics I. Students are given an in-depth coverage of key empirical papers in environmental economics, either papers that have tested several hypotheses derived from theoretical models or papers that are advancing knowledge in the field, generating empirical results for which no theory yet exists.

ECON 7111. Indust Organization I. 3 Credit Hours.
Topics include market structures and the strategic behavior of firms (monopoly, oligopoly, imperfect competition), research and development, adoption of new technologies, regulations, procurement, antitrust law and competition policy.

ECON 7112. Industrial Organization II. 3 Credit Hours.
Empirical course that trains students to empirically examine the theoretical issues arising in Industrial Organization I. Students are taught about how to use existing data, collect and compile their own datasets and use frontier methods in empirical Industrial Organization to test hypotheses that originate from the theories related to pricing, product and process innovation, among others.

ECON 7121. International Econ I. 3 Credit Hours.
Empirical extension of International Economics I, which surveys the empirical literature and presents the key empirical results related to the topics discussed in the theoretical course. It also discusses frontier empirical work in the field, empirical studies that go beyond the testable hypotheses originated with theory.

ECON 7130. Res Dev & Pres Workshop. 3 Credit Hours.
Lecture topics include instructions on writing research papers in Economics and presenting their work. Contents of presentations and research undertaken by students depend on students’ research interests. Students receive personalized feedback on research and presentations.

ECON 8801. Special Topics. 1 Credit Hour.

ECON 8802. Special Topics. 2 Credit Hours.

ECON 8803. Special Topics. 3 Credit Hours.

ECON 8910. Special Problems. 1-21 Credit Hours.

ECON 8990. Special Problems. 1-21 Credit Hours.

ECON 8997. Teaching Assistantship. 1-9 Credit Hours.
For graduate students holding teaching assistantships.

ECON 8998. Research Assistantship. 1-9 Credit Hours.
For graduate students holding research assistantships.

ECON 9000. Doctoral Thesis. 1-21 Credit Hours.

Elect & Comp Engr-Professional (ECEP)

ECEP 6301. Power Sys Ctrl&Operation. 3 Credit Hours.
Introduction to methods for the real time operation and control of power systems; to study the hardware and software technologies of modern energy management systems. Credit will not be awarded for both ECEP 6301 and ECE 6320.

ECEP 6304. Power System Economics. 3 Credit Hours.
Comprehensive introduction to electricity economics, including economic theory, markets, and policy. Renewable energy, information systems, smart grid, and consumers examined as drivers for market architecture.
ECEP 6305. Pwr Sys Plan&Reliability. 3 Credit Hours.
To introduce basic concepts as well as analysis and optimization techniques underlying reliability assessment of electric power systems and planning techniques. Credit not awarded for both ECEP 6305 and ECE 6322.

ECEP 6310. Capstone Project. 3 Credit Hours.
Apply methods and techniques learned throughout the program to conduct energy system design. Students prepare a project proposal leading to a final report and presentation.

ECEP 6351. Power System Protection. 3 Credit Hours.
The theory and practice of modern power system protection techniques. Credit will not be awarded for both ECEP 6351 and ECE 6323.

ECEP 8803. Special Topics. 3 Credit Hours.
Special topics for ECEP

ECEP 8813. Special Topics. 3 Credit Hours.
Special topics in ECEP.

ECEP 8823. Special Topics. 3 Credit Hours.
Special Topics for ECEP

Electrical & Computer Engr (ECE)

ECE 1010. Intro ECE Design. 2 Credit Hours.
An introduction to basic concepts useful for all areas of Electrical and Computer Engineering. Focus on hands-on, team-based activities using robotics.

ECE 1750. Intro to Bioengineering. 3 Credit Hours.
An introduction to the field of bioengineering, including the application of engineering principles and methods to problems in biology and medicine, the integration of engineering with biology, and the emerging industrial opportunities. Crosslisted with AE, BMED, CHE, ME, and MSE 1750.

ECE 1801. Special Topics. 1 Credit Hour.

ECE 1802. Special Topics. 2 Credit Hours.

ECE 1803. Special Topics. 3 Credit Hours.

ECE 1804. Special Topics. 4 Credit Hours.

ECE 1805. Special Topics. 5 Credit Hours.

ECE 1811. Special Topics. 1 Credit Hour.

ECE 1812. Special Topics. 2 Credit Hours.

ECE 1813. Special Topics. 3 Credit Hours.

ECE 1814. Special Topics. 4 Credit Hours.

ECE 1815. Special Topics. 5 Credit Hours.

ECE 1881. Special Topics. 1 Credit Hour.

ECE 1882. Special Topics. 2 Credit Hours.

ECE 1883. Special Topics. 3 Credit Hours.

ECE 1884. Special Topics. 4 Credit Hours.

ECE 1891. Special Topics. 1 Credit Hour.

ECE 1892. Special Topics. 2 Credit Hours.

ECE 1893. Special Topics. 3 Credit Hours.

ECE 1894. Special Topics. 4 Credit Hours.

ECE 1800. Special Problems. 1-21 Credit Hours.

ECE 1900. Special Problems. 1-21 Credit Hours.

ECE 1901. Special Problems. 1-21 Credit Hours.

ECE 1902. Special Problems. 1-21 Credit Hours.

ECE 1903. Special Problems. 1-21 Credit Hours.

ECE 1XXX. Elec/Comp Engr Elective. 1-21 Credit Hours.

ECE 2001. ECE Seminar. 1 Credit Hour.
Speakers with diverse backgrounds and representing many different industries, professions, and institutions describe their experiences, entrepreneurial ventures, and research challenges.

ECE 2002. ECE Seminar. 1 Credit Hour.
Speakers with diverse backgrounds and representing many different industries, professions, and institutions describe their experiences, entrepreneurial ventures, and research challenges.

ECE 2003. ECE Seminar. 1 Credit Hour.
Speakers with diverse backgrounds and representing many different industries, professions, and institutions describe their experiences, entrepreneurial ventures, and research challenges.

ECE 2020. Digital System Design. 3 Credit Hours.
Computer system and digital design principles. Switch and gate design, Boolean algebra, number systems, arithmetic, storage elements. Datapath, memory organization, instruction set architecture, assembly language. Credit not allowed for both ECE 2020 and ECE 2030.

ECE 2025. Intro-Signal Processing. 4 Credit Hours.
Introduction to signal processing for discrete-time and continuous-time signals. Filtering. Frequency response. Fourier Transform. Z Transform. Laboratory emphasizes computer-based signal processing. Credit not allowed for both ECE 2025 and ECE 2026.

ECE 2026. Intro Signal Processing. 3 Credit Hours.
Introduction to discrete-time signal processing and linear systems. Sampling theorem, filtering, frequency response, Discrete Fourier Transform, Z-Transform. Laboratory emphasizes computer-based signal processing. Credit not allowed for both ECE 2026 and ECE 2025.
ECE 2030. Intro to Computer Engr. 3 Credit Hours.
Computer system and digital design principles. Architectural concepts, software, Boolean algebra, number systems, combinational datapath elements, sequential logic, and storage elements. Design of DRAM control and I/O bus. Credit not allowed for both ECE 2030 and ECE 2020.

ECE 2031. Digital Design Lab. 2 Credit Hours.
Design and implementation of digital systems, including a team design project. CAD tools, project design methodologies, logic synthesis, and assembly language programming.

ECE 2035. Programming HW/SW System. 4 Credit Hours.
Creation of complex execution and storage mechanisms, based on instruction set architecture, for software design including high-level programming languages and operating systems. Programming design projects. Credit not allowed for both ECE 2035 and ECE 3035.

ECE 2036. Engr Software Design. 4 Credit Hours.
Object-oriented software methods for engineering applications. Numerical analysis methods; simulations and graphical presentation of simulation results; analysis of numerical precision. Programming projects. Credit not allowed for both ECE 2036 and ECE 3090.

ECE 2040. Circuit Analysis. 3 Credit Hours.
Basic concepts of DC and AC circuit theory and analysis.

ECE 20X2. Transfer-Digital Des Lab. 2 Credit Hours.

ECE 20X3. Transfer-Digital Systems. 3 Credit Hours.

ECE 2698. Research Assistantship. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

ECE 2699. Undergraduate Research. 1-12 Credit Hours.
Independent Research conducted under the guidance of a faculty member.

ECE 2801. Special Topics. 1 Credit Hour.

ECE 2802. Special Topics. 2 Credit Hours.

ECE 2803. Special Topics. 3 Credit Hours.

ECE 2804. Special Topics. 4 Credit Hours.

ECE 2805. Special Topics. 5 Credit Hours.

ECE 2811. Special Topics. 1 Credit Hour.

ECE 2812. Special Topics. 2 Credit Hours.

ECE 2813. Special Topics. 3 Credit Hours.

ECE 2814. Special Topics. 4 Credit Hours.

ECE 2815. Special Topics. 5 Credit Hours.

ECE 2881. Special Topics. 1 Credit Hour.

ECE 2882. Special Topics. 2 Credit Hours.

ECE 2883. Special Topics. 3 Credit Hours.

ECE 2884. Special Topics. 4 Credit Hours.

ECE 2891. Special Topics. 1 Credit Hour.

ECE 2892. Special Topics. 2 Credit Hours.

ECE 2893. Special Topics. 3 Credit Hours.

ECE 2894. Special Topics. 4 Credit Hours.

ECE 2900. Special Problems. 1-21 Credit Hours.

ECE 2901. Special Problems. 1-21 Credit Hours.

ECE 2902. Special Problems. 1-21 Credit Hours.

ECE 2903. Special Problems. 1-21 Credit Hours.

ECE 2900. Special Problems. 1-21 Credit Hours.

ECE 3005. ECE Prof/Tech Comm. 1 Credit Hour.
Written, oral, and visual communication skills required by electrical and computer engineers. Prepares students for advanced communication tasks required in academic and professional settings.

ECE 3006. ECE Co-Curric Prof Comm. (null) Credit Hours.
This course documents student completion of ECE professional communications requirement through workshops, seminars, research projects, co/extra-curricular activities, etc.

ECE 3020. Math Foundations of CmpE. 3 Credit Hours.
Fundamental concepts in discrete mathematics and their efficient realization via algorithms, data structures, computer programs, and hardware. Discussion of engineering and computational applications.

ECE 3025. Electromagnetics. 3 Credit Hours.
To present the laws and applications of electromagnetics.

ECE 3030. Physical Foundations CmpE. 3 Credit Hours.
Basic principles governing the physical realization of computing systems and their relationship to characteristics such as performance, energy, and robustness. Implementation technologies.

ECE 3035. Mechanisms-Computing Sys. 4 Credit Hours.
Computing system execution and storage mechanisms, starting with instruction set architecture and concluding with support for high level languages and operating systems. Credit not allowed for both ECE 3035 and ECE 2035.

ECE 3040. Microelectronic Circuits. 4 Credit Hours.
Basic concepts of microelectronic materials, devices, and circuits.
ECE 3041. Instrument & Circuits Lab. 2 Credit Hours.
Fundamental experimental techniques for the laboratory analysis of signals and passive electrical circuits using basic electronic test and measurement instrumentation. Component characterization, computer-automated measurements, and simulation. Technical writing. Credit not allowed for both ECE 3041 and ECE 3043.

ECE 3042. Microelectro Circuit Lab. 2 Credit Hours.
Design, analysis, simulation, implementation, and evaluation of electronic circuits. Employs op amp, clock, counter, and converter integrated circuits, discrete diodes, bipolar junction, and field effect transistors; and some integrated circuits.

ECE 3043. Circuits & Electronics Lab. 2 Credit Hours.
Basic electronic test instrumentation. Elementary passive and active circuits using both discrete (diodes, bipolar junction transistors, MOSFETs) and integrated devices (operational amplifiers). Credit not allowed for both ECE 3043 and ECE 3041.

ECE 3050. Analog Electronics. 3 Credit Hours.
To present concepts of analysis and design of electronic circuits and systems. Biasing, small-signal analysis, frequency response, feedback amplifiers, active filters, non-linear op-amp applications, and oscillators.

ECE 3055. Computer Arch & Oper Sys. 4 Credit Hours.
Core concepts of computer architecture and operating systems. Instruction set architectures (ISA), compiler/ISA relationships, pipelined datapaths. Memory hierarchy, memory management, and protection. Processes, threads, CPU scheduling, and associated techniques. Credit not allowed for both ECE 3055 and ECE 3056.

ECE 3056. Comp Arch, Concurr, Energy. 3 Credit Hours.
Basic organizational principles of the major components of computer processors: cores, memory hierarchy, and the I/O subsystem. Implications for performance, concurrency, and energy. Credit not allowed for both ECE 3056 and ECE 3055.

ECE 3060. VLSI & Adv Digital Dsgn. 4 Credit Hours.
Advanced digital design issues in the context of VLSI systems. Introduction to a design methodology that encompasses the range from behavioral models to circuit simulation. Credit will not be awarded for ECE 3060 and ECE 3150.

ECE 3065. Electromagnetic Apps. 3 Credit Hours.
To present concepts in waveguiding and radiation, with application to microwaves, antennas, and optics. Credit will not be awarded for ECE 3065 and ECE 4350.

ECE 3070. Elec Energy Conversion. 3 Credit Hours.
This course serves as an introduction to three-phase power systems, electromechanical energy conversion, and operating principles of electric machines.

ECE 3071. Electric Energy Systems. 3 Credit Hours.
Non-renewable and renewable/sustainable energy sources. Processes, costs, and environmental impact of conversion into electric energy. Delivery and control of electric energy, electromechanical systems. Credit not allowed for both ECE 3071 and ECE 3072.

ECE 3072. Elec Energy Systems. 3 Credit Hours.
Non-renewable and renewable/sustainable energy sources. Processes, costs, and environmental impact of conversion into electric energy. Delivery and control of electric energy, electromechanical systems. Credit not allowed for both ECE 3072 and ECE 3071.

ECE 3075. Random Signals. 3 Credit Hours.
Study of random variables and random processes for applications in electrical and computer engineering. Includes an introduction to statistical filtering, parameter estimation, Markov processes.

ECE 3076. Computer Communications. 3 Credit Hours.
Presents the basic concepts of computer communications network protocols.

ECE 3077. Prob/Stats for ECE. 3 Credit Hours.
Introduction to probability, random variables, distributions, estimation, confidence intervals, linear regression and other tools for describing and managing uncertainty in electrical and computer engineering.

ECE 3080. Semiconductor Devices. 3 Credit Hours.
To gain an understanding of the device needs for current and future computers, and fiber optic and wireless communication systems addressing the future needs of high-frequency, GHz-range, device operation.

ECE 3084. Signals and Systems. 3 Credit Hours.
Continuous-time linear systems and signals, their mathematical representations, and computational tools. Fourier and Laplace transforms, convolutions, input-output responses, stability.

ECE 3085. Intro Systems & Control. 3 Credit Hours.
Theory of linear time-invariant systems for continuous and discrete time. Laplace and Z-Transforms. Transfer function and state space representations. Introduction to feedback control theory.

ECE 3090. Software for Engr System. 4 Credit Hours.
Using computer algorithms for solving electrical engineering problems arising in various application domains. Development of effective algorithms and their implementation by object-oriented code. Credit not allowed for both ECE 3090 and ECE 2036.

ECE 3150. VLSI & Adv Digital Dsgn. 4 Credit Hours.
Advanced digital design issues in the context of VLSI systems. Introduction to a design methodology that encompasses the range from architectural models to circuit simulation. Credit not awarded for ECE 3150 and ECE 3060.

ECE 3300. Elec Energy Conversion. 3 Credit Hours.
Introduction to three phase power systems, electromechanical energy conversion and operating principles of electric machines.

ECE 3400. Analog Electronics. 3 Credit Hours.
Analysis and design of electronic circuits and systems. Biasing, small-signal analysis, frequency response, feedback amplifiers, active filters, non-linear op-amp applications, and oscillators.

ECE 3431. Analog Electronics Lab. 2 Credit Hours.
Design, analysis, simulation, implementation, and evaluation of advanced electronic circuits. Employs bipolar junction, metal oxide semiconductor and field effect transistors; and some integrated circuits.

ECE 3450. Semiconductor Devices. 3 Credit Hours.
Properties of semiconductor devices. Applications in current and future computers, fiber optic and wireless communication systems. Future needs of high frequency, GHz-range, device operation.

ECE 3550. Feedback Control Systems. 3 Credit Hours.
Analysis and design of control systems. Laplace transforms, transfer functions, and stability. Feedback systems: tracking and disturbance rejection. Graphical design techniques.

ECE 3600. Computer Communications. 3 Credit Hours.
Basic concepts of computer communication network protocols.
ECE 3710. Circuits & Electronics. 2 Credit Hours.
An introduction to electric circuit elements and electronic devices and a study of circuits containing such devices.

ECE 3741. Instrum & Electronic Lab. 1 Credit Hour.
Basic analog and digital electronic circuits and principles. Techniques of electrical and electronic measurements with laboratory instruments.

ECE 3801. Special Topics. 1 Credit Hour.

ECE 3802. Special Topics. 2 Credit Hours.

ECE 3803. Special Topics. 3 Credit Hours.

ECE 3804. Special Topics. 4 Credit Hours.

ECE 3805. Special Topics. 5 Credit Hours.

ECE 3811. Special Topics. 1 Credit Hour.

ECE 3812. Special Topics. 2 Credit Hours.

ECE 3813. Special Topics. 3 Credit Hours.

ECE 3814. Special Topics. 4 Credit Hours.

ECE 3815. Special Topics. 5 Credit Hours.

ECE 3881. Special Topics. 1 Credit Hour.

ECE 3882. Special Topics. 2 Credit Hours.

ECE 3883. Special Topics. 3 Credit Hours.

ECE 3884. Special Topics. 4 Credit Hours.

ECE 3891. Special Topics. 1 Credit Hour.

ECE 3892. Special Topics. 2 Credit Hours.

ECE 3893. Special Topics. 3 Credit Hours.

ECE 3894. Special Topics. 4 Credit Hours.

ECE 3900. Special Problems. 1-21 Credit Hours.

ECE 3901. Special Problems. 1-21 Credit Hours.

ECE 3902. Special Problems. 1-21 Credit Hours.

ECE 3903. Special Problems. 1-21 Credit Hours.

ECE 3951. Undergrad Research I. 1-21 Credit Hours.
Participation in an individual or group research project under the direction of a faculty member.

ECE 3952. Undergrad Research II. 1-21 Credit Hours.
Participation in an individual or group research project under the direction of a faculty member. Requires a formal research report.

ECE 3XXX. Elec/Comp Engr Elective. 1-21 Credit Hours.

ECE 4001. Engr Practice & Profess. 2 Credit Hours.
Technical tools and professional issues for engineering practice and early career development. Engineering ethics, design tools, financial and economic principles, project management, probabilistic and statistical techniques, and decision making. Credit not allowed for both ECE 4001 and ECE 4000.

ECE 4007. ECE Design Project. 4 Credit Hours.
Team-oriented culminating design project in electrical/computer engineering, incorporating engineering standards and realistic constraints. Requires formal reports and group presentations. Credit not allowed for both ECE 4007 and ECE 4006.

ECE 4011. ECE Culminating Design 1. 2 Credit Hours.
First semester of ECE culminating design sequence. Design tools, financial principles, project management, probabilistic and statistical techniques, team forming. Requires formal reports and group presentations.

ECE 4012. ECE Culminating Design 2. 3 Credit Hours.
Second semester of ECE culminating design sequence. Team project in ECE incorporating engineering standards and realistic constraints. Requires formal reports and group presentations.

ECE 4043. Analog Electronics Lab. 2 Credit Hours.
Experiments in analog electronics using discrete devices and off-the-shelf integrated circuits.

ECE 4100. Adv Computer Architecture. 3 Credit Hours.
Comprehensive coverage of the architecture and system issues that confront the design of high-performance workstation/PC computer architectures with emphasis on quantitative evaluation. Credit is not allowed for both ECE 4100 and any of the following courses: ECE 6100, CS 4290, CS 6290.

ECE 4110. Internetwork Programming. 4 Credit Hours.
Exploration of Internet implementation as a network of computing systems. Internetworking skills for design and implementation of hardware and software Internet products.

ECE 4112. Internetwork Security. 3 Credit Hours.
Hands-on experimentation and evaluation of internet security theory, principles, and practices. Laboratory component involves implementing both defensive and offensive security techniques.

ECE 4115. Intro to Comp Security. 4 Credit Hours.
Introductory topics in computer security are presented with an emphasis on fundamental security primitives and current security challenges facing society. Credit not awarded for both ECE 4115 and ECE 4112.

ECE 4122. Adv Prog Techniques. 3 Credit Hours.
Course covers a number of programming techniques for distributed and parallel computing and other advanced methods, such as multiprecision arithmetic and nonblocking I/O. Credit not awarded for ECE 4122 and ECE 6122.

ECE 4130. Adv VLSI Systems. 4 Credit Hours.
An advanced treatment of VLSI systems analysis, design, and testing with emphasis on complex systems and how they are incorporated into a silicon environment. Credit is not allowed for both ECE 4130 and ECE 6130.

ECE 4150. Cloud Computing. 3 Credit Hours.
Cloud computing technologies, computation models, and applications, design methodologies for cloud applications, use of cloud-based languages and tools in developing advanced applications.

ECE 4170. HDL Based Design. 3 Credit Hours.
Introduction to hardware description languages and associated methodologies for digital system design. In-depth coverage includes applications to the simulation and synthesis of digital systems.

ECE 4175. Emb Microcontroller Dsgn. 4 Credit Hours.

ECE 4180. Embedded Systems Design. 4 Credit Hours.
Processors, chipsets, busses, and I/O devices for high-ended embedded systems. Embedded operating systems; device drivers and applications for embedded systems.

ECE 4181. Embedded Comp Systems. 4 Credit Hours.
Algorithms and methodologies for the design of real-time, low-power embedded computing systems.
ECE 4185. Emb Microcontroller Des. 4 Credit Hours.
Design, implement, and debug embedded micro-controller systems. Develop code; understand underlying assembly code instructions and addressing modes. Use ADC, timers, and other resources.

ECE 4260. Random Signals & Appl. 3 Credit Hours.
Introduction to random signals and processes with emphasis on applications in ECE. Includes basic estimation theory, linear prediction, and statistical modeling.

ECE 4270. Fund-Digital Signal Proc. 3 Credit Hours.

ECE 4271. Applications of DSP. 4 Credit Hours.
Applications of DSP in speech, image processing, radar, pattern recognition, and adaptive filtering requiring working software implementations applied to the analysis of real signals.

ECE 4273. DSP Chip Design. 3 Credit Hours.
Fundamentals of theory and practice of DSP chip design in VHDL. Exposure to tools and environments for chip design, simulation, and verification.

ECE 4320. Power Sys Analy& Control. 3 Credit Hours.
Introduces basic concepts in electric power generation, distribution, system control, and economic operation.

ECE 4321. Power System Engineering. 3 Credit Hours.
To introduce basic concepts of electric power system design, encompassing protection, stability, and control.

ECE 4325. Electric Power Quality. 3 Credit Hours.
Transients and harmonics in power systems, analysis methods and mitigation practices. Causes of power quality problems and relationship to equipment susceptibility. Credit not allowed for both ECE 4325 and ECE 6340.

ECE 4330. Power Electronics. 3 Credit Hours.
Introduces power semiconductor devices and power electronic converters, including single-phase and three-phase ac/dc rectifiers, ac voltage controllers, dc/dc converters, and dc/ac inverters.

ECE 4335. Elec Machinery Analysis. 3 Credit Hours.
Advanced theory of AC machines, including AC motor winding design, finite element analysis, induction motor design, permanent magnet machine design, and synchronous machine dynamics. Credit is not allowed for both ECE 4335 and ECE 6335.

ECE 4350. Electromag Applications. 3 Credit Hours.
Presents concepts of electromagnetic fields applied to microwave circuit design and antenna radiation. Credit will not be awarded for ECE 4350 and ECE 3065.

ECE 4360. RF-Microwave Lab. 2 Credit Hours.
RF/microwave measurement theory and techniques. Use of state-of-the-art equipment operating into the GHz range.

ECE 4370. Antenna Engineering. 3 Credit Hours.
Basic theory, application, and design of a broad range of antennas.

ECE 4371. Antenna Engineering Lab. 1 Credit Hour.
Experimentation to develop a practical understanding of antennas and their properties.

ECE 4390. Radar and EM Sensing. 3 Credit Hours.
Introduces students to radar systems, including pulsed, CW, CWFM, and MTI radars. Other techniques for electromagnetic sensing such as radiometry and EM tagging are discussed.

ECE 4391. Electromag Compatibility. 3 Credit Hours.
To study electromagnetic interference and susceptibility of electrical systems, with application to analog and digital circuits.

ECE 4410. Analog Filters. 3 Credit Hours.
An introduction to the theory, design techniques, and applications of analog passive, active, and switched-capacitor filters.

ECE 4415. RF Engineering I. 3 Credit Hours.
Fundamentals of RF engineering. Components at high frequencies, device modeling, amplifiers, lumped-element and microstrip impedance transformation networks, S-parameter-based design of RF and microwave amplifiers.

ECE 4418. RF Engineering II. 3 Credit Hours.
Fundamentals learned in RF-I are employed to design the elements of radio receivers, transmitters, and similar systems. Systems analysis, mixers, detectors, power amplifiers, low-noise amplifiers, and oscillators are covered.

ECE 4420. Digital Integ Circuits. 3 Credit Hours.
Analysis and design of bipolar and MOS digital integrated circuit families and their applications in modern electronic systems.

ECE 4430. Analog Integra Circuits. 3 Credit Hours.
Analysis and design of analog ICs using analytic techniques and CAD tools. Topics include amplifiers, current sources, output circuits, and other analog building blocks.

ECE 4435. Operational Amp Design. 3 Credit Hours.
Analysis and design techniques for utilization of integrated circuit operational amplifiers for applications in electronic systems.

ECE 4445. Audio Engineering. 3 Credit Hours.
Concepts of acoustics and electroacoustic modeling for the analysis and design of microphones, loudspeakers, and crossover networks. Methods of analysis and design of audio power amplifiers.

ECE 4446. Audio Engineering Lab. 1 Credit Hour.
A companion laboratory to ECE 4445. Design, analysis, construction, modeling, and testing of circuits and systems pertaining to audio engineering.

ECE 4451. Semiconductor Dev-Commun. 3 Credit Hours.
Advanced development of semiconductor device theory focusing on optoelectronic emitters, detectors, and high-frequency transistors to provide an understanding of devices used in communications systems.

ECE 4452. IC Fabrication. 3 Credit Hours.
Introduction to microelectronic processing technologies and CMOS. Includes a laboratory for fabrication/testing of MOS transistors, basic CMOS circuits, integrated resistors and capacitors. Credit will not be awarded for ECE 4452 and ECE 4752.

ECE 4460. Electronic Packaging. 3 Credit Hours.
Introduction to packaging technologies, technology drivers, electrical performance, thermal management, materials, optoelectronics, RF integration, reliability, system issues, assembly, testing.

ECE 4500. Optical Engineering. 3 Credit Hours.
Introduction to applications of geometric, physical optics to engineering, including optical measurements, matrix methods, instruments, interference, holography, beam optics, Fourier optics, and diffraction.

ECE 4501. Fiber Optics. 5 Credit Hours.
Combined lecture-laboratory exploration of the technology of fiber optics, with special emphasis on optical fiber communications systems. Credit will not be awarded for ECE 4501 and ECE 4502.
ECE 4502. Optical Fiber Comm. 4 Credit Hours.
Combined lecture-laboratory exploration of the technology of fiber optics, with emphasis on optical fiber communication systems. Credit will not be awarded for ECE 4502 and ECE 4501.

ECE 4550. Control System Design. 4 Credit Hours.
Design of control algorithms using state-space methods, microcontroller implementation of control algorithms, and laboratory projects emphasizing motion control applications.

ECE 4551. Systems & Controls I. 4 Credit Hours.
Introduction to feedback control. Root locus and bode design for SISO systems, continuous and discrete. Introduction to state space formulation, continuous and discrete.

ECE 4555. Embedded&Hybrid Control. 3 Credit Hours.
Modeling, analysis, and design of embedded and hybrid control systems.

ECE 4560. Intro-Automation&Robotic. 4 Credit Hours.
Concurrent engineering principles; robotic manipulator kinematics, dynamics, and control; applications of robots in industry, medicine, and other areas; team projects and hands-on laboratory experience.

ECE 4562. Neural Nets & Fuzzy Ctrl. 3 Credit Hours.
Principles of neural networks and fuzzy systems; the MATLAB Neural Network and Fuzzy Logic Toolboxes; examples from system identification, classification, and control; laboratory experience.

ECE 4563. Game Theory. 3 Credit Hours.
An introduction to game theory and its application to multiagent systems, including distributed routing, multivehicle control, and networked systems.

ECE 4570. Modern System Theory. 4 Credit Hours.
Study of the basic concepts in linear system theory and numerical linear algebra with applications to communication, computation, control, and signal processing. A unified treatment.

ECE 4575. Numerical Methods Optim. 3 Credit Hours.
Algorithms for numerical optimization and optimal control, Gradient-descent techniques, linear programming, numerical linear system solvers, second-order methods of optimizing performance of dynamical systems.

ECE 4580. Computer Vision. 3 Credit Hours.
Computational and theoretical aspects of computer vision. Application areas include robotics, autonomous vehicles, tracking, and image-guided surgery. Includes major project.

ECE 4601. Communication Systems. 3 Credit Hours.
To present the fundamentals of modern digital communication systems and evaluate their performance with realistic channel models.

ECE 4602. Communication System Lab. 1 Credit Hour.
To examine the performance of analog and digital telecommunications systems and components. Credit will not be awarded for ECE 4612 and ECE 4602.

ECE 4604. Network Dsgn&Simulation. 4 Credit Hours.
Introduces the principles of Monte Carlo techniques and network simulation, and applies them to design issues in ATM systems.

ECE 4605. Advanced Internetworking. 4 Credit Hours.
Networking fundamentals, including TCP/IP protocol suite. Latest networking technologies in wireless networks and mobile computing, network quality of service, network programmability, and miscellaneous topics. Project intensive.

ECE 4606. Wireless Communications. 3 Credit Hours.
Cellular concept, wireless propagation modeling; types of digital modulation used in wireless systems, diversity combining, performance over fading channels, and multiple access techniques.

ECE 4607. Mobile&Wireless Networks. 3 Credit Hours.

ECE 4612. Telecom Systems Lab. 1 Credit Hour.
Basic digital telecommunications systems are examined in a laboratory setting using electronic modules, covering concepts such as modulation, channel coding, AWGN, eye diagrams, and BER. Credit will not be awarded for ECE 4612 and ECE 4602.

ECE 4698. Research Assistantship. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

ECE 4699. Undergraduate Research. 1-12 Credit Hours.
Independent Research conducted under the guidance of a faculty member.

ECE 4751. Laser Theory&Application. 3 Credit Hours.
Provides an introduction to the theory and applications of laser principles and related instrumentation. Emphasis is on the fundamental principles underlying laser action. Crosslisted with PHYS 4751.

ECE 4752. IC Fabrication. 3 Credit Hours.
Gives students exposure to the various steps involved in the fabrication of integrated circuits and devices. The course will include a laboratory segment in which students fabricate MOS transistors, diffused resistors, and MOS capacitors from a bare silicon substrate. Crosslisted with CHE 4752. Credit will not be awarded for ECE 4752 and ECE 4452.

ECE 4753. Topics in Engr Practice. 3 Credit Hours.
Topics of current importance offered in collaboration with an approved partner of Georgia Tech’s Distance Learning Program. Crosslisted with ME 4753.

ECE 4754. Elec Packaging Assembly. 3 Credit Hours.
The course provides hands-on instruction in electronics packaging, including assembly, reliability, thermal management, and test of next-generation microsystems. Crosslisted with ME and MSE 4754.

ECE 4755. Packaging Substrate Fab. 3 Credit Hours.
This course provides hands-on instruction in basic packaging substrate fabrication techniques, including interconnect design and testing, dielectric deposition, via formation, and metallization. Crosslisted with CHE 4755.

ECE 4761. IndustrialCtrls & Mfg. 3 Credit Hours.
Students are introduced to industrial controls and the fundamentals of manufacturing with hands-on experience based on lab projects using industry software and hardware for communications and control. Crosslisted with PTFE 4761.

ECE 4781. Biomed Instrumentation. 3 Credit Hours.
A study of medical instrumentation from a systems viewpoint. Pertinent physiological and electro-physiological concepts will be covered. Credit not allowed for both ECE 4781 and (CHE 4781 or CHBE 4781 or BMED 4781 or ME 4781).

ECE 4782. Biosystems Analysis. 3 Credit Hours.
Analytical methods for modeling biological systems, including white-noise protocols for characterizing nonlinear systems. Crosslisted with BMED, CHE and ME 4782.
ECE 4783. Intro-Medical Image Proc. 3 Credit Hours.  
A study of mathematical methods used in medical acquisition and processing. Concepts, algorithms, and methods associated with acquisition, processing, and display of two- and three-dimensional medical images are studied. Crosslisted with BMED 4783.

ECE 4784. Engr Electrophysiology. 3 Credit Hours.  
Basic concepts of electrophysiology from an engineering perspective. Functionality of relevant organs and systems; instrumentation tools which monitor electrophysiology function. Crosslisted with BMED 4784.

ECE 4801. Special Topics. 1 Credit Hour.
ECE 4802. Special Topics. 2 Credit Hours.
ECE 4803. Special Topics. 3 Credit Hours.
ECE 4804. Special Topics. 4 Credit Hours.
ECE 4805. Special Topics. 5 Credit Hours.
ECE 4811. Special Topics. 1 Credit Hour.
ECE 4812. Special Topics. 2 Credit Hours.
ECE 4813. Special Topics. 3 Credit Hours.
ECE 4814. Special Topics. 4 Credit Hours.
ECE 4815. Special Topics. 5 Credit Hours.
ECE 4823. Special Topics. 3 Credit Hours.
ECE 4833. Special Topics. 3 Credit Hours.
ECE 4881. Special Topics. 1 Credit Hour.
ECE 4882. Special Topics. 2 Credit Hours.
ECE 4883. Special Topics. 3 Credit Hours.
ECE 4884. Special Topics. 4 Credit Hours.
ECE 4891. Special Topics. 1 Credit Hour.
ECE 4892. Special Topics. 2 Credit Hours.
ECE 4893. Special Topics. 3 Credit Hours.
ECE 4894. Special Topics. 4 Credit Hours.
ECE 4900. Special Problems. 1-21 Credit Hours.
ECE 4901. Special Problems. 1-21 Credit Hours.
ECE 4902. Special Problems. 1-21 Credit Hours.
ECE 4903. Special Problems. 1-21 Credit Hours.
ECE 4951. Undergrad Research I. 1-21 Credit Hours. 
Participation in an individual or group research project under the direction of a faculty member.
ECE 4952. Undergrad Research II. 1-21 Credit Hours. 
Participation in an individual or group research project under the direction of a faculty member.
ECE 4XXX. Elec/Comp Engr Elective. 1-21 Credit Hours.
ECE 6100. Adv Comput Architecture. 3 Credit Hours. 
Comprehensive coverage of the architecture and system issues that confront the design of high-performance workstation/PC computer architectures with emphasis on quantitative evaluation. Credit is not allowed for both ECE 6100 and any of the following courses: ECE 4100, CS 4290, CS 6290.
ECE 6101. Parallel& Dist Comp Arch. 3 Credit Hours. 
An advanced study of the critical issues and limiting factors in the design of asynchronous and synchronous parallel and distributed architectures.
ECE 6102. Dependable Distrib Sys. 3 Credit Hours. 
Concepts, theory, and practice of dependable distributed systems. Techniques for tolerating hardware and software faults. Security aspects such as confidentiality, availability, and integrity.
ECE 6110. CAD-Communication Netwks. 3 Credit Hours. 
Investigation of the methodologies and algorithms used for designing and optimizing computer/communications networks with a focus on the algorithmic aspects of network design.
ECE 6120. Automata Theory. 3 Credit Hours. 
The course presents a broad base of topics in modern automata and switching theory. These elements form the essentials upon which modern digital systems are constructed.
ECE 6121. Combinatorial Strategies. 3 Credit Hours. 
Modern counting theory and algorithmic approaches necessary for discrete computation.
ECE 6122. Adv Prog Techniques. 3 Credit Hours. 
Covers a number of advanced topics in programming methods, data management, distributed computing, and advanced algorithms used in typical engineering applications. Credit will not be awarded for ECE 4122 and ECE 4122.
ECE 6130. Adv VLSI Systems. 3 Credit Hours. 
An advanced treatment of VLSI systems analysis, design, and testing with emphasis on complex systems and how they are incorporated into a silicon environment. Credit is not allowed for both ECE 4130 and ECE 6130.
ECE 6132. Comp-aided VLSI Sys Dsgn. 3 Credit Hours. 
Theory and practice of computer-aided VLSI digital systems design. Logic synthesis, semi-custom VLSI design, high-level synthesis, low-power systems, and hardware/software co-design. Individual and group projects.
ECE 6133. Phys Design Automat-VLSI. 3 Credit Hours. 
Various design automation problems in the physical design process of VLSI circuits including clustering, partitioning, floor planning, placement, routing, and compaction.
ECE 6140. Digital Systems Test. 3 Credit Hours. 
Introduction to the basic concepts in digital systems testing. Advanced topics in fault modeling and simulation, test pattern generation, and design for testability.
ECE 6200. Biomedical Applic MEMS. 3 Credit Hours. 
MEMS processing technologies, design of fabrication process flows, and applications of the technologies to the development of biomedical micro instrumentation and detection methodologies.
ECE 6229. Introduction to MEMS. 3 Credit Hours. 
Introduction to Micro-Electro-Mechanical systems: Microfabrication techniques including: photolithography, etching, physical and chemical vapor deposition, electroplating, bonding and polymer processing. Application to sensors and actuators. Credit not allowed for both ECE 6229 and ME 6229 or CHBE 6229.
ECE 6250. Adv Digital Signal Proc. 3 Credit Hours. 
An introduction to advanced signal processing methods that are used in a variety of applications areas.
ECE 6254. Stat Machine Learning. 3 Credit Hours. 
An introduction to the theory of statistical learning and practical machine learning algorithms with applications in signal processing and data analysis.
ECE 6255. Digit Proc-Speech Signal. 3 Credit Hours.
The application of digital signal processing to problems in speech
communication. Part of this goal requires a laboratory project.

ECE 6258. Digital Image Processing. 3 Credit Hours.
An introduction to the theory of multidimensional signal processing
and digital image processing, including key applications in multimedia
products and services, and telecommunications.

ECE 6260. Data Compression & Model. 3 Credit Hours.
Theory and algorithms of signal encoding and decoding for data
compression. Applications in information systems, digital telephony,
digital television, and multimedia Internet.

ECE 6261. Adaptive Filtering. 3 Credit Hours.
Basic theory of adaptive filter design and implementation. Steepest
descent, LMS algorithms, nonlinear adaptive filters, and neural networks.
Analysis of performance and applications.

ECE 6272. Fund-Radar Signal Proces. 3 Credit Hours.
Signal modeling including radar cross section, multipath, and clutter.
Properties of the ambiguity function and coded waveforms. Algorithms
for Doppler processing, detection, and radar imaging.

ECE 6273. Pattern Recognit-Speech. 3 Credit Hours.
Theory and application of pattern recognition with a special application
section for automatic speech recognition and related signal processing.

ECE 6274. Stat Natural Lang Proc. 3 Credit Hours.
Foundations of statistical natural language processing established for
text data analysis, language engineering, information extraction, and
statistical inference. Applications using large text datasets are illustrated.

ECE 6276. DSP Hardware Sys Design. 3 Credit Hours.
A study of theory and practice in the design and implementation of DSP
algorithms on programmable processors, multiprocessors, and ASICs.

ECE 6277. DSP Software Sys Design. 3 Credit Hours.
Specification, evaluation, and implementation of real-time DSP
applications on embedded DSP-based environments.

ECE 6279. Spatial Array Processing. 3 Credit Hours.
Introduce application areas where signals are sampled over space and
time. Transfer knowledge of time-based techniques to spatial processing.
Develop algorithms unique to spatial processing.

ECE 6280. Cryptography & Security. 3 Credit Hours.
Algebraic and number theory approaches to cryptographic techniques,
information security, secret key and public key encryption, signature
schemes, hash functions, message authentication, and key distribution.
Credit not allowed for both ECE 6280 and CS 6260.

ECE 6282. Radar Imaging. 3 Credit Hours.
An indepth study of digital signal processing methods for Synthetic
Aperture Radar (SAR) image formation. Methods are also applicable to
sonar.

ECE 6283. Harm Analysis Sig Proc. 3 Credit Hours.
Explores the role of sparse representations in signal processing. Specific
topics include: frame decompositions, approximation theory, inverse
problems, imaging, and compressed sensing.

ECE 6320. Power Sys Ctrl&Operation. 3 Credit Hours.
Introduction to methods used in the real-time operation and control of
power systems as well as to the hardware and software technology of
energy management systems (EMS). Credit will not be awarded for both
ECE 6320 and ECEP 6301.

ECE 6321. Power System Stability. 3 Credit Hours.
Techniques for stability analysis of electric power systems and
applications of these methods.

ECE 6322. Pwr Sys Plan&Reliability. 3 Credit Hours.
To introduce basic concepts as well as analysis and optimization
techniques underlying reliability assessment of electric power systems
and planning techniques. Credit will not be awarded for both ECE 6322
and ECEP 6305.

ECE 6323. Power System Protection. 3 Credit Hours.
Theory and practice of modern power system protection techniques.
Credit will not be awarded for both ECE 6323 and ECEP 6351.

ECE 6330. Power Electronic Devices. 3 Credit Hours.
Physical considerations involved in the fabrication and use of power
semiconductor devices and high-frequency magnetic transformers and
inductors.

ECE 6331. Power Electronic Circuits. 3 Credit Hours.
The analysis, control, and design of switching power converters: rectifiers,
cycoconverters, voltage-sourced and current-source inverters, dc-dc
converters, pfc and resonant converts.

ECE 6332. Power Electronic CAD Lab. 1 Credit Hour.
To introduce the use of CAD tools in the simulation, analysis, and design
of power electronic circuits and systems.

ECE 6335. Electric Machinery Analy. 3 Credit Hours.
An introduction to the analysis and basic construction principles of
rotating electric machines and transformers, including ac synchronous
and induction machines and dc machines. Credit is now allowed for both
ECE 4335 and ECE 6335.

ECE 6336. Electric Machine Drives. 3 Credit Hours.
A study of the dynamics and control of electric machinery and variable
speed machine drive systems.

ECE 6337. Electricity Markets. 3 Credit Hours.
Comprehensive introduction to markets for electrical energy, including
economic theory, market design, utility models, effects of the physical
grid, and grid services.

ECE 6350. Applied Electromagnetics. 3 Credit Hours.
The methodology and application of advanced electromagnetic theory.

ECE 6360. Microwave Design. 3 Credit Hours.
Applications of electromagnetic theory to microwave components
and systems. Introduction to the latest characterization and design
techniques including monolithic microwave integrated circuit (MMIC)
technology.

ECE 6361. Microwave Design Lab. 3 Credit Hours.
This laboratory course will teach microwave measurement/design
fundamentals for both passive and active components. Students will use
both CAD tools and network analyzers.

ECE 6370. EM Radiation & Antennas. 3 Credit Hours.
The fundamentals of electromagnetic radiation and antennas.

ECE 6380. Intro Computational EM. 3 Credit Hours.
The practical application of the finite-difference time-domain and finite
element techniques to electromagnetic problems. Computer projects are
required.

ECE 6390. Satellite Comm&Navig Sys. 3 Credit Hours.
To introduce satellite communications and navigation system design
including microwave transmission, satellite transponders, earth station
hardware, and satellite networks. A design project is required.
ECE 6412. Analog Integ Circuit Dgn. 3 Credit Hours.
Design of analog circuits using CMOS and bipolar technologies.

ECE 6414. Analog Integrate Sys Dgn. 3 Credit Hours.
Design of analog systems using CMOS and bipolar technologies. A higher level of design for analog and digital systems is presented.

ECE 6416. Low Noise Elec Sys Dsgn. 3 Credit Hours.
A study of the sources of noise found in electronic instrumentation. Teaches the recognition of sources of noise and the design techniques to achieve noise reduction.

ECE 6420. Wireless IC Design. 3 Credit Hours.
Wireless system specifications are translated to architectures and building blocks compatible with silicon technology. The course focuses on the analysis and design of these blocks.

ECE 6422. Interface IC Design. 3 Credit Hours.
Design of high-performance integrated interface circuits for various MEMS and sensing devices. System level issues in integrated microsystems.

ECE 6430. Digital MOS Ics. 3 Credit Hours.
Detailed analysis of the operation and design of high-performance MOS digital integrated circuits. Emphasis is on circuit design techniques with examples from the literature.

ECE 6435. Neuro Analog VLSI Ckts. 3 Credit Hours.
Large-scale analog computation for sensory and motor processing. Analog building blocks are presented, leading to VLSI systems inspired by neurobiological architectures and computational paradigms.

ECE 6440. Frequency Synthesizers. 3 Credit Hours.
Frequency synthesizers generate many discrete RF frequencies from one reference frequency. General synthesizers, digital PLL, direct digital, and hybrid synthesizers are covered.

ECE 6442. Electronic Oscillators. 3 Credit Hours.
Starting from nonlinear differential equations, this course presents a systematic approach to the design of electronic oscillators. Design of negative resistance and feedback oscillators is discussed. CAD techniques are employed.

ECE 6444. Si-Based Hetero Dev & Ckts. 3 Credit Hours.
Theory and design of novel silicon-germanium microelectronic devices and circuits. Materials, device physics, fabrication, measurement, circuit design, and system applications.

ECE 6445. Power IC Design. 3 Credit Hours.
Analysis and design of linear dc-dc regulators and switched-inductor dc-dc supplies with CMOS and BiCMOS integrated circuits (ICs).

ECE 6450. Microelectronics Tech. 3 Credit Hours.
Presents the fundamentals of microelectronics material, device, and circuit fabrication.

ECE 6451. Intro Microelec Theory. 3 Credit Hours.
Basis of quantum mechanics, statistical mechanics, and the behavior of solids to serve as an introduction to the modern study of semiconductors and semiconductor devices.

ECE 6453. Theory Electronic Device. 3 Credit Hours.
Presents the fundamentals of electronic device operation.

ECE 6455. Semiconductor Proc Ctrl. 3 Credit Hours.
This course is designed to explore methods of applying statistical process control and statistical quality control to semiconductor manufacturing processes. Students will be required to complete a design project.

ECE 6456. Solar Cells. 3 Credit Hours.
To provide a practical understanding of semiconductor materials and technology as it relates to design and development of efficient solar cells and photovoltaic systems.

ECE 6458. Gigascale Integration. 3 Credit Hours.
Hierarchy of physical principles that enable understanding and estimation of future opportunities to achieve multibillion transistor silicon chips using sub-0.25 micron technology.

ECE 6460. Microelectromech Devices. 3 Credit Hours.
Fundamental concepts for design of microelectromechanical devices (MEMS), including mechanical and thermal behavior of materials and structures, transduction principles, transducer design, and modeling.

ECE 6461. Nanoelectronics. 3 Credit Hours.
In this course carbon nanotubes are used as a framework to teach quantum transport as the foundation for all emerging nanoelectronic devices.

ECE 6500. Fourier Tech&Signal Analy. 3 Credit Hours.
Introduction to the use of Fourier Methods for analysis of signals.

ECE 6501. Fourier Optic&Holography. 3 Credit Hours.
Applications of the Fourier transform and linear systems theory to the analysis of optical propagation, diffraction imaging, holography, wavefront modulation, and signal processing.

ECE 6510. Electro-Optics. 3 Credit Hours.
Study of the fundamental principles and primary applications of lasers, and of detectors of optical radiation.

ECE 6515. Nanophotonics. 3 Credit Hours.
Design of nano-structures to guide light and to develop a new set of optical devices.

ECE 6520. Integrated Optics. 3 Credit Hours.
Theory and design of optical waveguides and optical waveguide devices.

ECE 6521. Optical Fibers. 3 Credit Hours.
Provides an in-depth understanding of the light-guiding properties of optical fibers as used in communication systems.

ECE 6522. Nonlinear Optics. 3 Credit Hours.
Provides an introduction to the field of nonlinear optics, exploring the physical mechanisms, applications, and experimental techniques.

ECE 6530. Mod, Diffract&Cryst Opt. 3 Credit Hours.
Provides a working knowledge of temporal and spatial optical modulation, diffractive optical devices, and crystal optics.

ECE 6540. Organic Optoelectronics. 3 Credit Hours.
Fundamental understanding of the optical and electronic properties of organic materials and devices that form the basis of the emerging technological area of printed flexible optoelectronics.

ECE 6542. Optoelectronic Systems. 3 Credit Hours.
Optoelectronic devices (detectors, emitters, modulators) from the practical realized and theoretical performance perspective. Explores monolithic and hybrid integration of devices, packaging, and system implementation.

ECE 6543. Fiber Optic Networks. 3 Credit Hours.
Architectural, performance and design aspects of fiber-optic communications networks, components, and technologies. Relationship between the physical network implementation and the higher-level network architecture.
ECE 6550. Linear Sys and Controls. 3 Credit Hours.
Introduction to linear system theory and feedback control. Topics include
state space representations, controllability and observability, linear
feedback control. Credit will not be awarded for both ECE 6550 and
AE 6530.

ECE 6551. Digital Control. 3 Credit Hours.
Techniques for analysis and synthesis of computer-based control
systems. Design projects provide an understanding of the application of
digital control to physical systems.

ECE 6552. Nonlinear Systems. 3 Credit Hours.
Classical analysis techniques and stability theory for nonlinear systems.
Control design for nonlinear systems, including robotic systems. Design
projects.

ECE 6553. Optimal Control. 3 Credit Hours.
Optimal control of dynamic systems, numerical optimization, techniques
and their applications in solving optical-trajectory problems.

ECE 6554. Adaptive Control. 3 Credit Hours.
Methods of parameter estimation and adaptive control for systems
with constant or slowly varying unknown parameters. MATLAB design
projects emphasizing applications to physical systems.

ECE 6555. Optimal Estimation. 3 Credit Hours.
Techniques for signal and state estimation in the presence of
measurement and process noise with the emphasis on Wiener and
Kalman filtering.

ECE 6556. Intelligent Control. 3 Credit Hours.
Principles of intelligent systems and their utility in modeling,
identification, and control of complex systems; neuro-fuzzy tools applied
to supervisory control; hands-on laboratory experience.

ECE 6557. Manufacturing Sys Design. 3 Credit Hours.
Analytic and simulation tools for design, control, and optimization
of manufacturing systems. Discrete event dynamic systems and
optimization.

ECE 6558. Stochastic Systems. 3 Credit Hours.
Advanced techniques in stochastic analysis with emphasis on stochastic
dynamics, nonlinear filtering and detection, stochastic control, and
stochastic optimization and simulation methods.

ECE 6559. Adv Linear Systems. 3 Credit Hours.
Study of multivariable linear system theory and robust control design
methodologies.

ECE 6560. PDEs Image Proc & Vision. 3 Credit Hours.
Mathematical foundations and numerical aspects of partial-differential
equation techniques used in computer vision. Topics include image
smoothing and enhancement, edge detection, morphology, and image
reconstruction.

ECE 6561. Computing for Controls. 3 Credit Hours.
Introduction to real-time computing, distributed computing, and software
engineering in control systems. The particular requirements of control
systems will be presented.

ECE 6562. Control Robotic Systems. 3 Credit Hours.
Fundamental issues associated with autonomous robot control.
Emphasizes biological perspective that forms the basis of many current
developments in robotics.

ECE 6563. Networked Control. 3 Credit Hours.
Covers tools and techniques for networked control systems as well as
application domains and promising research directions.

ECE 6564. Networked Control. 3 Credit Hours.
Covers tools and techniques for networked control systems as well as
application domains and promising research directions.

ECE 6565. Random Processes. 3 Credit Hours.
To develop the theoretical framework for the processing of random
signals and data.

ECE 6566. Digital Communications. 3 Credit Hours.
Basic M-ary digital communications systems, with emphasis on system
design and performance analysis in the presence of additive noise.

ECE 6567. Adv Digit Communications. 3 Credit Hours.
The theory and practice of efficient digital communications over linear
dispersive channels, including adaptive equalization and synchronization.

ECE 6568. Personal & Mobile Commun. 3 Credit Hours.
To introduce various topics that are fundamental to cellular mobile
telephone systems.

ECE 6569. Information Theory. 3 Credit Hours.
To introduce the mathematical theory of communications. Emphasis
will be placed on Shannon's theorems and their use in the analysis and
design of communication systems.

ECE 6570. Coding Theory & Appl. 3 Credit Hours.
To introduce the theory and practice of error control coding, with
emphasis on linear, cyclic, convolutional, and parallel concatenated
codes.

ECE 6571. Computer Comm Networks. 3 Credit Hours.
Fundamental concepts of computer network architecture and protocols.

ECE 6572. Performance Analysis. 3 Credit Hours.
Fundamental concepts of queuing systems, and applications of queuing
theory to the performance evaluation of computer networks.

ECE 6573. Wireless Networks. 3 Credit Hours.
Fundamental concepts of wireless networks.

ECE 6574. Broadband Networking. 3 Credit Hours.
Fundamental concepts of broadband networking, including network
models, ATM networks, quality of service, and traffic management.

ECE 6575. Comp Network Security. 3 Credit Hours.
Fundamental concepts of network information security, including
encryption, secure access methods, and vulnerabilities in network
protocols, operating systems, and network applications.

ECE 6576. Broadband Access Network. 3 Credit Hours.
Study and comparison of ongoing and emerging access network
technologies, including hybrid-fiber-coax, FTTP/FTTH, Gigabit Ethernet,
ADSL/VDSL, and ultra wideband wireless data over fiber systems.

ECE 6577. Multimedia Communication. 3 Credit Hours.
Comprehensive coverage of media compression, synthesis and
recognition, media communications and networking, and standards for
audiovisual communications over wired and wireless networks.

ECE 6578. Sensor Networks. 3 Credit Hours.
Basics of sensor network communications. Applications, architectures,
and communication protocols for sensor networks are treated in depth.

ECE 6579. Cognitive Radio Networks. 3 Credit Hours.
Scarce spectrum needs to be dynamically managed. Architectures and
communication protocols such as spectrum sensing, spectrum sharing,
and spectrum mobility are treated in depth.

ECE 6580. Model&Sim:Found&Implemen. 3 Credit Hours.
Foundations and algorithms concerning the development of conceptual
models for systems, and their realization in the form of computer
software; discrete and continuous models. Crosslisted with CSE 6730.
ECE 6744. Topics in Engr Practice. 3 Credit Hours.
Topics of current importance offered in collaboration with an approved partner of Georgia Tech's Distance Learning Program. Crosslisted with ME 6744.

ECE 6759. Plasma Processing. 3 Credit Hours.
Fundamental physics, chemistry, chemical engineering, and electrical engineering principles inherent in plasma processes. Includes etching, deposition, diagnostic methods, and control schemes. Crosslisted with CHE 6759.

ECE 6771. Optoelectronics. 3 Credit Hours.
Optoelectronic materials, physical processes, and devices. Includes compound semiconductor materials, excitation, recombination, gain, and modulation processes and devices such as emitters, detectors, and modulators. Crosslisted with PHYS 6771.

ECE 6776. Microelec Sys Packaging. 3 Credit Hours.
Broad overview of system-level, cross-disciplinary microelectronics packaging technologies, including design, test, thermal, reliability, optoelectronics, and RF integration. Comparison of system-on-chip and system-on-package. Crosslisted with ME and MSE 6776.

ECE 6779. Therm Pkg-Micro/Nano Sys. 3 Credit Hours.
Passive, active, and hybrid thermal management techniques, and computational modeling of micro systems. Air cooling, single phase and phase change liquid cooling, heat pipes, and thermoelectrics. Crosslisted with ME 6779.

ECE 6780. Medical Image Processing. 3 Credit Hours.
A study of methods for enhancing, analyzing, interpreting, and visualizing information from two- and three-dimensional data obtained from a variety of medical imaging modalities. Crosslisted with CS and BMED 6780.

ECE 6786. Medical Imaging Systems. 3 Credit Hours.
A study of the principles and design of medical imaging systems such as X-ray, ultrasound, nuclear medicine, and nuclear magnetic resonance. Crosslisted with BMED 6786.

ECE 6787. Quantitative Electrophys. 3 Credit Hours.
A quantitative presentation of electrophysiological systems in biological organisms, emphasizing the electrical properties and modeling of neural and cardiac cells and systems. Crosslisted with BMED and PHYS 6787.

ECE 6790. Info Proc Model Neur Sys. 3 Credit Hours.
Examines "top-down" modeling approaches for sensorineural systems, where optimal computational principles used in engineering (e.g., information theory, Bayesian inference, control theory) explain observed information processing.

ECE 6792. Manufacturing Seminar. 1 Credit Hour.
Guest speakers on a broad range of manufacturing-related topics: research, applications, and technology. Required for Certificate in Manufacturing. Crosslisted with ISYE and ME 6792.

ECE 6XXX. Elec/Comp Engr Elective. 1-21 Credit Hours.

ECE 7000. Master's Thesis. 1-21 Credit Hours.

ECE 7055. GT-SJTU. 12 Credit Hours.
For GT-SJTU dual-MS students during terms when they are not taking other GT courses. Placeholder course.

ECE 7056. GT-TU. 12 Credit Hours.
For GT-TU double-MS students during terms when they are not taking other GT courses.

ECE 7057. GT-Shenzhen Research. 12 Credit Hours.
For GT-Shenzhen students during terms when they are in Atlanta on research internship with GT-Atlanta faculty.

ECE 7102. RISC Architectures. 3 Credit Hours.
An advanced design-oriented class studying the design techniques and operational principles of modern Superscalar RISC datapaths.

ECE 7103. Advanced Memory Systems. 3 Credit Hours.
Covers the basic trade-offs in architecting a high performance memory hierarchy at all levels, starting from the on-chip cache to main memory and storage sub-system.

ECE 7131. Asynch & Self Timed Sys. 3 Credit Hours.
Specification and design of asynchronous digital systems.

ECE 7141. Adv Digital Sys Test. 3 Credit Hours.
Design and test techniques for high-speed digital systems operating at rates above 100 MHz with a practical emphasis via substantial projects.

ECE 7142. Fault Tolerant Computing. 3 Credit Hours.
Key concepts in fault-tolerant computing. Understanding and use of modern fault-tolerant hardware and software design practices. Case studies.

ECE 7251. Signal Detection&Estimat. 3 Credit Hours.
Detection theory and estimation theory and their application to communications and statistical signal processing problems.

ECE 7252. Adv Signal Proc Theory. 3 Credit Hours.
A lecture and seminar treatment of the latest developments in signal processing. Emphasis is placed on current literature and emerging research areas.

ECE 7370. Antennas/Waves in Matter. 3 Credit Hours.
Basic methods for characterizing the electromagnetic properties of common materials (geophysical, biological, etc.) and techniques for analyzing antennas and wave propagation in these materials.

ECE 7380. Topics-Computational EM. 3 Credit Hours.
Computational approaches for applications such as radar signature prediction, microwave antenna and device design, and modeling techniques for electronic packaging.

ECE 7611. Adv Communication Theory. 3 Credit Hours.
Latest developments in communications and networking are treated in lecture and seminar. Emphasis on current literature and open research areas.

ECE 7785. Intro Robotics Research. 3 Credit Hours.
Familiarizes students with the core areas of robotics; mechanics, control, perception, AI, and autonomy. Provides an introduction to the mathematical tools required in robotics research.

ECE 7999. Prep-Doctoral Qual Exam. 1-21 Credit Hours.
This course is reserved for students who are studying for the ECE Preliminary Exam.

ECE 8001. ECE Seminar. 1 Credit Hour.
Speakers with diverse backgrounds and representing many different industries, professions, and institutions describe their experiences, entrepreneurial ventures, and research challenges.

ECE 8002. ECE Seminar. 1 Credit Hour.
Speakers with diverse backgrounds and representing different industries, professions, and institutions describe their experiences, entrepreneurial ventures, and research challenges.

ECE 8003. ECE Seminar. 1 Credit Hour.
Speakers with diverse backgrounds and representing many different industries, professions, and institutions describe their experiences, entrepreneurial ventures, and research challenges.
ECE 8010. Research Seminar. 1 Credit Hour.
Seminar presentations describing ECE-related research projects, centers, and other activities at Georgia Tech.

ECE 8020. Pro Communication Skills. 3 Credit Hours.
Written, oral, and graphical communication skills needed by electrical and computer engineering professionals.

ECE 8022. Prof Communication Sem. 1 Credit Hour.
Seminar presentations on oral and written technical communication skills needed by electrical and computer engineering professionals. Credit for this course may not be used toward the master's degree in ECE.

ECE 8750. Robotics Research Fnd I. 3 Credit Hours.
Multidisciplinary research course supervised by two robotics faculty from different schools participating in the robotics Ph.D. program.

ECE 8751. Robotics Research Fnd II. 3 Credit Hours.
Continuation of AE 8751 (Robotics Research Foundation I).

ECE 8801. Special Topics. 1 Credit Hour.
ECE 8802. Special Topics. 2 Credit Hours.
ECE 8803. Special Topics. 3 Credit Hours.
ECE 8804. Special Topics. 4 Credit Hours.
ECE 8805. Special Topics. 5 Credit Hours.
ECE 8811. Special Topics. 1 Credit Hour.
ECE 8812. Special Topics. 2 Credit Hours.
ECE 8813. Special Topics. 3 Credit Hours.
ECE 8814. Special Topics. 4 Credit Hours.
ECE 8815. Special Topics. 5 Credit Hours.
ECE 8823. Special Topics. 3 Credit Hours.
ECE 8833. Special Topics. 3 Credit Hours.
ECE 8843. Special Topics. 3 Credit Hours.
ECE 8853. Special Topics. 3 Credit Hours.
ECE 8863. Special Topics. 3 Credit Hours.
ECE 8873. Special Topics. 3 Credit Hours.
ECE 8881. Special Topics-Lab. 1 Credit Hour.
ECE 8882. Special Topics-Lab. 2 Credit Hours.
ECE 8883. Special Topics-Lab. 3 Credit Hours.
ECE 8884. Special Topics-Lab. 4 Credit Hours.
ECE 8891. Special Topics-Lab. 1 Credit Hour.
ECE 8892. Special Topics-Lab. 2 Credit Hours.
ECE 8893. Special Topics-Lab. 3 Credit Hours.
ECE 8894. Special Topics-Lab. 4 Credit Hours.
ECE 8900. Special Problems. 1-21 Credit Hours.
ECE 8901. Special Problems. 1-21 Credit Hours.
ECE 8902. Special Problems. 1-21 Credit Hours.
ECE 8903. Special Problems. 1-21 Credit Hours.
ECE 8997. Teaching Assistantship. 1-9 Credit Hours.
For students holding graduate teaching assistantships.
ECE 8998. Research Assistantship. 1-9 Credit Hours.
For students holding graduate research assistantships.

ECE 8999. Prep-Doctoral Disserta’n. 1-21 Credit Hours.
This course is reserved for students who are actively seeking Ph.D. advisors and /or dissertation topics.

ECE 9000. Doctoral Thesis. 1-21 Credit Hours.

English (ENGL)

ENGL 0199. Support for ENGL 1101. 2 Credit Hours.
This course provides support for students taking ENGL 1101, reinforces student competencies, develops language skills, and encourages reflection.

ENGL 0989. Foundations English Comp. 3 Credit Hours.
This course provides development of basic skills used in writing the sentence, paragraph, and short essay. Prepares students for college-level composition, ENGL 0999, and ENGL 1101.

ENGL 0999. Support for ENGL 1101. 3 Credit Hours.
This course provides support for students taking ENGL 1101, reinforces student competencies, develops language skills, and encourages reflection.

ENGL 1101. English Composition I. 3 Credit Hours.
Develops analytical reading and writing skills through the investigation of methods used in cultural and literary studies and the application of those methods to specific texts.

ENGL 1102. English Composition II. 3 Credit Hours.
Develops communication skills in networked electronic environments, emphasizes interpretation and evaluation of cultural texts, and incorporates research methods in print and on the Internet.

Foreign Studies (FS)

FS 4000. Foreign Studies. 12 Credit Hours.
Course used by students participating in an exchange program with a foreign university.

FS 4003. Foreign Studies. 3 Credit Hours.
Course used by students participating in an exchange program with a foreign university.

FS 4006. Foreign Studies. 6 Credit Hours.
Course used by students participating in an exchange program with a foreign university.

FS 4009. Foreign Studies. 9 Credit Hours.
Course used by students participating in an exchange program with a foreign university.

FS 6000. Foreign Studies. 12 Credit Hours.
Course used by students participating in an exchange program with a foreign university.

FS 6003. Foreign Studies. 3 Credit Hours.
Course used by students participating in an exchange program with a foreign university.

FS 6006. Foreign Studies. 6 Credit Hours.
Course used by students participating in an exchange program with a foreign university.
Free Elective (FREE)

FREE 1XXX. Free Elective. 1-21 Credit Hours.
FREE 2XXX. Free Elective. 1-21 Credit Hours.
FREE 3XXX. Free Elective. 1-21 Credit Hours.
FREE 4XXX. Free Elective. 1-21 Credit Hours.
FREE 6XXX. Free Elective. 1-21 Credit Hours.

French (FREN)

FREN 1001. Elementary French I. 3 Credit Hours.
An introduction to the French language and culture of the French-speaking world. Beginning of a survey of basic French grammar and the development of the four language skills of listening, speaking, reading, and writing French. Some aspects of everyday life in the French speaking world will also be introduced. Humanities credit awarded for FREN 1001 upon successful completion of FREN 1002 or FREN 2001.

FREN 1002. Elementary French II. 3 Credit Hours.
The second part of an introduction to the French language and the culture of the French-speaking world. Completion of the survey of basic French grammar and further development of the four language skills. Aspects of everyday life in the French-speaking world will be introduced.

FREN 1813. Special Topics. 3 Credit Hours.
Topics of current interest in French.

FREN 1XXX. French Elective. 1-21 Credit Hours.

FREN 2001. French Culture I. 3 Credit Hours.
Proficiency-based introduction to selected sociocultural aspects of France: geography, demography, social institutions, history, art, socioeconomic problems, and current events; incorporates grammar review. Conducted in French.

FREN 2002. French Culture II. 3 Credit Hours.
Proficiency-based introduction to selected sociocultural aspects of France: geography, demography, social institutions, history, art, socioeconomic problems, and current events; incorporates grammar review. Conducted in French.

FREN 2005. LBAT Culture & Language. 6 Credit Hours.
Proficiency-based introduction to sociocultural aspects of the French speaking world. Part of the French intensive summer LBAT program. Admission by application only. Conducted in French.

FREN 2698. Research Assistantship. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

FREN 2699. Undergraduate Research. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

FREN 2813. Special Topics. 3 Credit Hours.
Topics of current interest in French.

FREN 2XXX. French Elective. 1-21 Credit Hours.

FREN 3000. Survey of French Lit. 3 Credit Hours.
This course introduces students to French literature. Taught in French.

FREN 3001. French Lit 1800-1900. 3 Credit Hours.
Romanticism, the reappearance of lyric poetry, the importance of the individual as opposed to classical anonymity. Realism and naturalism with emphasis on the development of the novel. Conducted in French.

FREN 3002. French Lit 1900-Present. 3 Credit Hours.
Exploration of currents in modern prose, poetry, and drama. Conducted in French.

FREN 3004. Drama Workshop. 3 Credit Hours.
Literary and theatrical aspects of French drama are explored through class discussion and performance of selections from contemporary and classical plays.

FREN 3011. France Today I. 3 Credit Hours.
Culture, history, and geography of modern France through lectures, videos, downloads from the Internet, audio and video tapes, and class discussions. Short papers, generated by use of a computer software package, treating assigned topics to enhance writing skills. Conducted in French.

FREN 3012. France Today II. 3 Credit Hours.
Culture, history, and geography of modern France through lectures, videos, downloads from the Internet, audio and video tapes, and class discussions. Short papers, generated by use of a computer software package, treating assigned topics to enhance writing skills. Conducted in French.

FREN 3014. Intro To Contemp France. 3 Credit Hours.
This course will introduce students enrolled in the Georgia Tech Lorraine summer program to issues in contemporary France. Taught in French.

FREN 3015. Social Identities French. 3 Credit Hours.
Analysis of production, reception and perceptions of clashing class identities in France via films, novels, plays, short stories, and newspapers. Conducted in French.

FREN 3017. Paris: Modernity Today. 3 Credit Hours.
This course explores contemporary Paris and its representations in light of its modern history and culture. Taught in French.

FREN 3030. French Phonetics. 3 Credit Hours.
A detailed analysis of the significant features of the French sound system, intonation curves, and graphic representation of individual sounds. Conducted in French.

FREN 3040. Reading and Translation. 3 Credit Hours.
This course will prepare students to the techniques of rapid reading in French, and give them tools to translate and use texts. Taught in French.

FREN 3061. Adv Business French I. 3 Credit Hours.
Advanced Business French, overview of French commerce, communications, publicity, various social milieus, and the work place.

FREN 3062. Adv Business French II. 3 Credit Hours.
Advanced Business French. Overview of French commerce, communications, publicity, various social milieus, and the work place.

FREN 3110. Comics & Graphic Arts. 3 Credit Hours.
This course studies French comics as a genre and its interrelationships with graphic arts and literature. Conducted in French.

FREN 3121. Advanced Composition. 3 Credit Hours.
In-depth study of advanced grammar patterns as used in written expressions. Conducted in French.

FREN 3500. Field Work Abroad. 1-3 Credit Hours.
This course will focus on theme-based individual projects abroad.

FREN 3551. Fren for Professions I. 3 Credit Hours.
Study aspects of literature, philosophy, cultural geography, history, business, and industry in France and other francophone countries in these applied-language courses. Taught in French.
FREN 3552. Fren for Professions II. 3 Credit Hours.
Study aspects of literature, philosophy, culture, geography, history, business, and industry in France and other francophone countries in these applied-language courses. Taught in French.

FREN 3555. French for Engineers I. 3 Credit Hours.
Study basics in math, physics, chemistry, biology, geology, computing, and the Internet in this applied language course sequence. Taught in French.

FREN 3556. French for Engineers II. 3 Credit Hours.
Study basics in math, physics, chemistry, biology, geology, computing, and the Internet in this applied language course sequence. Taught in French.

FREN 3691. French LBAT I. 3 Credit Hours.
Refinement of accuracy and flexibility in oral/written expression. Focus on appropriate use of strategies, business negotiation protocols, lexical precision. Incorporates grammar review. Part of the French intensive summer language program. See catalog p. ?? Admission by application only.

FREN 3692. French LBAT II. 3 Credit Hours.
Study of business, technological, and cultural issues, tendencies and patterns of behavior among French speaking people. Value systems and their manifestations. Part of the French intensive summer language program. See catalog p. ?? Admission by application only.

FREN 3693. French LBAT III. 3 Credit Hours.
Business organizations and use of technology in France. Specialized vocabularies of economics, engineering, and computer science. Attention to geographical and anthropological aspects of selected social and political situations. Part of the French intensive summer language program. See catalog p. ?? Admission by application only.

FREN 3694. LBAT French Sem Abroad. 3 Credit Hours.
Two-week seminar in France highlighting business and technology. Field study of technology firms, economic trends, business institutions, and cultural protocols. Journals and papers assigned. Admission by application only.

FREN 3697. Paris/Cinema. 3 Credit Hours.
This course offers an in-depth look at the history, industry, and scope of French cinema through the myth of Paris in films. Conducted in French.

FREN 3813. Special Topics. 3 Credit Hours.
Permits a group of students and a professor to pursue areas of the French language not covered in other courses in the department.

FREN 3821. Special Topics. 1 Credit Hour.
Topics of current interest in French.

FREN 3822. Special Topics. 2 Credit Hours.
Topics of current interest in French.

FREN 3823. Special Topics. 3 Credit Hours.
Topics of current interest in French.

FREN 3833. Special Topics. 3 Credit Hours.
Topics of current interest in French.

FREN 3XXX. French Elective. 1-21 Credit Hours.

FREN 4001. French Stylistics. 3 Credit Hours.
Advanced study of syntax and semantics, aimed at development of stylistic sensitivity. Analysis of representative literary and current interest texts for practice in conversation and composition. Conducted in French.

FREN 4011. French Art. 3 Credit Hours.
This course will explore contemporary French art in the historical, economic and cultural contexts of production and reception. Taught in French.

FREN 4013. Literature & Visual Arts. 3 Credit Hours.
This course studies French Literature and its interrelationships with various arts (painting, music, cinema, architecture or opera), often through several periods. Conducted in French.

FREN 4061. Fren Science & Tech I. 3 Credit Hours.
Introduction to scientific and technical French. Analysis and discussion of scientific and technical material pertaining to current issues in the scientific and technical communities. Background in chemistry, physics, or biology required.

FREN 4062. Fren Science & Tech II. 3 Credit Hours.
Introduction to scientific and technical French. Analysis and discussion of scientific and technical material pertaining to current issues in the scientific and technical communities. Background in chemistry, physics, or biology required.

FREN 4101. Francophone Lit I. 3 Credit Hours.
Exploration of the literature of the francophone world. Currents in modern prose, poetry, and drama. Conducted in French.

FREN 4102. Francophone Lit II. 3 Credit Hours.
Continuation of Literature of the Francophone World I. Currents in modern prose, poetry, and drama. Conducted in French.

FREN 4103. Francophone Africa. 3 Credit Hours.
This course will explore contemporary Africa and its representations in light of its modern history and culture.

FREN 4105. Francophone Cinema. 3 Credit Hours.
This course will explore contemporary Africa and its representations in light of its modern history and culture. Taught in French.

FREN 4107. African Diasporas France. 3 Credit Hours.
Intercultural class taught in French about the complex nature of the African Diasporas in France from their historical development to our present day society.

FREN 4200. Intro French Philosophy. 3 Credit Hours.
Introduction to major French philosophical texts with an emphasis on post-WWI thinkers (includes Existentialism, Structuralism, Post-Structuralism, Postmodernism, Deconstructionism). Conducted in French.

FREN 4241. French Cinema I. 3 Credit Hours.
A topical approach focusing on the major contributions of French cinema and cinematographic aesthetics, from the 1908s to contemporary films. Conducted in French.

FREN 4242. French Cinema II. 3 Credit Hours.
In-depth and concentrated study of French cinema. Particular attention devoted to the French New Wave, the development of film theory and criticism in France. Conducted in French.

FREN 4250. Reading Les Miserables. 3 Credit Hours.
This course examines in its entirety the world famous novel from Victor Hugo. Les Miserables within its artistic and social environments and messages. Taught in French.

FREN 4300. France and Globalization. 3 Credit Hours.
Intercultural class about French attitudes and policies toward globalization as well as France’s role in the European Community. Conducted in French.
FREN 4500. Intercultural Seminar. 3 Credit Hours.
Integrates cross-cultural research and reflection into discussion of current issues in the French-speaking world. Intended for students who have some study-abroad experience in a French-speaking country. Conducted in French.

FREN 4695. French Internship. 1-3 Credit Hours.
Professional experience with a business/organization in which students enhance their language skills and cultural knowledge in French in relation to the practical goals/objectives of the entity.

FREN 4698. Research Assistantship. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

FREN 4699. Undergraduate Research. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

FREN 4813. Special Topics. 3 Credit Hours.
Topics of interest not covered in the regular course offerings.

FREN 4823. Special Topics. 3 Credit Hours.
Topics of current interest in French.

FREN 4833. Special Topics. 3 Credit Hours.
Topics of current interest in French.

FREN 4901. Special Problems. 1-21 Credit Hours.
Provides the special instruction required under special programs.

FREN 4902. Special Problems. 1-21 Credit Hours.
Provides the special instruction required under special programs.

FREN 4XXX. French Elective. 1-21 Credit Hours.

Georgia Tech (GT)

GT 0900. Challenge IDC. 2 Credit Hours.
Challenge is a summer residential program for incoming freshman. This course provides critical skills and competencies for the interpersonal and communication development components of Challenge.

GT 1000. GT Freshman Seminar. 1 Credit Hour.
Discussion of topics related to academic, social and professional success including learning styles, time management, major and career exploration, leadership and teamwork.

GT 1201. Explr Grand Challenges. 3 Credit Hours.
A problem-based learning approach to developing problem solving skills for multidisciplinary teams of freshmen to tackle Grand Challenges facing humanity.

GT 1900. Re-entry Planning. 1 Credit Hour.
Placeholder for returning student.

GT 2000. GT Transfer Seminar. 1 Credit Hour.
Discussion of topics related to academic, social and professional success including learning styles, time management, major and career exploration, leadership and teamwork.

GT 2100. Success Seminar. 1 Credit Hour.
This academic skills seminar is designed to help students develop personalized strategies for success within the rigorous academic environment at Georgia Tech. This is a non-credit bearing course which cannot be used toward degree requirements.

GT 2201. Grand Challenges Research Proj. 1 Credit Hour.
This course is for participants in year 2 of the Grand Challenges program. Students will organize into small teams of 4-8 student to pursue research and development projects that were approved and funded in year 1. Participating students can also propose new projects.

GT 2202. Grand Challenges Research Proj. 2 Credit Hours.
This course is for participants in year 2 of the Grand Challenges program. Students will organize into small teams of 4-8 student to pursue research and development projects that were approved and funded in year 1. Participating students can also propose new projects.

GT 2500. ThinkBig@Tech. (null) Credit Hours.
ThinkBig@Tech are faculty led Living Learning Communities. Students participating in these programs will be engaging closely with faculty. The topic of each Living Learning Community is based on the faculty interests, and students sign up for the one they are interested in.

GT 2694. Undergraduate Internship. 1-21 Credit Hours.
Undergraduate Internship for which the student is paid, Freshmen and Sophomores only.

GT 2801. Special Topics. 1 Credit Hour.
GT 2802. Special Topics. 2 Credit Hours.
GT 2803. Special Topics. 3 Credit Hours.
Special Topics - content varies.

GT 2811. Special Topics. 1 Credit Hour.
GT 2812. Special Topics. 2 Credit Hours.
GT 2813. Transfer Student Seminar. 1 Credit Hour.
Discussion of topics related to the academic and personal transition of new transfer students, including campus resources, major and career exploration, and academic and personal success strategies.

GT 2901. Special Problems. 21 Credit Hours.
GT 4500. ThinkBig@Tech. (null) Credit Hours.
ThinkBig@Tech are faculty led Living Learning Communities. Students participating in these programs will be engaging closely with faculty. The topic of each Living Learning Community is based on the faculty interests, and students sign up for the one they are interested in.

GT 4694. Undergraduate Internship. 1-21 Credit Hours.
Undergraduate Internship for which the student is paid, Juniors and Seniors only.

GT 4701. Inventions and Startups. 3 Credit Hours.
The theory and practice of innovation and startup creation.

GT 4801. Special Topics. 1 Credit Hour.
GT 4802. Special Topics. 2 Credit Hours.
GT 4803. Special Topics. 3 Credit Hours.
Special Topics - content varies.

GT 4813. Proj In Energy Systems. 3 Credit Hours.
Multidisciplinary project in the area of energy systems. Open to students completing the minor in Energy Systems. Students must have completed or be on track to complete all requirements for the energy systems minor except this course.

GT 4822. Special Topics. 2 Credit Hours.
Special Topics (lab and lecture)
GT 4823. Special Topics - Design. 3 Credit Hours.
Seniors will work in teams to apply a systematic design process to real multidisciplinary problems. Problems selected from a broad spectrum of interest areas, including biomedical, environmental, mechanical, industrial design, electrical and thermal/fluids.

GT 4824. Special Topics. 4 Credit Hours.
Special Topics (lecture and lab)

GT 4833. Special Topics. 3 Credit Hours.
Special Topics course - content varies.

GT 4903. Special Problems. 1-21 Credit Hours.
Multi-disciplined research topic selected in consultation with advisor. A brief description, endorsed by the faculty advisor(s).

Georgia Tech Lorraine (GTL)

GTL 2000. Ga Tech Lorraine Seminar. 1 Credit Hour.
Seminar discussing aspects of European cities. Part of the Georgia Tech Lorraine summer program.

GTL 6001. GTL and SUPELEC. 1-11 Credit Hours.
GTL - SUPELEC.

GTL 6010. CentraleSupelec. 12 Credit Hours.

GTL 6011. GTL - SUPELEC. 12 Credit Hours.
For students attending both GTL and SUPELEC.

GTL 6012. GTL - ENSAM. 12 Credit Hours.
For students attending both GTL and ENSAM.

GTL 6014. GTL - ENSEA. 12 Credit Hours.
For students attending both GTL and ENSEA.

GTL 6015. GTL - INPL ENSEM. 12 Credit Hours.
For students attending both GTL and INPL ENSEM.

GTL 6016. GTL - INPT ENSEEIHT. 12 Credit Hours.
For students attending both GTL and INPT ENSEEIHT.

GTL 6018. GTL - UTC. 12 Credit Hours.

GTL 6020. GTL-INSAS. 12 Credit Hours.
For students attending both GTL and INSA.

GTL 6021. CentraleSupelec. 1-21 Credit Hours.

GTL 6022. ENSTA Bretagne. 12 Credit Hours.

GTL 6023. IMT. 12 Credit Hours.
For Ecoles des Mines(all) + Telecom Sud Paris.

GTL 6024. USTL. 12 Credit Hours.

GTL 6025. GTL and ENSAM. 1-11 Credit Hours.

GTL 6110. GTL - BRESCIA. 12 Credit Hours.

GTL 6114. GTL-UTT. 12 Credit Hours.
For students attending both GTL and UTT (universite de Technologie de Troye)

GTL 6119. GTL-ESIE. 12 Credit Hours.

German (GRMN)

GRMN 1001. Elementary German I. 3 Credit Hours.
An introduction to German language and culture. Beginning of a survey of basic German grammar and the development of the four language skills of listening, speaking, reading and writing. Some aspects of everyday life in the German-speaking world will also be introduced. Humanities credit awarded for GRMN 1001 upon successful completion of GRMN 1002 or 2001.

GRMN 1002. Elementary German II. 3 Credit Hours.
The second part of an introduction to German language and culture. Survey of more basic German grammar and the development of the four language skills of listening, speaking, reading, and writing. Some aspects of everyday life in the German-speaking world will also be introduced.

GRMN 1813. Special Topics. 3 Credit Hours.
Topics of current interest in German.

GRMN 1XXX. German Elective. 1-21 Credit Hours.

GRMN 2001. Intermediate German I. 3 Credit Hours.
Review of basic grammatical concepts and vocabulary build-up. Selected readings, audio and video material on the cultural, historical, and intellectual development of Germany. Teaching and class discussion in German.

GRMN 2002. Intermediate German II. 3 Credit Hours.
Continuation of GRMN 2001.

GRMN 2698. Research Assistantship. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

GRMN 2699. Undergraduate Research. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

GRMN 2813. Special Topics. 3 Credit Hours.
Topics of current interest in German.

GRMN 2XXX. German Elective. 1-21 Credit Hours.

GRMN 3010. Intro-German Literature. 3 Credit Hours.
Introduction to the periods and genres of German literature from the Middle Ages to modern times. Conducted in German.

GRMN 3011. Germany Today. 3 Credit Hours.
Introduction to current issues in contemporary Germany. Lectures, papers, and class discussions. Conducted in German.

GRMN 3023. Advanced German Grammar. 3 Credit Hours.
Students refine their command and understanding of German grammar through in-class discussion in German, formal exercises, and communicative application of grammatical topics. Taught in German.

GRMN 3024. Conversation&Composition. 3 Credit Hours.
A combination of conversation, composition, and stylistics, this course is designed to promote listening, speaking, and writing proficiency; expansion of vocabulary; stylistic skills.

GRMN 3026. Stylistics. 3 Credit Hours.
This course introduces students to stylistic differences and idiomatic usages of German, expands vocabulary, and enlarges upon grammatical and syntactic structures. Taught in German. Credit not allowed for both GRMN 3026 and GRMN 3024.

GRMN 3030. Crossing Borders Lit/Cul. 3 Credit Hours.
The class examines politics of immigration and integration such as national, geographic, ethnic, race, gender, and sexuality boundaries in literature and film. Taught in German.
GRMN 3055. Fairy Tales Grimm/Disney. 3 Credit Hours.
Discussion of socio-historical, cultural, and literary themes in
German fairy tales, their place in Western tradition, and their echo in
contemporary society. Conducted in German.

GRMN 3071. Intro-Business German I. 3 Credit Hours.
Analysis and discussion of texts and videos pertaining to issues in
the current business world.

GRMN 3110. TV & Electronic Culture. 3 Credit Hours.
This course examines the significance of television, computer games, film
and online sites (among other sources) in contemporary German culture.
Taught in German.

GRMN 3695. Structure,Commun&Corr. 3 Credit Hours.
Overview of Germany’s business structure, such as industries, service
sector, banking system, relation to the European Union, the United States,
and the global economy. Site visits. Admission by application only.

GRMN 3696. Current Issues. 3 Credit Hours.
Themes oriented toward business German, with emphasis on historical,
social, cultural, and political questions pertaining to the development of
modern Germany. Admissions by application only.

GRMN 3697. Communication & Culture. 3 Credit Hours.
Development of language skills through discussions, compositions,
journals, oral reports, and presentations. Individual and group projects
use interviews, explore German surroundings, and focus on cross-cultural
issues. Admission by application only.

GRMN 3813. Special Topics. 3 Credit Hours.
Permits a group of students and a professor to pursue areas of the
German language not covered in other courses in the department.

GRMN 3821. Special Topics. 1 Credit Hour.
Topics of current interest in German.

GRMN 3822. Special Topics. 2 Credit Hours.
Topics of current interest in German.

GRMN 3823. Special Topics. 3 Credit Hours.
Topics of current interest in German.

GRMN 3833. Special Topics. 3 Credit Hours.
Topics of current interest in German.

GRMN 3901. Special Problems. 1-21 Credit Hours.
Small group or individual instruction.

GRMN 3XXX. German Elective. 1-21 Credit Hours.
Topics of current interest in German.

GRMN 4010. Perspectives Grmn Media. 3 Credit Hours.
A comparison of differences in representation between various
German media sources applied towards the development of a critical
understanding of media language to influence, persuade, inform and
entertain.

GRMN 4012. German Identity. 3 Credit Hours.
Images of a nation are composed of characteristic traits, some cliches
and stereotypes. This course examines a possible German Identity from
a variety of viewpoints: history, geography, linguistics, culture, values and
traditions, literature, music and the arts, architecture, film, politics and
daily life.

GRMN 4023. Select Readings-Ger Lit. 3 Credit Hours.
Study of selected authors, movements, genres, in German literature.
Selection varies. Conducted in German.

GRMN 4024. Ger Film and Literature. 3 Credit Hours.
A survey of German culture and recent past as presented through films
and related literary works illuminating Germany’s quest for identity since
1945.

GRMN 4025. German Culture & Film. 3 Credit Hours.
This course offers a survey of German Cinema from the 1930s to the
1900s. These films will be analyzed as reflections of the historical, social,
and cultural context in which they originated.

GRMN 4026. German Post-Wall Cinema. 3 Credit Hours.
This course offers a cross-section of the most important German
films since 1989. Students will analyze the narratives in the context of
contemporary German history, society, and culture.

GRMN 4027. Grmn Pol Songwriting. 3 Credit Hours.
This class offers an overview of political songwriting in Germany(GDR
and FRG) between 1945 and the present. Taught in German.

GRMN 4061. Adv Business German I. 3 Credit Hours.
Advanced principles of German business organization and language.
Taught through the use of reading, audio, and video materials. Conducted
in German.

GRMN 4065. European Union. 3 Credit Hours.
The European Union plays an increasing role in European politics and
daily life. This seminar examines the origins of the European Union, its
institutions, legal framework, and current topics such as immigration,
enlargement, and relationships with other countries.

GRMN 4120. Literary Repr of History. 3 Credit Hours.
This course examines how literary representation reveals interpretations
of historical events and the relationship between history and fiction in
selected German history. Taught in German.

GRMN 4126. Advanced Stylistics. 3 Credit Hours.
This course incorporates study of stylistic difference and idiomatic
usages of German, expands vocabulary, and solidifies and enlarges upon
grammatical and syntactic structures. Taught in German.

GRMN 4500. Intercultural Seminar. 3 Credit Hours.
Integrates cross-cultural research and reflection into discussion of
current issues Germany. Intended for students who have had some study-
abroad experience in Germany. Conducted in German.

GRMN 4691. Berlin in the 20th Cent. 3 Credit Hours.
By engaging contemporaneous topics in film, literature, photography, etc.,
students will investigate topics that dominated the different periods of
Berlin’s turbulent history. Taught in German.

GRMN 4692. Americanization in FRG. 3 Credit Hours.
Americanization and Anti-Americanism in the FRG. Survey of the
reception of US culture in West Germany since the end of WWII. Taught in
German.

GRMN 4693. Ind Transf Grmn Soc/Econ. 3 Credit Hours.
Examination of technological and societal changes resulting from
transformation of an industrial area to one dominated by high tech and
media industries. Taught in German.

GRMN 4694. 200 Yrs of Grmn Technlgy. 3 Credit Hours.
The course chronicles German technological inventions, industrial
development and the resulting social changes from the Industrial
Revolution through Globalization. Taught in German. Prerequisites:
GRMN 2002 or equivalent plus at least one 3000-level course.

GRMN 4695. German Internship. 1-3 Credit Hours.
Professional experience with a business/organization in which students
enhance their language skills and cultural knowledge in German in
relation to the practical goals/objectives of the entity.

GRMN 4698. Research Assistantship. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty
member.
GRMN 4699. Undergraduate Research. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

GRMN 4813. Special Topics. 3 Credit Hours.
Topics of interest not covered in the regular course offerings.

GRMN 4823. Special Topics. 3 Credit Hours.
Topics of current interest in German.

GRMN 4833. Special Topics. 3 Credit Hours.
Topics of current interest in German.

GRMN 4901. Special Problems. 1-21 Credit Hours.
Special problems course for advanced students. Topics to be arranged with instructor.

GRMN 4902. Special Problems. 1-21 Credit Hours.
Special problems course for advanced students. Topics to be arranged with instructor.

GRMN 4XXX. German Elective. 1-21 Credit Hours.

Health Physics (HP)

HP 6403. Radiological Health I. 3 Credit Hours.
Applied nuclear and atomic physics, radioactive decay, radiation interactions, radiation dosimetry, and safety guidelines; instrumentation, radiation protection and basics of criticality safety.

HP 6406. Radiological Health II. 3 Credit Hours.
Radiation quantities, microdosimetry, biological effects of ionizing radiation, radiation risk, internal radiation protection, ALARA, and radiological emergency response.

HP 6416. App Radiol Health Lab. 3 Credit Hours.
Advanced laboratory course in radiochemical and instrumental analysis. Practical radiation/radioactivity monitoring problems in nuclear facilities and environmental surveillance.

HP 6506. Operational Health Phys. 3 Credit Hours.
Radiation sources, radiological safety practices and procedures for nuclear facilities, and the impact of radiological safety in the design of such facilities.

HP 6601. Industrial Hygiene. 3 Credit Hours.
Chemical, physical, biological, and ergonomic exposures. Occupational environment regulations. Application of scientific and engineering principles to hazard evaluation and general occupational health control measures.

HP 6755. Rad Assessment&Waste Mgt. 3 Credit Hours.
Critical analyses of sources and human exposures, mathematical models for movement through the biosphere, environmental transport, and exposure for nuclear facilities and waste disposal processing. Crosslisted with NRE 6755.

HP 6756. Radiation Physics. 3 Credit Hours.
Characteristics of atomic and nuclear radiation, transition probabilities, radioactivity and isotopes, cross sections, electromagnetic radiation, neutrons, and charged particle interaction with matter. Crosslisted with NRE 6756.

HP 6757. Radiation Detection. 3 Credit Hours.
Introduction to the theory and application of radiation detectors, measurement methods, signal processing, and data analysis. Crosslisted with NRE 6757.

HP 6758. Numerical Methods in ME. 3 Credit Hours.
Numerical methods for solution of engineering problems; initial, eigenvalue, and boundary-value problems; computational stability for ordinary and linear partial differential equations. Crosslisted with ME and NRE 6758.

HP 6XXX. Health Phys Elective. 1-21 Credit Hours.

HP 7000. Master's Thesis. 1-21 Credit Hours.

HP 7757. Teaching Practicum. 3 Credit Hours.
Supervised teaching for doctoral students. Teaching techniques, course and curriculum design, student evaluation methods and criteria. Students may, in some instances, prepare and present lectures. Crosslisted with NRE, ME, and CHBE 7757.

HP 8011. Seminar-Health Physics. 1 Credit Hour.
Seminars involving current research projects presented by graduate students, faculty, and invited speakers.

HP 8012. Seminar-Health Physics. 1 Credit Hour.
Seminars involving current research projects presented by graduate students, faculty, and invited speakers.

HP 8801. Spec Top-Health Physics. 1 Credit Hour.
Special topic offerings of current interest in health physics not included in regular courses.

HP 8802. Spec Top-Health Physics. 2 Credit Hours.
Special topic offerings of current interest in health physics not included in regular courses.

HP 8803. Spec Top-Health Physics. 3 Credit Hours.
Special topics offerings of current interest in health physics not included in regular courses.

HP 8804. Spec Top-Health Physics. 4 Credit Hours.
Special topic offerings of current interest in health physics not included in regular courses.

HP 8805. Spec Top-Health Physics. 5 Credit Hours.
Special topic offerings of current interest in health physics not included in regular courses.

HP 8806. Spec Top-Health Physics. 6 Credit Hours.
Special topic offerings of current interest in health physics not included in regular courses.

HP 8801. Spec Prob-Health Physics. 1-21 Credit Hours.
Individual studies and/or experimental investigations of problems of current interest in health physics.

HP 8802. Spec Prob-Health Physics. 1-21 Credit Hours.
Individual studies and/or experimental investigations of problems of current interest in health physics.

HP 8803. Spec Prob-Health Physics. 1-21 Credit Hours.
Individual studies and/or experimental investigations of problems of current interest in health physics.

HP 8804. Spec Prob-Health Physics. 1-21 Credit Hours.
Individual studies and/or experimental investigations of problems of current interest in health physics.

HP 8805. Spec Prob-Health Physics. 1-21 Credit Hours.
Individual studies and/or experimental investigations of problems of current interest in health physics.

HP 8806. Spec Prob-Health Physics. 1-21 Credit Hours.
Individual studies and/or experimental investigations of problems of current interest in health physics.
**Health Systems (HS)**

HS 4001. Intro to Health Systems. 3 Credit Hours.
Background of U.S. healthcare; the workforce; mechanisms and costs of delivery; facilities; ambulatory care; regulation and quality; managed care, finance, and role of government.

HS 6000. Healthcare Delivery. 3 Credit Hours.
Historical background; the healthcare workforce; nature, problems, and costs of delivery sites; health planning, finance, role of government, alternative delivery models, and health policy.

HS 6100. Healthcare Deliv Models. 3 Credit Hours.
Progression in service delivery from individual providers to complex financing and delivery organizations. Alternative models are explored with an emphasis on access, efficiency, and effectiveness.

HS 6200. Healthcare Financial Mgt. 3 Credit Hours.
Applications of accounting and finance in the healthcare delivery system; methods of reimbursement, product costing, strategic financial planning, and capital formation.

HS 6300. Healthcare Info Systems. 3 Credit Hours.
Application of information systems to assist in medical practice including communication within the healthcare enterprise, reimbursement for care, clinical decision making, and assessment of outcomes.

HS 6400. Health Systems Practice. 3 Credit Hours.
An actual project conducted by individual graduate students within a healthcare institution or a health service organization. Project has both a faculty and site sponsor.

HS 6XXX. Health Systems Elective. 1-21 Credit Hours.

**Hindi (HIN)**

HIN 1814. Special Topics. 4 Credit Hours.
Topics of current interest in Hindi Languages.

HIN 1824. Special Topics. 4 Credit Hours.
Topics of current interest in Hindi Languages.

HIN 2813. Special Topics. 3 Credit Hours.
Topics of current interest in Hindi Languages.

HIN 3813. Special Topics. 3 Credit Hours.
Topics of current interest in Hindi Languages.

**History (HIST)**

HIST 2111. United States to 1877. 3 Credit Hours.
Colonial settlement, the American Revolution and the Constitution, antebellum expansion, slavery and plantation economy, sectional conflict and Civil War, Reconstruction.

HIST 2112. United States since 1877. 3 Credit Hours.
The social, political, and economic history of the United States since Reconstruction. Topics include American industrialization, two world wars, New Deal, and the Civil Rights movement.

**History, Technology & Society (HTS)**

HTS 1001. Intro-Hist, Tech, & Soc. 3 Credit Hours.
An introduction to classic texts, key concepts, and research opportunities in history and sociology.

HTS 1031. Europe Since Renaissance. 3 Credit Hours.
Social, political, economic, and cultural history of Europe since the Renaissance. Topics include Renaissance; Reformation; political, scientific, and industrial revolutions; nationalism; fascism and communism; decolonization.

HTS 1081. Engineering in History. 3 Credit Hours.
Uses historical case studies to examine the relationship between engineers and the larger society in which they function. Often taught jointly with engineering faculty.

HTS 1XXX. Hist, Tech & Soc Elective. 1-21 Credit Hours.

HTS 2001. Early American History. 3 Credit Hours.
North America to 1763, including native cultures, contacts with European colonizers, settlement strategies and patterns, and foundation of American political and economic institutions.

HTS 2002. American Revolution. 3 Credit Hours.
The American Revolution as political debate, war, and social upheaval, with attention to the framing and ratification of the Constitution.

HTS 2006. Hist-Old South to 1865. 3 Credit Hours.
A study of social, political, and economic developments in the South from the colonial period through the Civil War.

HTS 2007. History of the New South. 3 Credit Hours.
An examination of social, political, and economic developments from the Reconstruction period to the present.

HTS 2011. The Gilded Age. 3 Credit Hours.
Populism, the currency question, immigration, the rise of big business, war, and reform in one of the most turbulent periods of American history.

HTS 2013. Modern America. 3 Credit Hours.
Dawning of the atomic age, anticommunism, the Civil Rights Movement, New Frontier and Great Society, Vietnam and the tumultuous 1960s, and end of Cold War.

HTS 2015. History Sports America. 3 Credit Hours.
Examines American sport from colonial to contemporary times. Focuses on the rise of organized sports and the influence of race, class, gender, and ethnicity.

HTS 2016. Soc Issues & Public Policy. 3 Credit Hours.
Draws on sociological theory and research to understand the major economic, social, and cultural issues facing American society today.
HTS 2036. Revolutionary Europe. 3 Credit Hours.
Industrialization and political revolution, the development of political ideologies and labor activism, modern nation-state building, and imperialism from the French Revolution to World War I.

HTS 2037. 20th Century Europe. 3 Credit Hours.
Global war and the Bolshevik Revolution, rise and fall of Mussolini and Hitler, Stalinism, the Holocaust, Cold War, decolonization, and the movement toward European integration.

HTS 2040. Hist Islamic Societies. 3 Credit Hours.
Survey of Middle East from pre-Islamic times to Ottoman rule, tracing the development of Islamic society and emphasizing the plurality of culture in the region.

HTS 2041. Hist-Modern Middle East. 3 Credit Hours.
The transformation of the Middle East in the modern era and the relationship of the "East" and "West" in the contemporary world.

HTS 2051. Colonial Latin America. 3 Credit Hours.
An exploration of colonial Latin America from the perspective of Global History.

HTS 2052. North Amer Borderlands. 3 Credit Hours.
Introduction to the history of early Florida, Georgia, Louisiana, Texas, New Mexico, Arizona and California in the Spanish Colonial period.

HTS 2061. Traditional Asia. 3 Credit Hours.
Civilizations of East Asia up to 1850, emphasizing traditional cultures in China and Japan, including religion, science, formation of empires, social life, and commerce.

HTS 2062. Asia in the Modern World. 3 Credit Hours.
Civilizations of India, China, and Japan since 1600, emphasizing Western impact and adaptation of these countries' political, economic, and social systems.

HTS 2080. Intro Hist Disease & Med. 3 Credit Hours.
Introduction to the history of disease and medicine since the Renaissance focusing on infectious diseases, the rise of germ theory, and evolution of medical training. Cerdit not allowed for both HTS 2080 and HTS 3087.

HTS 2081. Scientific Revolution. 3 Credit Hours.
A critical approach to the Scientific Revolution, introducing students to primary documents and images from the period and emphasizing interpretive strategies and methods.

HTS 2082. Tech& Sci-Industrial Age. 3 Credit Hours.
Surveys major developments in technology and science since 1600 and places them in the broader social context of their times.

HTS 2084. Technology and Society. 3 Credit Hours.
Analyzes social conditions that promote or retard technological activity, emphasizing role of business, the state, and scientific and engineering professions, and the emergence of consumerism.

HTS 2085. Reel History I. 3 Credit Hours.
Students evaluate films as sources for specific historical events by viewing films, reading historical documents, and applying critical analysis to written assignments and class discussions.

HTS 2100. Sci, Tech & Modern World. 3 Credit Hours.
An introduction to perspectives on how developments in science and technology at once reflect and influence politics and society on a global scale.

HTS 2101. Research Methods. 3 Credit Hours.
Interdisciplinary survey based on critical readings of the methods historians and social scientists use to generate knowledge about social life. Students engage in "hands-on" research.

HTS 2694. HTS Internship - Paid. 1-12 Credit Hours.
Undergraduate internship for which the student is paid and receives audit credit. Freshmen and sophomores only.

HTS 2695. HTS Internship-Credit. 1-12 Credit Hours.
Unpaid undergraduate internship for which the student receives pass/fail credit. Freshmen and sophomores only.

HTS 2698. Research Assistantship. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

HTS 2699. Undergraduate Research. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

HTS 2803. Special Topics. 3 Credit Hours.
Allows a group of students and a professor to study topics not covered in other courses in the department.

HTS 2813. Special Topics. 3 Credit Hours.
Allows a group of students and a professor to study topics not covered in other courses in the department.

HTS 2823. Special Topics. 3 Credit Hours.
Allows a group of students and a professor to study topics not covered in other courses in the department.

HTS 2927. Special Problems. 1-21 Credit Hours.

HTS 2928. Special Problems. 1-21 Credit Hours.

HTS 2929. Special Problems. 1-21 Credit Hours.

HTS 2XXX. Hist,Tech & Soc Elective. 1-21 Credit Hours.

HTS 3001. American Economic Hist. 3 Credit Hours.
U.S. economic history since 1607, including regional specialization, agriculture, industrialization, technology, government and economy, money and banking, labor, international trade, and contemporary economic problems.

HTS 3002. Hist-American Business. 3 Credit Hours.
Evolution of business institutions from colonial period to present, including entrepreneurship, business-government relations, institutional innovation, and twentieth century managerial capitalism.

HTS 3003. Soc of Econ Institutions. 3 Credit Hours.
Examines links between economic structures-markets, regulatory bodies, and labor relations systems-and the wider structural and cultural context.

HTS 3005. Amer Environmental Hist. 3 Credit Hours.
Transformation of the North American environment since 1500, including different notions of nature, romantic responses to wilderness during industrialization, rise of conservation movements, and environmental policy.

HTS 3006. United States Labor Hist. 3 Credit Hours.
The changing nature of work and labor relations, with focus on unionization and government regulation, and equity issues in the workplace.

HTS 3007. Soc of Work and Industry. 3 Credit Hours.
Analyzes paid employment as a decisive social attachment, emphasizing work organizations, technological change and authority relations, and social inequality among diverse groups of employees.
HTS 3008. Class, Power & Inequality. 3 Credit Hours.
This course examines how social class and the market economy affect inequality and stratification in the U.S., with additional attention to the roles of race and gender.

HTS 3009. The American Civil War. 3 Credit Hours.
Social, economic, political, and military aspects of the Civil War, including causes of the war, military campaigns, and long-term consequences.

HTS 3011. City in American Hist. 3 Credit Hours.
Examines the historical background of the American city since colonial times, including city planning, urban technology and services, neighborhoods, and race relations.

HTS 3012. Urban Sociology. 3 Credit Hours.
Sociological perspectives on the city, urbanization, and problems of community, evolution of cities and problems of urban life in the United States and Third World.

HTS 3015. History of Vietnam War. 3 Credit Hours.
Diplomatic, military, and social aspects of America's war in Vietnam, including antirwar protests, the defense industry boom, and the war's enduring impact on American life.

HTS 3016. Women & Gender in U.S.. 3 Credit Hours.
Course examines themes and theories of women's and gender history since the colonial period, including work, family, race, sexuality, and politics.

HTS 3017. Sociology of Gender. 3 Credit Hours.
Gender as a dimension of social life that shapes and is shaped by the economy, schooling, family, politics, medicine and health, race, and social class.

HTS 3018. Religions & Cults in US. 3 Credit Hours.
Explores controversial and influential new religious movements and cults in America, focusing on their origin, appeal, and impact.

HTS 3019. Family & Sexuality in U.S.. 3 Credit Hours.
Changing patterns of family life and sex roles since colonial times, with a focus on mainstream ideals, utopian alternatives, and social criticism.

HTS 3020. Gender and Technology. 3 Credit Hours.
Course examines the ways in which the design, development, and application of technologies, as well as cultural responses to them, have been gendered historically.

HTS 3021. Women in Science & Engr. 3 Credit Hours.
Women in science and engineering and gender differences in participation, location, and status. Examines education, access, and apprenticeship, culture of science and engineering.

HTS 3022. Gender and Sports. 3 Credit Hours.
Examines how gender norms and beliefs shape sport structures, participation opportunities and experiences in American sport.

HTS 3023. Free People of Color. 3 Credit Hours.
Free people of color during the era of slavery, including everyday life, political and social philosophies, literature, community development, and movements for social change.

HTS 3024. African-Amer His to 1865. 3 Credit Hours.
The experience of African and African American people in North America from the beginnings of slavery until the era of emancipation in the Civil War.

HTS 3025. Afr-Amer Hist since 1865. 3 Credit Hours.
The African American experience since 1865, including Reconstruction, segregation, the African American family, the Harlem Renaissance, the Civil Rights Movement, and Black Power.
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<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>HTS 3045</td>
<td>Nazi Germany-Holocaust</td>
<td>3</td>
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<tr>
<td></td>
<td>Genocide in the twentieth century, emphasizing the extermination of European Jews. Course investigates roots of racism, eugenics, and ideologies of genocide in comparative perspective.</td>
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<tr>
<td>HTS 3046</td>
<td>Sci Pol Culture Nazi Ger.</td>
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<td></td>
<td>Examines the social, political and cultural context of science and technology in Nazi Germany to understand the interaction of science and politics under totalitarian regimes.</td>
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<tr>
<td>HTS 3048</td>
<td>Modern Russian History</td>
<td>3</td>
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<td></td>
<td>Provides an overview of Russian history during the 20th Century. Special emphasis will be on the Soviet period of Russian history from 1917-1991.</td>
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<tr>
<td>HTS 3051</td>
<td>Women &amp; Gender-Middle East</td>
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<td></td>
<td>The role of women in imperial, nationalist, and Islamist political programs in the Middle East and the impact of politics on women's lives.</td>
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<tr>
<td>HTS 3055</td>
<td>Globalization Modern Era</td>
<td>3</td>
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<td></td>
<td>This course examines the process of globalization and global change in the twentieth century. Also offers a critical examination of various theories of globalization.</td>
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<tr>
<td>HTS 3061</td>
<td>Modern China</td>
<td>3</td>
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<td>The decline of Confucian order, the impact of the West, changes and continuities of Chinese culture, the Communist revolution, nationalism, and economic reforms since 1978.</td>
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<tr>
<td>HTS 3062</td>
<td>Modern Japan</td>
<td>3</td>
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<td>Japan's transformation in one century from a feudal state into an economic superpower and the impact of these changes on the Japanese people.</td>
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<tr>
<td>HTS 3063</td>
<td>British Colonization</td>
<td>3</td>
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<td>Analysis of four British settlement colonies-Australia, New Zealand, Canada, and South Africa-emphasizing settlement, race relations, and national identity.</td>
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<tr>
<td>HTS 3064</td>
<td>Sociology of Development</td>
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<td></td>
<td>Course examines competing perspectives on international development and surveys some of the crucial issues, including political instability, facing the Third World today.</td>
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<tr>
<td>HTS 3065</td>
<td>Hist Global Societies</td>
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<td>Examines the historical patterns of interaction and interdependence between world regions, from approximately the 13th century to global interdependence to the contemporary world.</td>
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<tr>
<td>HTS 3066</td>
<td>Soc-Politics &amp; Society</td>
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<td></td>
<td>Political sociology studies the way power is distributed in society. This course takes a comparative and historical approach, focusing on the development of the nation-state.</td>
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<tr>
<td>HTS 3067</td>
<td>Revolutionary Movement</td>
<td>3</td>
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<td></td>
<td>Comparative analysis of the origin, development, and impact of major twentieth century revolutionary movements.</td>
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<tr>
<td>HTS 3068</td>
<td>Social Movements</td>
<td>3</td>
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<td>Why do social movements emerge? Why might they succeed? This course examines how ordinary people challenge powerful segments of society and contribute to social change.</td>
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<tr>
<td>HTS 3069</td>
<td>Modern Cuba</td>
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<td></td>
<td>Cuba since 1492 emphasizing slavery and sugar, wars of independence, the revolution of 1959, and the regime of Fidel Castro.</td>
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<tr>
<td>HTS 3070</td>
<td>Culture and Society</td>
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<td></td>
<td>Covers core issues in the study of culture. Focuses on key sites, social practices, and institutions. Topics include education, medicine, consumption, and the mass media.</td>
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<tr>
<td>HTS 3071</td>
<td>Sociology of Crime</td>
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<td>This course examines the theories and issues such as perceptions of crime and criminals, characteristics of offenders and victims, and how crime is studied.</td>
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<tr>
<td>HTS 3072</td>
<td>Sociology of Education</td>
<td>3</td>
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<td></td>
<td>Examines sociological perspectives on how individual, school, and social factors influence students and teachers. Particular attention is paid to gender, race, ethnicity, and social class.</td>
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<tr>
<td>HTS 3073</td>
<td>Sociology of Sports</td>
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<td></td>
<td>Examines what constitutes &quot;sports,&quot; and uses sociological lens to study sports relationship to education, policy, media, deviance, violence as well as gender, race and class.</td>
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<tr>
<td>HTS 3075</td>
<td>Foundations Sports Stds.</td>
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<td>Offers case studies of the multidisciplinary study of sports using the lenses of history, sociology, economics, science and technology to understand sports practices and controversies.</td>
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<tr>
<td>HTS 3076</td>
<td>History of Intel</td>
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<td>Examines the Cold War's most important spy cases and operations to better understand the interplay between the world of secrets and intelligence and the world of statecraft and technology.</td>
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<tr>
<td>HTS 3080</td>
<td>History of Rocketry</td>
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<td></td>
<td>Examines the history of rocketry, scientists, and organizations in the US, USSR, and Europe during the twentieth century.</td>
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<tr>
<td>HTS 3081</td>
<td>Tech and Environment</td>
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<td></td>
<td>Examines how technology affected the environment during the 20th Century, with special attention to issues like industrialization, pollution, overcrowding, and the biotech revolution.</td>
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<tr>
<td>HTS 3082</td>
<td>Sociology of Science</td>
<td>3</td>
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<td></td>
<td>The growth of science, its social structure, deviance and norms, the social context of scientific knowledge and practice, and science policy. Credit not allowed for both HTS 3082 and HTS 6115.</td>
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<tr>
<td>HTS 3083</td>
<td>Tech &amp; American Society</td>
<td>3</td>
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<td></td>
<td>The complex interplay between technical innovation and cultural change in the United States since 1850, with emphasis on the emergence of modern consumer-oriented society.</td>
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<tr>
<td>HTS 3084</td>
<td>Culture &amp; Technology</td>
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<td>Modernism and post-modernism: this course investigates culturally creative responses to modern manufacturing, transportation (trains, cars, airplanes), evolving gender ideals, and new communications.</td>
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<tr>
<td>HTS 3085</td>
<td>Law, Technology &amp; Politics</td>
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<td>Examines the ways in which courts, legislatures, and regulatory agencies have responded to challenges posed by new technology and shaped the course of technical change.</td>
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<tr>
<td>HTS 3086</td>
<td>Soc of Medicine &amp; Health</td>
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<td>Relationship between health and society, including health care problems in the United States and culture's role in defining health and sickness and in determining appropriate therapies.</td>
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<tr>
<td>HTS 3087</td>
<td>History of Medicine</td>
<td>3</td>
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<td></td>
<td>An introduction to historical perspectives on the development of medicine, and its relationship to health, illness, and society. Credit not allowed for both HTS 3087 and HTS 2080.</td>
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<tr>
<td>HTS 3088</td>
<td>Race Medicine &amp; Science</td>
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<td></td>
<td>Examines how race is an issue in medicine and science in ways such as education, professions, treatments, experiments, and as a subject of analysis.</td>
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</tbody>
</table>
HTS 3089. Science Tech & Sports. 3 Credit Hours.
This course examines what constitutes a “sport,” debates on the role of social inequality in sports, and the intersection of science, technology and sport.

HTS 3100. Intro To Museum Studies. 3 Credit Hours.
Covers theoretical and practical issues in museum studies, including the role of material culture in scholarly work, registration of artifacts, exhibit design, and public relations.

HTS 3102. Social Theory&Structure. 3 Credit Hours.
Introduction to social theory, providing students with skills for reading theory and examining works of major social theorists, including Marx, Weber, Durkheim, Gilman, and Bourdieu.

HTS 3103. Honor's Thesis. 4 Credit Hours.
This course is designed to allow honor’s students to distinguish themselves by producing a significant, original research paper.

HTS 3803. Special Topics. 3 Credit Hours.
Allows a group of students and a professor to study topics not covered in other courses in the department.

HTS 3813. Special Topics. 3 Credit Hours.
Allows a group of students and a professor to study topics not covered in other courses in the department.

HTS 3823. Special Topics. 3 Credit Hours.
Allows a group of students and a professor to study topics not covered in other courses in the department.

HTS 3XXX. Hist,Tech & Soc Elective. 1-21 Credit Hours.

HTS 4001. Seminar in US History. 4 Credit Hours.
Advanced undergraduate topics in U.S. history. Designed for HTS majors, but open to other students with junior or senior standing.

HTS 4011. Seminar in Sociology. 4 Credit Hours.
Advanced undergraduate topics in sociology. Designed for HTS majors, but open to other students with junior or senior standing.

HTS 4031. Seminar in European Hist. 4 Credit Hours.
Advanced undergraduate topics in European history. Designed for HTS majors, but open to other students with junior or senior standing.

HTS 4061. Seminar in Asian History. 4 Credit Hours.
Advanced undergraduate topics in Asian history. Designed for HTS majors, but open to other students with junior or senior standing.

HTS 4081. Seminar in Hist of Tech. 4 Credit Hours.
Advanced undergraduate topics in the history of technology. Designed for HTS majors, but open to other students with junior or senior standing.

HTS 4086. Sem Health Med & Society. 4 Credit Hours.
Advanced undergraduate topics in health and medicine. Designed for HTS majors and HMS minors, but open to other students with junior or senior standing.

HTS 4091. Seminar Global Issues. 4 Credit Hours.

HTS 4694. HTS Internship-Paid. 1-12 Credit Hours.
Undergraduate internship for which the student is paid and receives audit credit. Juniors and seniors only.

HTS 4695. HTS Internship-Credit. 1-12 Credit Hours.
Unpaid undergraduate internship for which the student receives pass/fail credit. Juniors and seniors only.

HTS 4698. Research Assistantship. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

HTS 4699. Undergraduate Research. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

HTS 4811. Special Topics. 1 Credit Hour.
Topics of interest not covered in the regular course offering.

HTS 4812. Special Topics. 2 Credit Hours.
Topics of interest not covered in the regular course offerings.

HTS 4813. Special Topics. 3 Credit Hours.
Topics of interest not covered in the regular course offerings.

HTS 4814. Special Topics. 4 Credit Hours.
Topics of current interest not covered in the regular course offerings.

HTS 4815. Special Topics. 5 Credit Hours.
Topics of interest not covered in the regular course offerings.

HTS 4823. Special Topics. 3 Credit Hours.
Allows a group of students and a professor to study topics not covered in other courses in the department.

HTS 4833. Special Topics. 3 Credit Hours.
Allows a group of students and a professor to study topics not covered in other courses in the department.

HTS 4843. Special Topics. 3 Credit Hours.
Allows a student and a professor to study topics not included in other courses in the department.

HTS 4925. Special Problems in HTS. 1-21 Credit Hours.
Individual studies of topics of current interest in history, technology, and society.

HTS 4926. Special Problems in HTS. 1-21 Credit Hours.
Individual studies of topics of current interest in History, Technology, and Society.

HTS 4927. Special Problems in HTS. 1-21 Credit Hours.
Individual studies of topics of current interest in History, Technology, and Society.

HTS 4928. Special Problems in HTS. 1-21 Credit Hours.
Individual studies of topics of current interest in History, Technology, and Society.

HTS 4929. Special Problems in HTS. 1-21 Credit Hours.
Individual studies of topics of current interest in History, Technology, and Society.

HTS 4990. HTS Internship. 1-12 Credit Hours.
Recognition for a paid or unpaid, full or part-time, employment experience that is relevant to a student’s history and sociology education.

HTS 4XXX. Hist,Tech & Soc Elective. 1-21 Credit Hours.

HTS 6001. Proseminar-Social Theory. 3 Credit Hours.
An introduction to key theoretical traditions in modern social theory, including both classical and contemporary works.

HTS 6002. Proseminar-Hist of Tech. 3 Credit Hours.
Identifies major areas of interest in the history of technology and introduces a variety of approaches to the discipline.

HTS 6101. Soc & Pol Hist of U.S.. 3 Credit Hours.
Examines the social experiences of Americans and the political contexts in which they lived.

HTS 6102. Soc & Pol Hist of Europe. 3 Credit Hours.
Classic works and debates in European social history, including transition from feudalism to capitalism, French Revolution, rural history and industrialization, and origins of nationalism.
HTS 6103. Soc&Pol Hist-Nonwestern. 3 Credit Hours.
Covers basic empirical and relevant theoretical literature in English on the social and political history of Africa, Asia, and/or Latin America.

HTS 6106. Business Org & Pol Econ. 3 Credit Hours.
Examines the historical evolution and contemporary operations of business institutions within the larger context of political economy; emphasis on business, government, and technology.

HTS 6110. Gender,Science & Tech. 3 Credit Hours.
Examines the ways in which gendered relations shape scientific and technological institutions, careers, artifacts, knowledge, and culture.

HTS 6111. Tech & Modern Culture. 3 Credit Hours.
Introduces the complex interplay between technological systems and diffuse systems of consumption, social organization, and culture beyond the act of production.

HTS 6112. Studies-Science & Engr. 3 Credit Hours.
Empirical investigation of scientific and engineering practice in historical and contemporary settings.

HTS 6113. Development Tech Sci. 3 Credit Hours.
Explores the impact of science and technology on development and modernization. Credit not allowed for both HTS 6113 and HTS 4011.

HTS 6114. Hist Science. 3 Credit Hours.
Explores topics in the history of science in their social and political contexts.

HTS 6115. Sociology Sci Tech. 3 Credit Hours.
Explores current debates in the history of the sociology of science and technology. Credit not allowed for both HTS 6115 and HTS 3082.

HTS 6116. Environmental History. 3 Credit Hours.
Surveys the field of global environmental history with examples taken from biology, geography, sociology and anthropology.

HTS 6117. Urbanization. 3 Credit Hours.
An intensive introduction to the political, social, and economic forces involved in the process of urbanization. Credit not allowed for both HTS 6117 and HTS 6105.

HTS 6118. Sci Tech & The Economy. 3 Credit Hours.
Examines how science and technology are related to economic institutions and processes. Credit not allowed for both HTS 6118 and HTS 6107.

HTS 6119. Race and Ethnicity. 3 Credit Hours.
Examines the structural impact of racism and ethnic discrimination on American society, and the controversies over racial and ethnic identity. Credit not allowed for both HTS 6119 and HTS 6108.

HTS 6120. Inequality Sci Tech. 3 Credit Hours.
Explores the impacts of science and technology on inequality, as well as how notions of difference have shaped science and technology. Credit not allowed for both HTS 6120 and HTS 6109.

HTS 6121. Science Tech Security. 3 Credit Hours.
Topics in the study of the relationship between national security and the scientific-technological enterprise from diverse perspectives.

HTS 6122. History of Medicine. 3 Credit Hours.
The impact of disease in history; modern developments in medicine and health focusing on western medicine in a global context.

HTS 6123. Social & Cultural BIOMED. 3 Credit Hours.
Introduces students to the changing social, political, and corporate worlds of the biological sciences, biotechnology, and biomedicine.

HTS 6124. Sci&Tech Beyond Borders. 3 Credit Hours.
Discusses the roles of science and technology as instruments of social control and of social change in development and modernization. Credit not allowed for both HTS 6124 and HTS 6104.

HTS 6743. STS Core Seminar. 3 Credit Hours.
This survey course covers key works in Science, Technology & Society, and guest lectures introduce students to faculty doing STS-related research across the Ivan Allen College. Credit not allowed for both HTS 6743 and PUBP 6743 or LCC 6743.

HTS 6801. Research Paper. 3 Credit Hours.
Under the direct supervision of one or more faculty members, graduate students will complete an original research design and execute that study.

HTS 6XXX. Hist, Tech & Society Elect. 1-21 Credit Hours.

HTS 7001. SSMT Elect. 3 Credit Hours.
Introduces key concepts and methods used in the historical analysis of social phenomena.

HTS 7002. Research & Writing Sem. 3 Credit Hours.
Introduces methods of sociohistorical research and writing; requires preparation of an original research paper based on primary sources.

HTS 7999. Comp Exam Prep. 3 Credit Hours.
Preparation for comprehensive exam in fields of history or sociology.

HTS 8001. Labor, Indus, Tech & Society. 3 Credit Hours.
An intensive, team-taught reading seminar covering major themes and classic works in these fields.

HTS 8801. Special Topics. 1 Credit Hour.

HTS 8802. Special Topics. 2 Credit Hours.

HTS 8803. Special Topics. 3 Credit Hours.

HTS 8804. Special Topics. 4 Credit Hours.

HTS 8805. Special Topics. 5 Credit Hours.

HTS 8806. Special Topics. 6 Credit Hours.

HTS 8901. Special Problems. 1-21 Credit Hours.

HTS 8902. Special Problems. 1-21 Credit Hours.

HTS 8903. Special Problems. 1-21 Credit Hours.

HTS 8904. Special Problems. 1-21 Credit Hours.

HTS 8905. Special Problems. 1-21 Credit Hours.

HTS 8906. Special Problems. 1-21 Credit Hours.

HTS 8997. Teaching Assistantship. 1-9 Credit Hours.
For graduate students holding a teaching assistantship.

HTS 9000. Doctoral Thesis. 1-21 Credit Hours.
Industrial & Systems Engr (ISYE)

ISYE 1XXX. Indust&Sys Engr Elective. 1-21 Credit Hours.
Topics include conditional probability, density and distribution functions from engineering, expectation, conditional expectation, laws of large numbers, central limit theorem, and introduction to Poisson Processes.

ISYE 2027. Probability With Apps. 3 Credit Hours.
Topics include conditional probability, density and distribution functions from engineering, expectation, conditional expectation, laws of large numbers, central limit theorem, and introduction to Poisson Processes.

ISYE 2028. Basic Statistical Meth. 3 Credit Hours.
Topics include conditional probability, density and distribution functions from engineering, expectation, conditional expectation, laws of large numbers, central limit theorem, and introduction to Poisson Processes.

ISYE 2127. Honors Probability. 3 Credit Hours.
Topics parallel those in ISYE 2027 with an intended treatment that is more innovative and challenging. Credit not allowed for both ISYE 2127 and 2027.

ISYE 2128. Honors Statistics. 3 Credit Hours.
Topics parallel to those in ISYE 2028 with an intended treatment that is more innovative and challenging. Credit not given for both ISYE 2028 and 2128.

ISYE 2698. Research Assistantship. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

ISYE 2699. Undergraduate Research. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

ISYE 2801. Special Topics. 1 Credit Hour.
Courses in special topics of timely interest to the profession, conducted by resident or visiting faculty.

ISYE 2803. Special Topics. 3 Credit Hours.
Courses in special topics of timely interest to the profession, conducted by resident or visiting faculty.

ISYE 2XXX. Indust&Sys Engr Elective. 1-21 Credit Hours.

ISYE 3025. Engineering Economy. 1 Credit Hour.
Introduction to engineering economic decision making, economic decision criteria, discounted cash flow, replacement and timing decisions, risk, depreciation, and income tax.

ISYE 3039. Methods-Quality Improve. 3 Credit Hours.
Topics include quality system requirements, designed experiments, process capability analysis, measurement capability, statistical process control, and acceptance sampling plans. Credit will not be awarded for both ISYE 3039 and ISYE 6382.

ISYE 3044. Simulation Analy & Dsgn. 3 Credit Hours.
Discrete event simulation methodology emphasizing the statistical basis for simulation modeling and analysis. Overview of computer languages and simulation design applied to various industrial situations.

ISYE 3103. Sply Chain Mod:Logistics. 3 Credit Hours.
Course focuses on engineering design concepts and optimization models for logistics decision making in three modules: supply chain design, planning and execution, and transportation.

ISYE 3104. Sply Chain Mod:Manf&Ware. 3 Credit Hours.
Design and operation of manufacturing and warehousing facilities.

ISYE 3133. Engineering Optimization. 3 Credit Hours.
Topics include modeling with networks and graphs; linear, nonlinear, and integer programming, construction of models employing modern modeling languages; and general solution strategies.

ISYE 3232. Stochastic Mfg&Serv Sys. 3 Credit Hours.
Methods for describing stochastic movements of material in manufacturing facilities, supply chain, and equipment maintenance networks. Includes analysis of congestion, delays, and inventory ordering policies.

ISYE 3770. Statistics& Applications. 3 Credit Hours.
Introduction to probability, probability distributions, point estimation, confidence intervals, hypothesis testing, linear regression, and analysis of variance. Crosslisted with MATH 3770 and CEE 3770. Also, credit not awarded for both ISYE 3770 and MATH 3760.

ISYE 3790. Intro-Cognitive Science. 3 Credit Hours.
Multidisciplinary perspectives on cognitive science. Interdisciplinary approaches to issues in cognition, including memory, language, problem solving, learning, perception, and action. Crosslisted with CS, PST, and PSYC 3790.

ISYE 3833. Special Topics. 3 Credit Hours.
Courses in special topics of timely interest to the profession, conducted by resident or visiting faculty.

ISYE 3XXX. Indust&Sys Engr Elective. 1-21 Credit Hours.

ISYE 4009. Human Integrated Systems. 3 Credit Hours.
Topics include general cognitive systems engineering concepts and principles, and specific concepts and principles of interface design, task analysis, prototyping, and empirical usability of evaluation methods.

ISYE 4031. Regression/Forecasting. 3 Credit Hours.
Regression analysis: multiple linear regression, diagnostics, and variable selection. Forecasting: exponential smoothing techniques and autoregressive moving average models.

ISYE 4034. Decision and Data Analytics. 3 Credit Hours.
This course integrates decision and data analytics to solve real-world business problems. It includes hands-on system modeling, data collection and analysis, and reporting writing projects.

ISYE 4106. Senior Design. 4 Credit Hours.
Senior design project requiring student to formulate a project plan with an off-campus enterprise. Includes specific milestones, targets, and evaluation criteria.

ISYE 4111. Adv Supply Chain Logists. 3 Credit Hours.
This course is a follow-up to ISYE 3103 that covers optimization models and case studies for logistics network design and logistics operations.

ISYE 4133. Advanced Optimization. 3 Credit Hours.
Theory and implementation of practical methods to find good or optimal solutions to optimization problems too large or complex to solve in a straightforward way.

ISYE 4232. Advanced Stochastic Sys. 3 Credit Hours.
The course will cover Jackson Networks and Markov Decision Processes with applications to production/inventory systems, customer contact centers, revenue management, and health care.

ISYE 4301. Supply Chain Economics. 3 Credit Hours.
The course studies techniques for coordination and collaboration in supply chains. Applications include pricing strategies, revenue management, gaming, and incentives.

ISYE 4311. Capital Invest Analysis. 3 Credit Hours.
Students learn core concepts and techniques for economic decision and analysis of complex capital investment problems that involve dimensions of time, uncertainty and strategy.
ISYE 4331. Honors Optimization. 3 Credit Hours.
Topics parallel those in ISYE 4231 with an intended treatment that is more innovative and challenging. Credit not given for both ISYE 4331 and 4231.

ISYE 4501. Energy, Effic & Sustain. 3 Credit Hours.
Analysis and modeling of energy production and use, material and energy efficiency, sustainability, and cost for systems, products, and services.

ISYE 4698. Research Assistantship. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

ISYE 4699. Undergraduate Research. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

ISYE 4740. Bio-Inspired Design. 3 Credit Hours.
We examine evolutionary adaptation as a course for engineering design inspiration, utilizing principles of scaling, adaptability, and robust multifunctionality that characterize biological systems. Credit not allowed for both ISYE 4740 and (BIOL 4740, or PTFE 4740 or MSE 4740 or ME 4740).

ISYE 4800. Special Topics. (null) Credit Hours.
ISYE Senior Design Preparation.

ISYE 4801. Special Topics. 1 Credit Hour.
Courses in special topics of timely interest to the profession, conducted by resident or visiting faculty.

ISYE 4802. Special Topics. 2 Credit Hours.
Courses in special topics of timely interest to the profession, conducted by resident or visiting faculty.

ISYE 4803. Special Topics. 3 Credit Hours.
Courses in special topics of timely interest to the profession, conducted by resident or visiting faculty.

ISYE 4813. Special Topics. 3 Credit Hours.
Courses in special topics of timely interest to the profession conducted by resident or visiting faculty.

ISYE 4823. Special Topics. 3 Credit Hours.
Courses in special topics of timely interest to the profession conducted by resident or visiting faculty.

ISYE 4833. Honors Topics. 3 Credit Hours.
Topics of current interest in the field of ISYE that are covered with an appropriately high level of innovation and rigor.

ISYE 4843. Special Topics. 3 Credit Hours.
Topics of current interest in the field of ISYE.

ISYE 4852. Special Topics. 2 Credit Hours.
Courses in special topics of timely interest to the profession, conducted by resident or visiting faculty.

ISYE 4991. Special Problems. 1-21 Credit Hours.
A variable hour credit opportunity to develop initiative and apply fundamental principles by performing semioriginal laboratory or research work in ISYE.

ISYE 4992. Special Problems. 1-21 Credit Hours.
A variable credit hour opportunity to develop initiative and apply fundamental principles by performing semioriginal laboratory or research work in ISYE.

ISYE 4993. Special Problems. 1-21 Credit Hours.
A variable credit hour opportunity to develop initiative and apply fundamental principles by performing semioriginal laboratory or research work in ISYE.

ISYE 4994. Special Topics. 1-21 Credit Hours.
A variable credit hour opportunity to develop initiative and apply fundamental principles by performing semioriginal laboratory or research work in ISYE.

ISYE 4XX. Indust.Sys Engr Elective. 1-21 Credit Hours.

ISYE 6101. Organizational Behavior. 3 Credit Hours.
Studies the scientific generation, formalization, and application of the knowledge of individual and group behaviors that engineers need to function effectively within contexts.

ISYE 6201. Manufacturing Systems. 3 Credit Hours.
Topics include analysis of flows, bottlenecks and queuing, types of operations, manufacturing inventories, aggregate production planning, lot sizes and lead times, and pull production systems.

ISYE 6202. Warehousing Systems. 3 Credit Hours.
Topics include design and analysis of materials handling systems, warehouse layout, order picking strategies, warehousing inventories, warehouse management systems, integration of production and distribution systems. Credit will not be awarded for both ISYE 6202 and ISYE 6383.

ISYE 6203. Transp&Supply Chain Sys. 3 Credit Hours.
Topics include supply chain characterization, site location, mode selection, distribution planning, vehicle routing, demand management, replenishment management, geographic information systems, and real-time control issues. Credit will not be awarded for both ISYE 6203 and ISYE 6383.

ISYE 6205. Cognitive Engineering. 3 Credit Hours.
Application of cognitive science concepts to system design, and the development of concepts appropriate for understanding and aiding cognition in naturally or technologically complex environments.

ISYE 6215. Human-Machine Systems. 3 Credit Hours.
The development and use of mathematical models of human behavior are considered. Approaches from estimation theory, control theory, queuing theory, and fuzzy set theory are considered.

ISYE 6223. Human Decision Making. 3 Credit Hours.
Prescriptive and descriptive theories of human decision making are discussed/contrasted. Approaches to aiding human decision making are considered in context of these theoretical frameworks.

ISYE 6224. Topics:Human-Integr Sys. 3 Credit Hours.
State-of-the-art research directions including supervisory control models of human command control tasks; human-computer interface in scheduling and supervision of flexible manufacturing systems.

ISYE 6225. Engineering Economy. 3 Credit Hours.
Advanced engineering economy topics, including economic worth, economic optimization under constraints, risk and uncertainty, foundations of utility theory.

ISYE 6227. Intro to Financial Engr. 3 Credit Hours.
Advanced techniques for economic analysis of capital investment. Basic terminology and financial engineering concepts for managing and valuing project risk. Real options applications in systems engineering.

ISYE 6229. Productivity Analysis. 3 Credit Hours.
Modern measurement of productivity measurement and analysis including principles, issues, and latest techniques associated with benchmarking, efficiency measurement, and productivity tracking. Empirical studies and group projects.

ISYE 6230. Economic Decision Analy. 3 Credit Hours.
Topics include preferences and utilities, social choice, equilibrium concepts, noncooperative and cooperative game theory, price mechanisms, auction mechanisms, voting theory, and incentive compatibility.
ISYE 6333. Opns Res For Sup Chns I. 3 Credit Hours.
Deterministic models of supply chains including location and material flow. Optimization techniques including linear programming, network flows, integer programming, and heuristics.

ISYE 6334. Opns Res For Sup Chns II. 3 Credit Hours.
Probabilistic models of supply chains, including the effects of variability, models of wholesale and retail demand; forecasting and simulation.

ISYE 6335. Supply Chain Engrg I. 3 Credit Hours.
Production scheduling; inventory systems; warehousing, including stocking strategies, order-picking, sortation, automation; distribution.

ISYE 6336. Supply Chain Engrg II. 3 Credit Hours.
Transportation: truck-load and less-than-truckload, and package-courier systems; container shipping, including port operations, steamship scheduling; railroad operations, including intermodal; air cargo. The international freight network and patterns of freight flow. Management and recirculation of trailers/containers. Labor issues.

ISYE 6337. Supply Chain Engrg III. 3 Credit Hours.
Problems of coordination and collaboration along the supply chain; make-or-buy decisions; pricing and auctions; wholesale and retail channels; supply chain dynamics, including the bullwhip effect. Distinctive supply chain issues in key economies.

ISYE 6338. Supply Chain Strategy. 3 Credit Hours.
Case studies of notable supply chains successes and failures.

ISYE 6339. Supply Chain Info Sys. 3 Credit Hours.
Planning and executing systems for inventory, warehousing, transportation, import/export, etc. Services-oriented architecture, cloud computing; systems integration; RFID and other technologies for scanning and monitoring.

ISYE 6340. Seminar in Sup Chn Engrg. 3 Credit Hours.
Through a program of industry speakers and facility tours, student will learn to assess and critique supply chain practice.

ISYE 6341. Capstone Project I. 3 Credit Hours.
Small groups of students undertake an industry-sponsored project under faculty guidance.

ISYE 6342. Capstone Project II. 3 Credit Hours.
Small groups of students undertake an industry-sponsored project under faculty guidance.
ISYE 6501. Intro Analytics Modeling. 3 Credit Hours.
An introduction to important and commonly-used models in analytics, as well as aspects of the modeling process.

ISYE 6644. Simulation. 3 Credit Hours.
Covers modeling of discrete-event dynamic systems and introduces methods for using these models to solve engineering design and analysis problems.

ISYE 6645. Monte Carlo Methods. 3 Credit Hours.
Covers state-of-the-art Monte Carlo simulation techniques. These techniques will be used to model and solve a variety of real-world problems from several diverse areas in science and engineering, including supply chain analysis and design, pattern recognition, VLSI design, network reliability, financial engineering, and molecular biology.

ISYE 6650. Probabilistic Models. 3 Credit Hours.
An introduction to basic stochastic processes such as Poisson and Markov processes and their applications in areas such as inventory, reliability, and queueing.

ISYE 6656. Queueing Theory. 3 Credit Hours.

ISYE 6661. Linear Optimization. 3 Credit Hours.
Theory, algorithms, and applications of linear programming. Topics include the simplex method and resolution of degeneracy, duality and sensitivity analysis, basis factorization, the dual and revised simplex methods, and geometry of polyhedra. Intended for Ph.D. students.

ISYE 6662. Discrete Optimization. 3 Credit Hours.
Fundamentals of integer and combinatorial optimization. Topics include polyhedra, cuts, Lagrangean duality, complexity, and others. This course is intended for Ph.D. students.

ISYE 6663. Nonlinear Optimization. 3 Credit Hours.
Fundamentals of nonlinear optimization. Topics include optimality conditions; convex programming and duality; unconstrained and constrained methods. Polynomial algorithms and interior point methods. Dual methods. This course is for students seriously considering a PhD.

ISYE 6664. Stochastic Optimization. 3 Credit Hours.
An introduction to sequential decision making under uncertainty. Much of the course is devoted to the theoretical, modeling, and computational aspects of Markov decision processes.

ISYE 6669. Deterministic Optimiz. 3 Credit Hours.
An introduction to deterministic optimization methodologies including approaches from linear, discrete, and nonlinear optimization including algorithms and computations. Applications will be introduced as appropriate.

ISYE 6673. Financial Optimization. 3 Credit Hours.
An introduction to optimization techniques with special emphasis on applications to finance, including portfolio optimization, immunization, and risk management.

ISYE 6679. Computational Methods. 3 Credit Hours.
Strategies and techniques for converting optimization theory into effective computational procedures. Emphasis is on applications in linear, integer, and nonlinear programming; networks and graphs.

ISYE 6701. Energy Technol & Policy. 3 Credit Hours.
Examines energy production, use, and production, use, and policy using quantitative engineering and policy analysis. Addresses resource constraints, physical principles, and policy analysis methods.

ISYE 6739. Statistical Methods. 3 Credit Hours.
Overview of basic tools used in statistical analysis and modeling. Credit not allowed to students seeking a degree in ISYE.

ISYE 6740. Computational Data Analy. 3 Credit Hours.
Theoretical/computational foundations of analyzing large/complex modern datasets, including the fundamental concepts of machine learning and data mining needed for both research and practice. Crosslisted with CSE 6740.

ISYE 6748. Appld Analytics Pract. 6 Credit Hours.
Practical analytics project experience applying ideas from the classroom to a significant project of interest to a business, government agency, or other organization.

ISYE 6759. Stoch Process-Finance. 3 Credit Hours.
Mathematical modeling of financial markets, derivative securities pricing, and portfolio optimization. Concepts from probability and mathematics are introduced as needed. Crosslisted with MATH 6759.

ISYE 6761. Stochastic Processes I. 3 Credit Hours.
Discrete time Markov chains, Poisson and renewal processes; transient and limiting behavior; average cost and utility measures of systems. Intended for Ph.D. students. Crosslisted with MATH 6761.

ISYE 6762. Stochastic Processes II. 3 Credit Hours.
Continuous time Markov chains; uniformization, transient and limiting behavior; Brownian motion and martingales; optional sampling and convergence. Intended for Ph.D. students. Crosslisted with MATH 6762.

ISYE 6767. Sys-Computation Finance. 3 Credit Hours.
Introduction to large-scale system design to support computational finance for options, stocks, or other financial instruments. Some programming experience and previous exposure to stocks, bonds, and options required. Crosslisted with MATH 6767.

ISYE 6769. Fixed Income Securities. 3 Credit Hours.
Description, institutional features, and mathematical modeling of fixed income securities. Use of both deterministic and stochastic models. Crosslisted with MATH 6769.

ISYE 6772. Mgt Resources-Tech Firms. 3 Credit Hours.
This course explores the competitive advantage manufacturing and service firms derive from the effective management of their technology, workforce, materials, and information resources. Crosslisted with MGT 6772.

ISYE 6773. High-Tech Ventures. 3 Credit Hours.
This course provides a forum for the in-depth examination of issues involving the strategic management of high-tech corporate start-ups and small technology-based businesses. Crosslisted with MGT 6773.

ISYE 6774. MOT Project. 3 Credit Hours.
This course organizes students into multidisciplinary teams devoted to solving a real problem for a technology-based firm. Crosslisted with MGT 6774.

ISYE 6775. MOT Seminar. 1 Credit Hour.
This course introduces the frontiers of key technologies, provides a forum for visiting speakers from the corporate world, and supplements topics from other MOT courses. Crosslisted with MGT 6775.

ISYE 6777. Analysis-Emerging Tech. 3 Credit Hours.
Methods for technology monitoring, forecasting, and assessment. Crosslisted with PUBP 6777.
ISYE 6779. Dynamic System Modeling. 3 Credit Hours.
Models of dynamic systems, such as aircraft, ground vehicles, and machinery, and manual control. Numerical simulation techniques and applications. Interactive simulators. Student programming project. Crosslisted with AE 6779.

ISYE 6781. Reliability Theory. 3 Credit Hours.
Structural properties and reliability of coherent systems.

ISYE 6783. Financial Data Analysis. 3 Credit Hours.
Fundamentals of statistical inference for models used in the modern analysis of financial data. Crosslisted with MATH 6783.

ISYE 6785. The Practice of QCF. 3 Credit Hours.
Case studies, visiting lecturers from financial institutions, student group projects of an advanced nature, and student reports, all centered around quantitative and computational finance. Crosslisted with MATH and MGT 6785.

ISYE 6792. Manufacturing Seminar. 1 Credit Hour.
Guest speakers on a broad range of manufacturing-related topics: research, applications, and technology. Required for Certificate in Manufacturing. Crosslisted with ECE and ME 6792.

ISYE 6793. Adv Topics in QCF. 3 Credit Hours.
Advanced foundational material and analysis techniques in quantitative and computational finance. Crosslisted with MATH 6793.

ISYE 6795. Intro-Cognitive Science. 3 Credit Hours.
Interdisciplinary approaches to issues in cognition, including memory, language, problem solving, learning, perception, and action. Crosslisted with CS and PSYC 6795.

ISYE 6805. Reliability Engineering. 3 Credit Hours.
Topics include hazard functions, life distributions, censoring, life tables, nonparametric and parametric estimation and inference, accelerated life testing, structure functions, reliability and maintenance systems, replacement theory.

ISYE 6810. Sys Montr&Prognostics. 3 Credit Hours.
The course focuses on sensor-based condition monitoring techniques, modeling of degradation processes, fault diagnostics and prognostics of failures in engineering systems using stochastic and statistical methods.

ISYE 6831. Advanced Simulation. 3 Credit Hours.
Topics include generalized semi-Markov processes; input and output analysis; random number, variate, and sample path generation, rare event simulation; and optimization via simulation.

ISYE 6832. Simulation Theory-Meth. 3 Credit Hours.
Theory, algorithms, and applications of computer simulation. Topics include generalized semi-Markov processes; input-output analysis; random number, variate, and sample path generation; variance reduction techniques; and optimization via simulation. This course is intended for Ph.D. students.

ISYE 6833. Industries & Sys Engr Elect. 1-21 Credit Hours.

ISYE 7000. Master’s Thesis. 1-21 Credit Hours.
Required of degree candidates in the master’s thesis option.

ISYE 7201. Prod&Service Sys Engg. 3 Credit Hours.
Advanced models in operations planning, scheduling and control of supply chain, production and service systems. Intended for Ph.D. students.

ISYE 7203. Logistics Systems Engg. 3 Credit Hours.
Advanced modeling and analysis of freight transportation and logistics systems. Intended for Ph.D. students.

ISYE 7204. Info Prod & Ser Sys. 3 Credit Hours.
A course covers integration of statistics, signal processing and control for variability reduction (modeling, analysis, diagnosis, control) for complex systems in a data rich environment.

ISYE 7210. Real-Time Interact Sim. 3 Credit Hours.
Principles and laboratory experience in design and implementation of interactive simulations of complex dynamic systems.

ISYE 7400. Adv Design-Experiments. 3 Credit Hours.
Random and mixed models, nested and blocked designs. Intended for Ph.D. students and those seeking the M.S. in Statistics.

ISYE 7401. Adv Statistical Modeling. 3 Credit Hours.
Nonlinear models, logistic regression, loglinear models. Intended for Ph.D. students and those seeking the M.S. in Statistics.

ISYE 7405. Multivariate Data Analy. 3 Credit Hours.
Multivariate ANOVA, principal components, factor analysis etc. Intended for Ph.D. students and those seeking the M.S. in Statistics.

ISYE 7406. Data Mining&Stat Learn. 3 Credit Hours.
Topics include neural networks, support vector machines, classification trees, boosting and discriminant analyses. Intended for Ph.D. students and those seeking the M.S. in Statistics.

ISYE 7441. Theory of Linear Models. 3 Credit Hours.
Intended for Ph.D. students and those seeking the M.S. in Statistics.

ISYE 7510. Graph Algorithms. 3 Credit Hours.
Algorithms for graph problems such as maximum flow, covering, matching, coloring, planarity, minimum cuts, shortest paths, and connectivity. Crosslisted with MATH 7510 and CS 7510.

ISYE 7653. Case Studies-Logist/Mfg. 3 Credit Hours.
Advanced topics in logistics and manufacturing through the use of industrial case studies. Difficult modeling issues such as data representation and consistency will be introduced.

ISYE 7661. Linear Inequalities. 3 Credit Hours.
Theoretical foundations of linear and integer programming. Topics include representation of polyhedra, polarity, simplex and ellipsoid algorithms, diophantine equations, Hilbert bases, total dual integrality, and others.

ISYE 7662. Convexity. 3 Credit Hours.
Convex sets, theory of finite systems of linear inequalities, convex functions, convex programming.

ISYE 7683. Adv Nonlinear Prog. 3 Credit Hours.
Convex programming; linear, conic quadratic and semidefinite programming; cheap optimization methods for extremely large-scale convex problems.

ISYE 7686. Adv Combinatorial Opt. 3 Credit Hours.
Typical coverage includes: Matching theory, network optimization, traversals in graphs, integrality of polyhedra, matroids, covers, cliques, and stable sets.

ISYE 7687. Adv Integer Programming. 3 Credit Hours.
General integer modeling concepts; valid inequalities and facets; duality; general algorithms such as branch-and-bound and branch-and-cut; special purpose algorithms; applications.

ISYE 7688. Comp Math Prog. 3 Credit Hours.
Study of solution techniques in mathematical optimization, emphasizing computational aspects of both theory and algorithms.
ISYE 7790. Cognitive Modeling. 4 Credit Hours.
A hands-on course covering a range of cognitive methodologies. It explores the analysis, development, construction, and evaluation of models of cognitive processing. Crosslisted with CS and PSYC 7790.

ISYE 8011. Graduate Seminar. 1 Credit Hour.
Audit basis only.

ISYE 8012. Graduate Seminar. 1 Credit Hour.
Audit basis only.

ISYE 8013. Graduate Seminar. 1 Credit Hour.
Audit basis only.

ISYE 8014. Topics in SIAC. 1 Credit Hour.
A seminar course to introduce important research problems and applications related to the system informatics and control in production and service systems.

ISYE 8795. Colloquium-Cognitive Sci. 1 Credit Hour.
Reading of research papers by leading cognitive scientists, attendance at their colloquia, and meeting with them to discuss research. Crosslisted with CS and PSYC 8795.

ISYE 8802. Special Topics. 2 Credit Hours.
Special Topics in Industrial and Systems Engineering.

ISYE 8803. Special Topics. 3 Credit Hours.
Special topics in Industrial and Systems Engineering.

ISYE 8811. Special Topics. 1 Credit Hour.
Special topics in Industrial and Systems Engineering.

ISYE 8813. Special Topics in OR. 3 Credit Hours.
Special Topics in the field of Operations Research.

ISYE 8843. Adv. Topics-Statistics. 3 Credit Hours.
For Ph.D. students.

ISYE 8851. Topics in Manufacturing. 3 Credit Hours.
Current topics in manufacturing including: manufacturing automation and controls, advanced planning systems, heuristic scheduling techniques, stochastic models of manufacturing systems, advanced warehousing, and materials handling.

ISYE 8852. Topics in Logistics. 3 Credit Hours.
Current topics in logistics including: inventory control in supply chain design, stochastic vehicle routing, computational methods in logistics systems, location theory, and geographic information systems.

ISYE 8861. Topics in Stochastics. 3 Credit Hours.
Coverage of advanced topics of interest that support research interests of students in the field.

ISYE 8862. Topics in Simulation. 3 Credit Hours.
Coverage of advanced topics of interest that support research interests of students in the field.

ISYE 8871. Topics in Optimization. 3 Credit Hours.
Topics may vary with each offering and include subjects such as integer programming, combinatorics, graphs and networks, matching, matroids, polyhedral combinatorics, as well as others.

ISYE 8872. Topics-Nonlinear Optimiz. 3 Credit Hours.
Similar to ISYE 8871 but deals with subjects in nonlinear programming, interior-point methods, convexity, global optimization, etc. Topics may vary each term.

ISYE 8893. Spec Topic-Cognitive Sci. 3 Credit Hours.

ISYE 8900. Special Problems in ISYE. 1-21 Credit Hours.

ISYE 8901. Special Problems in OR. 1-21 Credit Hours.

ISYE 8997. Teaching Assistantship. 1-9 Credit Hours.
For graduate students holding graduate teaching assistantships.

ISYE 8998. Research Assistantship. 1-9 Credit Hours.
For graduate students holding graduate research assistantships.

ISYE 9000. Doctoral Thesis. 1-21 Credit Hours.

Industrial Design (ID)

ID 1011. Ind Des Fundamentals 1. 2 Credit Hours.
Theory and practice in Industrial Design including an introduction to process, methodology, ergonomics, research tools and user research. Focus is on fundamental design principles.

ID 1012. Ind Des Fundamentals 2. 2 Credit Hours.
Theory and practice in Industrial Design including an introduction to process, methodology, ergonomics, research tools and user research. Focus is on CAD and digital prototyping.

ID 1101. Intro Industrial Des 1. 1 Credit Hour.
Introduction to Industrial Design – a survey of evolving diverse career options and the designer's impact on society. Emphasis on traditional product design, research, and strategy.

ID 1102. Intro Industrial Des 2. 1 Credit Hour.
Introduction to Industrial Design – a survey of evolving diverse career options and the designer's impact on society. Emphasis is on user experience and interaction design.

ID 1401. Intro Graphic Comm 1. 1 Credit Hour.
Introduction to graphic design, composition, layout, color, typography, photography, social media & videography. Emphasis of this first course is on development of basic visual literacies.

ID 1402. Intro Graphic Comm 2. 1 Credit Hour.
Introduction to graphic design, composition, layout, color, typography, photography, social media & videography. This second course in the sequence will emphasize digital skill development.

ID 1418. Intro Sketch & Model 1. 1 Credit Hour.
Introduction to basic visual representation techniques that empower designers of products, services and systems through sketching, model making, computer-assisted drawing, rapid prototyping, and other methods.

ID 1419. Intro Sketch & Model 2. 1 Credit Hour.
Introduction to intermediate visual representation techniques that empower designers of products, services and systems through sketching, model making, computer-assisted drawing, rapid prototyping, and other methods.

ID 1XXX. Industrial Dsgn Elective. 1-21 Credit Hours.

ID 2011. Intro to Design I. 4 Credit Hours.
Foundation course in visual communications theory and practice, continuing the development of two-dimensional visual literacy. Emphasis on both analog and digital media.

ID 2012. Intro to Design II. 4 Credit Hours.
Foundation course in form giving and representing, continuing the development of three-dimensional visual literacy. Emphasis on visual relationships between form and image.
ID 2021. ID Studio 1. 4 Credit Hours.
This course provides an introduction to the design process on visual principles and presentation techniques with a focus on sketching and modeling techniques related to 3D form.

ID 2022. ID Studio 2. 4 Credit Hours.
This course applies more structured design methods to research and exploration of product form and function and introduces concepts of universal design and user centered design.

ID 2023. Ind Des Studio 1. 3 Credit Hours.
This course applied structured design methods to research and exploration of product form and function and introduces concepts of user centered design.

ID 2024. Ind Des Studio 2. 3 Credit Hours.
This course applies more structured design methods to research and exploration of product form and function and introduces concepts of universal design.

ID 2101. Digital Design Methods. 3 Credit Hours.
This course introduces the basics of product design in the CAD environment. Students design a product, apply 3D scanning, produce an animation and 3D print.

ID 2102. 3D Modeling. 2 Credit Hours.
This course introduces 3D modeling methods for solid and surface modeling in CAD software. Students create multi-component assembly drawings and explore product rendering techniques.

ID 2201. Issues for Design. 3 Credit Hours.
Introduction to the broad environmental issues that face humankind as a participant in the biosphere.

ID 2202. Hist-Modern Indus Dsgn. 3 Credit Hours.
History and development of industrial design from the beginning of the Industrial Revolution to the present.

ID 2241. History of Art 1. 3 Credit Hours.
This course surveys art from Prehistory through the Renaissance and is organized around stylistic periods that are arranged chronologically. Classes will consist of lectures with slides that focus on these stylistic periods.

ID 2242. History of Art 2. 3 Credit Hours.
This course surveys the major artistic movements and aesthetics of the 17th, 18th, 19th, 20th, and early 21st centuries in painting, sculpture and architecture.

ID 2320. Human Factors in Design. 3 Credit Hours.
This course examines the theory of Human Factors to provide a working knowledge of the physical and cognitive attributes of people that designers must accommodate.

ID 2325. User Cent Design Methods. 3 Credit Hours.
This course introduces students to user-centric design methods used to identify, understand, assess and prioritize the factors that contribute to more effective design solutions.

ID 2401. Visual Design Thinking. 3 Credit Hours.
Introduction to techniques to help designers build a vocabulary to support effective visual communication including fundamentals of layout, sketching, rendering, schematics, information graphics & storyboarding.

ID 2510. Intro Smart Product Des. 3 Credit Hours.
This course provides an introduction to smart product design including the basics of sensor technologies, electronics and programming required to produce working product concept prototypes.

ID 2511. Intermediate Design I. 5 Credit Hours.
The systematic design process as applied to industrial design and packaging problems.

ID 2512. Intermediate Design II. 5 Credit Hours.
Various dimensions of human factors applied to design, including: aging, disability, normal age change, childhood and adult anthropometrics, and human capability.

ID 3001. Health Des Studio 1. 4 Credit Hours.
The application of systematic design methods to projects focused on the design development of new and/or improved health-related products with an emphasis on inclusive design.

ID 3011. Intermediate Design I. 5 Credit Hours.
The systematic design process as applied to industrial design and packaging problems.

ID 3012. Intermediate Design II. 5 Credit Hours.
The systematic design process as applied to industrial design and packaging problems.

ID 3014. Indust Dsgn Computing II. 3 Credit Hours.
The systematic design process as applied to industrial design and packaging problems.

ID 3020. Ind Des Studio 1. 4 Credit Hours.
The systematic design process as applied to industrial design and packaging problems.

ID 3021. Health Des Studio 2. 4 Credit Hours.
The systematic design process as applied to industrial design and packaging problems.

ID 3022. Hist-Modern Indus Dsgn. 3 Credit Hours.
The systematic design process as applied to industrial design and packaging problems.

ID 3023. Ind Des Studio 2. 3 Credit Hours.
The systematic design process as applied to industrial design and packaging problems.

ID 3030. Human Factors in Design. 3 Credit Hours.
The systematic design process as applied to industrial design and packaging problems.

ID 3031. Health Des Studio 1. 4 Credit Hours.
The systematic design process as applied to industrial design and packaging problems.

ID 3032. Health Des Studio 2. 4 Credit Hours.
The systematic design process as applied to industrial design and packaging problems.

ID 3041. Product Dev Studio 1. 4 Credit Hours.
The systematic design process as applied to industrial design and packaging problems.

ID 3042. Product Dev Studio 2. 4 Credit Hours.
The systematic design process as applied to industrial design and packaging problems.

ID 3051. Interactive ID Studio 1. 4 Credit Hours.
The systematic design process as applied to industrial design and packaging problems.

ID 3052. Interactive ID Studio 2. 4 Credit Hours.
The systematic design process as applied to industrial design and packaging problems.

ID 3103. Indust Dsgn Computing I. 3 Credit Hours.
Introduction to 2-D computer drawing systems.

ID 3104. Indust Dsgn Computing II. 3 Credit Hours.
Introduction to 3-D modeling systems.

ID 3201. Design and Community. 3 Credit Hours.
Students explore socially and environmentally responsible industrial design practices at home and abroad, and partner with local organizations to develop community-based design projects.

ID 3301. Materials I. 3 Credit Hours.
This course examines the characteristics, production technologies, histories, and environmental impacts of nine categories of renewable materials familiar to industrial design.

ID 3302. Materials II. 3 Credit Hours.
Examination of characteristics, production technologies, histories, and environmental impacts of nonrenewable materials used in industrial design.
ID 3320. Design Methods. 3 Credit Hours.
This course introduces students to current user-centric design methods used to identify, understand, assess and prioritize the factors that contribute to more effective design solutions.

ID 3510. Interactive Products. 3 Credit Hours.
This course provides an introduction to interactive product design including the basics of sensor technologies, electronics and programming required to produce working product concept prototypes.

ID 3520. Tangible Interaction. 3 Credit Hours.
This course addresses the design process related to interactive environments. Projects will emphasize the inclusion of ubiquitous and emerging interactive technologies.

ID 3803. Special Topics. 3 Credit Hours.
Topics of current interest in industrial design.

ID 3813. Special Topics. 3 Credit Hours.
Topics of current interest in Industrial Design.

ID 3814. Special Topics. 4 Credit Hours.
Special Topics in Industrial Design (lecture and lab).

ID 3901. Special Problems. 1-21 Credit Hours.
ID 3902. Special Problems. 1-21 Credit Hours.
ID 3XXX. Industrial Dsgn Elective. 1-21 Credit Hours.

ID 4011. Advanced Design I. 5 Credit Hours.
Application of the design process to advanced multidisciplinary design problems. Experience in solving real design problems from areas such as consumer products and equipment, transportation and equipment.

ID 4012. Advanced Design II. 5 Credit Hours.
Capstone industrial design project of student’s own choosing, with consent of instructor, to refine problem-solving and design ability in preparation for professional practice.

ID 4061. ID Capstone Des Studio 1. 4 Credit Hours.
Comprehensive team-based projects incorporating an iterative approach to design development of products, & systems with emphasis on integration of research, design, prototyping and testing.

ID 4062. ID Capstone Des Studio 2. 4 Credit Hours.
Comprehensive individual projects incorporating an iterative approach to design development of products, & systems with emphasis on integration of research, design, prototyping and testing.

ID 4071. Invention Studio 1. 4 Credit Hours.
Comprehensive projects incorporating an iterative approach to design development of products, systems & services with emphasis on invention, design and manufacturing.

ID 4072. Invention Studio 2. 4 Credit Hours.
Comprehensive projects incorporating an iterative approach to design development of products, systems & services with emphasis on invention, innovation and entrepreneurship.

ID 4081. ID/ME Colab Des Studio 1. 4 Credit Hours.
An interdisciplinary team-based approach to integrate industrial design and engineering competencies in design development of products and systems with emphasis on corporate-sponsored projects.

ID 4082. ID/ME Colab Des Studio 2. 4 Credit Hours.
An interdisciplinary team-based approach to integrate industrial design and engineering competencies in design development of products and systems with emphasis on humanitarian projects.

ID 4103. Alias Studio I. 3 Credit Hours.
Introduction to modeling, rendering, and animation with Alias Studio software.

ID 4104. Alias Studio II. 3 Credit Hours.
Introduction to product animation using Alias Studio software.

ID 4105. Adv Modeling Concepts. 3 Credit Hours.
The Advance Modeling Concepts Course explores concepts, tools and theories used to model and validate complex forms encountered in the product design process.

ID 4106. Parametric Product Model. 3 Credit Hours.
This course focuses on advanced digital methods in product modeling for visual analysis, flexible design approaches and digital fabrication methods.

ID 4201. Design/Research Methods. 3 Credit Hours.
Research methods applicable to industrial design including task definition, information gathering, and analysis.

ID 4202. Professional Practice. 3 Credit Hours.
Principles of consulting and corporate industrial design including preparation of the professional portfolio.

ID 4203. French Society & Culture. 3 Credit Hours.
Studies in French society and culture.

ID 4204. Theorizing Design. 3 Credit Hours.
Introduction to what designers do and how they undertake their tasks; examples will come from a variety of design disciplines.

ID 4205. French Design & Culture. 3 Credit Hours.
Studies in French design and culture.

ID 4206. Culture of Objects. 3 Credit Hours.
This seminar surveys the theories and methodologies within the field of industrial design that locate meaning in the designed object as derived from culture.

ID 4210. Intro Universal Design. 3 Credit Hours.
This course provides an introduction to universal design focusing on the implications of ability on the usability of places, products, and systems for all individuals.

ID 4320. Prototyping Interaction. 3 Credit Hours.
This course exposes students to a range of practical methods for research and design exploration to support the design development of interactive products and technologies.

ID 4418. Design Sketching. 3 Credit Hours.
This course addresses drawing and visualization techniques necessary for design thinking and development and introduces methods and processes to formulate and present visual information.

ID 4450. Portfolio Development. 3 Credit Hours.
The portfolio development course provides students with a structured approach to preparing a professional visual record of their work in print and digital formats.

ID 4510. Wearable Product Design. 3 Credit Hours.
Wearable Product Design explores techniques in producing designs and prototypes for on-body interactions, and general textile knowledge for making effective wearable products.

ID 4698. Research Assistantship. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

ID 4699. Undergraduate Research. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.
ID 4803. Special Topics-Furniture. 3 Credit Hours.
Special topics in furniture design not covered in the professional curriculum.

ID 4813. Spec Top: Sustainability. 3 Credit Hours.
Special topics in sustainability not included in the professional curriculum.

ID 4823. Special Topic-Info Tech. 3 Credit Hours.
Special topics in information technology not included in the professional curriculum.

ID 4833. Spec Top: Collaborative. 3 Credit Hours.
Application of the design process to advanced multidisciplinary problems by a team. Projects from a range of interest areas: consumer, industrial products, transportation, furniture.

ID 4843. Spec Topics: Hist/Theory. 3 Credit Hours.
Special topics in history and theory not included in the professional curriculum.

ID 4900. Spec Prob: Visual Comm. 1-21 Credit Hours.
Special problems in communication not covered in the professional curriculum.

ID 4901. Spec Prob:Mentor Program. 1-21 Credit Hours.
Special problems in teaching pedagogy; mentoring by senior faculty in basic and intermediate design courses.

ID 4902. Spec Prob:Mentor Program. 1-21 Credit Hours.
Special problems in teaching pedagogy; mentoring by senior faculty in basic and intermediate design courses.

ID 4903. Special Prob: Research. 1-21 Credit Hours.
Special research topics for advanced students not covered in the professional curriculum.

ID 4904. Special Prob: Research. 1-21 Credit Hours.
Special research topics for advanced students not covered in the professional curriculum.

ID 4XXX. Industrial Dsgn Elective. 1-21 Credit Hours.

ID 6100. Intro to ID Grad Studies. 3 Credit Hours.
Introduction to the theory and practice of graduate studies in Industrial Design in relation to behavior research and consumer products.

ID 6101. Human Centered Design. 3 Credit Hours.
This course examines design artifacts in relation to the human body, aging, disabilities, and environments.

ID 6200. Graduate Studio I. 6 Credit Hours.
Graduate application of the design process to advanced multidisciplinary design problems. Experience in solving real design problems for consumer products.

ID 6201. Graduate Studio II. 6 Credit Hours.
Graduate-level application of the design process to advanced multidisciplinary problems.

ID 6211. Graduate Studio One. 4 Credit Hours.
Studio introduces MID program philosophy. Industrial Design is considered from a strategic perspective. Assignments explore the business, technology and user experience components.

ID 6212. Studio 2 Health&Wellness. 4 Credit Hours.
The application of systematic design methods to projects focused on the design of new and/or improved health products, services and interactions.

ID 6213. Studio 2 Interact Product. 4 Credit Hours.
The application of systematic design methods to projects focused on the design development of new and/or improved interactive or smart products.

ID 6214. Strategic Design Language. 3 Credit Hours.
Introduction to techniques to help designers clarify and support design ideas in a strategic business context by exploring methods to better leverage visual design skills.

ID 6215. Service Design. 3 Credit Hours.
This course introduces best practices of service design and focuses on the alignment and design of multiple brand touch points to optimize customer experience.

ID 6216. Service Design & Brand. 3 Credit Hours.
This course introduces students to how visual design, product design, and service design align to optimize user experiences that drive business.

ID 6271. Healthcare Des of Future. 3 Credit Hours.
Introduction to research-based approaches to integrated healthcare design innovation.

ID 6400. Master's Project. 1-21 Credit Hours.
Student produces a product prototype that must meet with instructor's approval.

ID 6401. Visualizing Interaction. 3 Credit Hours.
Introduction to techniques that empower designers to plan and create effective and clear visual communication depicting the interaction and relationships between people, products, and services.

ID 6420. Advanced Sketching. 3 Credit Hours.
This class will focus on developing advanced, traditional (non-digital) sketching, rendering, and presentation techniques.

ID 6500. Comp Creativity Des Cogn. 3 Credit Hours.
This course investigates computational methods, models, tools that support design creativity and cognition. Credit not allowed for both ID 6509 and ARCH 6509.

ID 6510. Design for Interaction. 3 Credit Hours.
This course examines opportunities for designers to leverage visualization and prototyping methods to foster new applications of technology to enhance user experience in everyday life.

ID 6515. Interface Prototyping. 3 Credit Hours.
This course focuses on the development of interactive prototypes for digital displays. Students learn how graphic and interactive design principles can be represented through prototypes.

ID 6753. HCI Prof Prep & Practice. 1 Credit Hour.
Preparation for a professional career in HCI. Speakers. Atlanta-area lab visits. Career trajectories. Project presentations. Technical, resume and interviewing skills. Atlanta-area HCI resources.

ID 6763. Design Interactv Environ. 3 Credit Hours.
Investigate and design ambient, intelligent, interactive interfaces and computational applications in tangible and physical environment to support health, wellness and quality of life. Credit not allowed for both ID 6763 and COA 6763 or CS 6763.

ID 6800. Adv Universal Design. 3 Credit Hours.
This course provides an advanced level to universal design focusing on the implications of ability on the usability of places, products, and systems for all individuals.
INTA 1110. Intro to Int'l Relations. 3 Credit Hours.
An introduction to the major principles, concepts, actors, and theories of international system and their application to current issues in world affairs.

INTA 1050. The World Today. 3 Credit Hours.
Introduction to current issues of politics, geography, and history around the globe, using a wide variety of media and sources.

INTA 1001. Careers In Intl Affairs. 1 Credit Hour.
Reinforces career development and planning process for international affairs majors. Includes facilitation of decision-making skills, job search strategies, self-assessment, and overview from industry speakers. Credit not allowed for both INTA 2001 and INTA 1001.

INTA 2001. Careers In Intl Affairs. 1 Credit Hour.
Reinforces career development and planning process for international affairs majors. Includes facilitation of decision-making skills, job search strategies, self-assessment, and overview from industry speakers. Credit not allowed for both INTA 2001 and INTA 1001.

INTA 2030. Ethics in Int'l Affairs. 3 Credit Hours.
Surveys the main traditions and theories of international ethics with a focus on intervention and the use of force, human rights, self-determination, and global distributive justice.

INTA 2100. Great Power Relations. 3 Credit Hours.
Juxtaposes competing explanations for the patterns of conflict and cooperation among nations, illustrated by relations among the great powers of Europe and Asia during the past two centuries.

INTA 2120. Intro to Intl Security. 3 Credit Hours.
Introduction to the role of theory and provide an understanding of the significance of various issues in international security.

INTA 2210. Pol Phil & Ideologies. 3 Credit Hours.
Explores political ideologies and philosophies, including theories of democracy, capitalism, and socialism, as well as rival views of the "good society" in comparative and historical perspective.

INTA 2210. Pol Phil & Ideologies. 3 Credit Hours.
Explores political ideologies and philosophies, including theories of democracy, capitalism, and socialism, as well as rival views of the "good society" in comparative and historical perspective.

INTA 2221. Politics of the EU. 3 Credit Hours.
A comparative analysis of the politics and major institutions of the countries of contemporary Western Europe.

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A comparative analysis of the politics and major institutions of the countries of contemporary Western Europe.

INTA 2230. Govt & Politics of Asia. 3 Credit Hours.
An introduction to the major issues and aspects of the politics, societies, and cultures of East Asia, and the changing role of the region in international affairs.

INTA 2241. Govt Pol Soc-Lat America. 3 Credit Hours.
Introduction to the study of historical forces, cultural production, identity, political development and contemporary issues in Latin America.
INTA 2260. Govt Pol Soc-Middle East. 3 Credit Hours.
Introduction to the study and analysis of contemporary Middle East politics with an emphasis on the Arab states.

INTA 2698. Research Assistantship. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

INTA 2699. Undergraduate Research. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

INTA 2803. Special Topics. 3 Credit Hours.
Topics of current interest in International Affairs.

INTA 2813. Special Topics. 3 Credit Hours.
Topics of current interest in International Affairs.

INTA 2823. Special Topics. 3 Credit Hours.
Topics of current interest in International Affairs.

INTA 2833. Special Topics. 3 Credit Hours.
Topics of current interest in International Affairs.

INTA 2901. Special Problems. 1-21 Credit Hours.
Independent study with a faculty member.

INTA 2902. Special Problems. 1-21 Credit Hours.
Independent study with a faculty member.

INTA 2903. Special Problems. 1-21 Credit Hours.
Independent study with a faculty member.

INTA 2XXX. Int'l Affairs Elective. 1-21 Credit Hours.

INTA 3010. Intl Technology Transfer. 3 Credit Hours.
Explores the impact of technology transfer on key contexts such as economic development and the international diffusion of defense production and technology.

INTA 3012. War in the 20th Century. 3 Credit Hours.
Provides historical foundation and understanding of the causes, conduct and consequences of modern war to support informed discussion and analysis of contemporary crisis and conflict.

INTA 3020. Contemporary Mexico. 3 Credit Hours.
This course examines the socio-economic and political history and development of twentieth century Mexico, with a focus on current problems and issues.

INTA 3031. Human Rights. 3 Credit Hours.
Explores how processes of globalization and advances in communication and technology have heightened and shaped human rights as a concern in international politics.

INTA 3042. Energy & Intl Security. 3 Credit Hours.
Examines issues at the intersection of national energy security and international conflict and cooperation.

INTA 3043. Space Policy. 3 Credit Hours.
Examination of the origins, evolution and range of current challenges and debates in international space policy issues, including civil, military, and commercial activities.

INTA 3044. Global Politics of Tech. 3 Credit Hours.
Examination of the economic and political dynamics that influence how regulations governing technology are adopted around the world.

INTA 3050. Global Citizenship. 3 Credit Hours.
Explore the meaning of global citizenship in scholarly and public debates and how it is "practiced" by individuals and "institutionalized" by universities, corporations and organizations.

INTA 3101. Intl Institutions. 3 Credit Hours.
Scrutinizes the evolution of international institutions, and juxtaposes competing theoretical approaches for understanding the changing roles and functions of institutions in world affairs.

INTA 3102. Problem of Proliferation. 3 Credit Hours.
Explores the political and economic issues, both international as well as domestic, involved in the spread of the weapons of mass destruction since the end of the Second World War.

INTA 3103. Challenge of Terrorism. 3 Credit Hours.
Examines the contexts that nurture domestic and international terrorism, the variety of terrorist organizations, and alternative approaches to combating the problem.

INTA 3104. Int'l Negotiations. 3 Credit Hours.
Examines the theories of bargaining and negotiation, with an emphasis on explaining success and failure in U.S. foreign policy and national security negotiations.

INTA 3110. U.S. Foreign Policy. 3 Credit Hours.
Analyzes the formulation and implementation of America's foreign policy from 1914 to the present, stressing economic, political, and strategic factors.

INTA 3111. U.S. Defense Policy. 3 Credit Hours.
Examines contemporary American defense policy, including the formulation of strategy, the defense budget, force structure, and nontraditional uses of military force.

INTA 3120. European Security Issues. 3 Credit Hours.
Explores the contemporary European security environment, including threats, challenges, and various security architectures (e.g., NATO, the WEU, and the OSCE).

INTA 3121. Russia and Eurasia. 3 Credit Hours.
Examines the many dimensions of the foreign and security policies of Russia and the other new post-Soviet states of Russia and Eurasia.

INTA 3130. Foreign Policy of China. 3 Credit Hours.
Analyzes the major dimensions of the foreign policies of the People's Republic of China and the domestic and international influences shaping those policies.

INTA 3131. Pacific Security Issues. 3 Credit Hours.
Examines past, present, and future security concerns in the Pacific, including the Korean peninsula, Japanese defense, the emergence of China as a military power, and the forward basing of American troops and materiel.

INTA 3203. Comparative Politics. 3 Credit Hours.
Contrasts competing theoretical perspectives in the comparative analysis of political systems.

INTA 3220. Gov't & Politics-Germany. 3 Credit Hours.
Examines the government and politics of Germany with an in-depth focus on the post-1945 period. NOTE: When taught jointly with the School of Modern Languages, all lectures, assignments, and readings are in German.

INTA 3221. Post-Soviet Politics. 3 Credit Hours.
Focuses on the challenge of building new social, political, and economic systems in Russia, but also considers some of the special problems confronting the other fourteen post-Soviet states.

INTA 3223. Transatlantic Relations. 3 Credit Hours.
Analysis of the different aspects of the relationship between the US and the EU and how it is characterized by cooperation, conflict and competition.
INTA 3230. Gov't & Politics-China. 3 Credit Hours.
Investigates the structure and institutions of political power as well
as the patterns and features of political change in the contemporary
People's Republic of China.

INTA 3231. Gov't & Politics-Japan. 3 Credit Hours.
Examines the main institutions, policies, and politics of contemporary
Japan. Investigates the impact of social, cultural, and economic forces on
Japan's government and politics.

INTA 3240. Gov't & Politics-Africa. 3 Credit Hours.
A survey of the history, cultures, social systems, governments,
economies, and international roles of Africa. Selected case studies of
individual countries are presented.

INTA 3241. Latin American Politics. 3 Credit Hours.
Surveys the government and politics of Latin America. The course begins
with an overview of the region's geography and history, and then explains
why demographic government has had a tenuous existence in this area.

INTA 3242. Soccer & Global Politics. 3 Credit Hours.
An examination of regional and national identity, development, and
politics through the history of soccer.

INTA 3243. US-Latin American Relat. 3 Credit Hours.
Study of government and non-governmental influences on policy and
effectiveness of political, economic, and military instruments of power in
Latin America.

INTA 3260. Middle East Relations. 3 Credit Hours.
Course will provide an in-depth understanding of the Arab-Israeli conflict
using theories of international relations and comparative politics.

INTA 3301. Int'l Political Econ. 3 Credit Hours.
Analyzes the relationship between political and economic issues in
international affairs. Examines the interaction of states and markets in
the context of trade, investment, and production.

INTA 3303. Pol Economy-Development. 3 Credit Hours.
Surveys theories of economic development and political change,
and examines a range of cases that include the European-American
experience, the East Asian episode, and the transition from socialism.

INTA 3304. Int'l Trade & Production. 3 Credit Hours.
Examines the political economy of international trade and the global
production process with particular emphasis on conflict and cooperation
in national competition for high-technology industries.

INTA 3321. Pol Econ-Europe Integrat. 3 Credit Hours.
Explores the processes and problems of political and economic integration
in the European Union, the world's largest trading bloc.

INTA 3330. Political Economy-China. 3 Credit Hours.
Examines the centuries of stagnation and the recent rapid growth of
the Chinese economy, and seeks to understand the current interaction
between politics and economic development in the People's Republic of
China.

INTA 3331. Political Economy-Japan. 3 Credit Hours.
Surveys the political foundations and economic achievements of modern
Japan. Explores the interaction of domestic and international forces, and
analyzes Japan's changing world role.

INTA 3773. Global Issues&Leadership. 3 Credit Hours.
Invited project based seminar: Uses global issues to explore diverse
viewpoints, cultures and cognitive biases to develop leadership and
presentation skills in small diverse groups.

INTA 3803. Special Topics. 3 Credit Hours.
Selected topics will vary from term to term.

INTA 3813. Specil Topics. 3 Credit Hours.
Selected topics will vary from term to term.

INTA 3823. Special Topics. 3 Credit Hours.
Topics of current interest in International Affairs.

INTA 3833. Special Topics. 3 Credit Hours.
Topics of current interest in International Affairs.

INTA 3XXX. Int'l Affairs Elective. 1-21 Credit Hours.

INTA 4007. Intell & Int'l Security. 3 Credit Hours.
This course examines the history, nature and business of secret
intelligence as a critical element of national and international security,
with special emphasis given to its role in the global war on terror, and the
relationship between the intelligence community and policy makers.

INTA 4011. Technology& Military Org. 3 Credit Hours.
Addresses the impact of technological developments on the evolution
of military organization and on international conflict from the Battle of
Agincourt (1415) to the Gulf War (1991).

INTA 4014. Scenario and Pathgaming. 3 Credit Hours.
Introduces students to the construction and presentation of
formalized scenarios for international planning, and into the formation,
implementation, and assessment of path games. Credit not allowed for
both INTA 4014 and INTA 6014.

INTA 4016. Strategy & Arms Control. 3 Credit Hours.
Explores elements of military strategy and tactics, weapons proliferation,
and arms control efforts.

INTA 4040. Environmental Politics. 3 Credit Hours.
Examines the interface between politics and the environment. Foci
include sustainable development, the politics of the rain forest, eco-
tourism, and export agriculture and the environment.

INTA 4050. Int'l Affair&Tech Policy. 3 Credit Hours.
International policy issues in which science and technology figure
prominently. Topics include: health, environment, information
technologies, arms control and defense, critical infrastructure,
transportation, and energy. Emphasis placed on policy analysis and
formation.

INTA 4060. International Law. 3 Credit Hours.
Explores major issues, concepts and cases in public international law and
their policy ramifications. Specific topics include human rights, armed
conflict, crimes against humanity, and the environment.

INTA 4101. Vietnam War Politics. 3 Credit Hours.
Strategic approaches and political environments of the United States,

INTA 4121. Sem Europe-Euro Security. 3 Credit Hours.
Examines the history, institutional structure, and functions, as well as
current policy challenges facing NATO and other European security
arrangements.

INTA 4230. Sem in Europe-Euro Union. 3 Credit Hours.
Explores the history and processes of economic and political integration
within the framework of the European Union.

INTA 4240. Argentine Politics. 3 Credit Hours.
Survey of the politics, history, and culture of Argentina. Topics include
Argentine economic and political failure, the politics of immigration, and
the relationship between culture and development.

INTA 4241. Democracy-Third World. 3 Credit Hours.
Surveys the Third World democratization. Examines various theories of
democratization. Examines various measures of democracy and explores
the depth and consolidation of the current democratization boom.
INTA 4330. Chinese Economic Reform. 3 Credit Hours.
Addresses the profound and consequential process of the Chinese economic reform that started at the end of the 1970s and has led to China's rapid economic growth.

INTA 4331. Chinese Politics. 3 Credit Hours.
Investigates the organizational apparatus through which the Chinese Communist Party exercises leadership over politics and society, and the way in which reforms have changed those relationships.

INTA 4332. Chinese Institutions. 3 Credit Hours.
Supervised field research on the Chinese institutions and policy-making process especially in the areas of economic and social issues.

INTA 4333. Korean Security Policy. 3 Credit Hours.
An examination of the principal policy issues facing the United States with regard to the Korean Peninsula and the principal neighboring states, China and Japan.

INTA 4340. Latin American Economics. 3 Credit Hours.
Examines institutional, interest group, international, and economic inputs and outputs of regional integration.

INTA 4500. INTA Pro-Seminar. 3 Credit Hours.
Capstone experience in which students formulate strategies and policies to cope with international problems. Themes vary from seminar to seminar. Credit not allowed for both INTA 4500 and INTA 4400.

INTA 4698. Research Assistantship. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

INTA 4699. Undergraduate Research. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

INTA 4740. Sem-Political Economy. 3 Credit Hours.
Capstone experience in which students apply tools of political economy to international issues. Crosslisted with ECON 4740.

INTA 4741. Thesis-Political Economy. 3 Credit Hours.
Individual project applying the tools of political economy to international issues. Crosslisted with ECON 4741.

INTA 4742. Mod, Sim&Military Gaming. 3 Credit Hours.
Creation and use of modeling and simulation tools to analyze and train students regarding strategic events in international relations. Credit not allowed for both INTA 4742 and INTA 6742 (or CSE 6742 or CS 4343).

INTA 4743. Japan Society & Politics. 3 Credit Hours.

INTA 4744. Global Develop Capstone. 3 Credit Hours.
Teams develop solutions to multidisciplinary problems selected from globalization, food security, infrastructure, health, water, sanitation, hygiene, ecosystem resilience, services, capacity building, and urbanization.

INTA 4745. Info&Com Tech&Global Dev. 3 Credit Hours.
Focus on technology, design, adoption, and use as seen through the lens of global development.

INTA 4803. Special Topics. 3 Credit Hours.
Selected topics will vary from term to term.

INTA 4811. Special Topics. 1 Credit Hour.
Topics of interest not covered in the regular course offerings.

INTA 4812. Special Topics. 2 Credit Hours.
Topics of interest not covered in the regular course offerings.

INTA 4813. Special Topics. 3 Credit Hours.
Topics of interest not covered in the regular course offerings.

INTA 4814. Special Topics. 4 Credit Hours.
Topics of interest not covered in the regular course offerings.

INTA 4815. Special Topics. 5 Credit Hours.
Topics of interest not covered in the regular course offerings.

INTA 4823. Special Topics. 3 Credit Hours.
Selected topics will vary from term to term.

INTA 4833. Special Topics. 3 Credit Hours.
Selected topics will vary from term to term.

INTA 4901. Special Problems. 1-21 Credit Hours.
Independent study with a faculty member.

INTA 4902. Special Problems. 1-21 Credit Hours.
Independent study with a faculty member.

INTA 4903. Special Problems. 1-21 Credit Hours.
Independent study with a faculty member.

INTA 4XXX. Int'l Affairs Elective. 1-21 Credit Hours.

INTA 5002. Strategic Decisions. 3 Credit Hours.
Examines the dynamics of individual, group, organizational, cross-cultural, and international interaction.

INTA 6003. Empirical Research Meth. 3 Credit Hours.
This course introduces research methods in international affairs. It emphasizes writing research proposals, empirical techniques, gathering and assembling data, and methods for analyzing and reporting results.

INTA 6004. Model,Forecast&Decision. 3 Credit Hours.
This course introduces modeling and forecasting in strategic decision making, analysis of long-term developments, path gaming, formal analysis of games, and simulation.

INTA 6011. Intl Trade&Tech Transfer. 3 Credit Hours.
This course examines the relationship between international trade and technology transfer and their effect on national competitiveness, national security, and international cooperation and coercion.

INTA 6014. Scenario and Path Gaming. 3 Credit Hours.
Introduces students to the construction and presentation of formalized scenarios for international planning, and into the formulation, implementation and assessment of path games. Credit not allowed for both INTA 6014 and INTA 4014.

INTA 6015. Technology& Military Org. 3 Credit Hours.
Explores changes in military technology, organization, and operations leading to new conceptions of the conduct of warfare as a result of revolutions in military affairs.

INTA 6016. Strategy & Arms Control. 3 Credit Hours.
Explores elements of military strategy and tactics, weapons proliferation, and arms control efforts.

INTA 6022. Ethics & Intl Affairs. 3 Credit Hours.
An overview of the main tradition and theories of international ethics applied to four major issues: intervention and the use of force; human rights; self-determination; and global distributive justice.

INTA 6102. Intl Relations Theory. 3 Credit Hours.
This course provides an introduction to theoretical approaches to understanding international relations. The focus of the course is on system-level theories and sub-systematical-level theories.
### INTA 6103. International Security. 3 Credit Hours.
Examines traditional and nontraditional issues in international security, including the uses of military force, military strategy and policy, arms control, peacekeeping, the environment, and migration.

### INTA 6105. Intl Institutional Dsgn. 3 Credit Hours.
This course examines international institutions and their effect on foreign policy decision makers. Specific topics include: the theoretical study of cooperation; supranatural organizations and informal institutions.

### INTA 6106. The State-Intl Affairs. 3 Credit Hours.
Explores various concepts of the state in international affairs as well as the concepts of sovereignty and revolution.

### INTA 6111. US Foreign Secur Strat. 3 Credit Hours.
This course focuses on the design and implementation of U.S. foreign policy and national strategy in the areas of arms control, the Third World, and economic policy.

### INTA 6121. Sem in Europe: Euro Sec. 3 Credit Hours.
This course examines the history, institutional structure and functions, and current policy challenges facing the North Atlantic Treaty Organization (NATO) and other European security institutions.

### INTA 6131. Pacific Security Issues. 3 Credit Hours.
Examines past, present, and future security concerns in the Pacific, including the Korean peninsula, Japanese defense, the emergence of China as a military power, and the forward basing of American troops and material.

### INTA 6202. Comparative Politics. 3 Credit Hours.
This course surveys the major political types of the late twentieth century world and explores their various development characteristics.

### INTA 6203. Compar Institut Design. 3 Credit Hours.
This course examines the creation, maintenance, and evolution of political institutions, and the ways in which institutions affect policy choice.

### INTA 6302. Intl Political Economy. 3 Credit Hours.
This course is an introduction to the politics of international economic relations. Major theoretical approaches are applied to international trade, international monetary relations, and global production in the modern era.

### INTA 6304. Modernization&Develompnt. 3 Credit Hours.
This course empirically examines processes in which a country’s organizational structure is altered through economic development, political democratization, and/or social liberalization.

### INTA 6306. Globalization. 3 Credit Hours.
Research seminar exploring theoretical perspectives on globalization and the political and economic issues facing modern states and their citizens in a “borderless” world.

### INTA 6320. Sem in Europe-Euro Union. 3 Credit Hours.
This course explores the history and processes of economic and political integration within the framework of the European Union.

### INTA 6330. Pol Econ-East Asia. 3 Credit Hours.
This course explores the politics of economic development in China, Japan, and Korea. Focal issues include: trade patterns, financial institutions, trade-bloc formation, industrial competitiveness, and the status of U.S.-East Asian economic relations.

### INTA 6331. Chinese Political Econ. 3 Credit Hours.
This course examines the Chinese social and economic development from the seventh century to current day. Specific emphasis is placed on the political economic reforms of Deng Xiaoqing and assessing the implications of continued Chinese modernization.

### INTA 6340. Innovation and the State. 3 Credit Hours.
Research seminar exploring the role of the state in industrial development, innovation and business-government relations. Special attention given to science and technology policies and their influence in different international and industrial contexts. Crosslisted with PUBP 6740.

### INTA 6742. Mod, Sim&Military Gaming. 3 Credit Hours.
Focuses on the creation and use of modeling and simulation tools to analyze and train students regarding strategic events in international relations. Credit not allowed for both INTA 6742 and CSE 6742 (or INTA 4742 or CS 4343).

### INTA 6745. Info&Com Tech&Global Dev. 3 Credit Hours.
Focus on technology design, adoption, and use as seen through the lens of global development.

### INTA 6753. Comp Science&Tech Policy. 3 Credit Hours.
Examination of the social, political, and cultural contexts of science and technology, and how they affect the research, development, and regulatory policies of nations. Crosslisted with PUBP 6753.

### INTA 6XXX. Intl Affairs Elective. 1-21 Credit Hours.
Under the direct supervision of one or more faculty members, graduate students will complete an original research design and execute that study.

### INTA 8000. Sci,Tech&Intl Affairs I. 3 Credit Hours.
Research course introducing engineers and scientists to issues in science and technology as related to international security policy and development.

### INTA 8001. Sci,Tech&Intl Affairs II. 3 Credit Hours.
Research course introducing engineers and scientists to issues in science and technology as related to international security policy and development.

### INTA 8010. IAST Ph.D. Proseminar. 1 Credit Hour.
An overview of resources and practices of doctoral research in International Affairs, Science, and Technology. Meetings will consist of faculty guest lectures and talks from Library personnel and others.

### INTA 8801. Special Topics. 1 Credit Hour.

### INTA 8802. Special Topics. 2 Credit Hours.

### INTA 8803. Special Topics. 3 Credit Hours.

### INTA 8804. Special Topics. 4 Credit Hours.

### INTA 8805. Special Topics. 5 Credit Hours.

### INTA 8813. Special Topics. 3 Credit Hours.
Topics of interest in the field of international affairs.

### INTA 8823. Special Topics. 3 Credit Hours.
Topics of interest in International Affairs.

### INTA 8833. Special Topics. 3 Credit Hours.
Topics of interest in the field of International Affairs.

### INTA 8901. Special Problems. 1-21 Credit Hours.

### INTA 8902. Special Problems. 1-21 Credit Hours.

### INTA 8903. Special Problems. 1-21 Credit Hours.

### INTA 8997. Teaching Assistantship. 1-9 Credit Hours.
For graduate students with a teaching assistantship.

### INTA 8998. Research Assistantship. 1-9 Credit Hours.
For graduate students with a research assistantship.
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International Logistics (IL)

IL 6450. Analytical Methods. 1 Credit Hour.
This course provides an overview of optimization, statistical, and stochastic models and methods with special emphasis on application to logistics.

IL 6451. Demand and Yield Mgt. 1 Credit Hour.
This course focuses on demand estimation and modeling and revenue management.

IL 6452. Reverse Green Logistics. 1 Credit Hour.
This course addresses issues, driving forces, and analytical approaches to aid in designing operating reverse logistics systems.

IL 6453. Labor Relations. 1 Credit Hour.
This course compares labor practices in Europe, North America, and Asia with special attention on the influences on logistics.

IL 6454. European Trade & Transport. 1 Credit Hour.
This course provides an overview of legal, cultural, political, and infrastructure issues influencing logistics in Europe.

IL 6455. Finance for Logistics. 1 Credit Hour.
This course provides an in-depth understanding of concepts of finance that relate to logistics, such as valuing logistics activities and measuring logistics performance.

IL 6456. Financial Decisions. 1 Credit Hour.
This course provides a thorough understanding of the key elements of building a better logistics business case.

IL 6457. American Trade & Transport. 1 Credit Hour.
This course provides an overview of legal, cultural, political, and infrastructure issues influencing logistics practices in the Americas.

IL 6458. Warehousing. 1 Credit Hour.
This course surveys the different types of warehouses and their functions, principles of operation, and strategic relationship to the supply chain.

IL 6459. Int’l Trade & Transport. 1 Credit Hour.
This course discusses how international trade is financed, what instruments are used and how they work, how transactions are settled, and the role of documentation.

IL 6460. Int’l Freight Management. 1 Credit Hour.
This course focuses on international freight management including consolidation, export packaging, customs, tracking, terminal operations, mode selection, and carrier selection.

IL 6461. Asian Trade & Transport. 1 Credit Hour.
This course provides an overview of legal, cultural, political, and infrastructure issues influencing logistics practices in Asia.

IL 6464. ERP Systems. 1 Credit Hour.
This course provides a strategic view of Enterprise Resource Planning and its relationship to logistics functions.

IL 6465. Marketing Channels. 1 Credit Hour.
This course focuses on logistics and supply chain issues as they impact the global marketing strategies of companies.

IL 6466. Global Supply Chain. 1 Credit Hour.
This course focuses on concepts and models for designing and measuring a global supply chain, with special focus on the impact of e-commerce.

IL 6467. Transportation. 1 Credit Hour.
This course focuses on logistics planning, execution, and performance measurement in the transportation industry.

IL 6468. Manufacturing. 1 Credit Hour.
This course focuses on logistics issues within the manufacturing facility including inventory, throughput, lead-time batching, and managing variability.

IL 6472. Supply Chain Lab III. 1 Credit Hour.
This course integrates supply chain management techniques in the Americas, Asia, and Europe through case studies.

IL 6475. Cases-Intl Logistics I. 2 Credit Hours.
In this course, cases are used to integrate strategic, management, and operating issues in international logistics and supply chain design.

IL 6476. Cases-Intl Logistics II. 2 Credit Hours.
In this course, cases are used to integrate strategic, management, and operating issues in international logistics and supply chain design.

IL 6477. Cases-Intl Logistics III. 2 Credit Hours.
In this course, cases are used to integrate strategic, management, and operating issues in international logistics and supply chain design.

IL 6478. Cases-Intl Logistics IV. 2 Credit Hours.
In this course, cases are used to integrate strategic, management, and operating issues in international logistics and supply chain design.

IL 6480. Supply Chain Lab I. 1 Credit Hour.
This course integrates supply chain management techniques in the region through readings, case studies, meetings and site visits. Typically Supply Chain Lab I focuses on the US. Credit not allowed for both IL 6480 and IL 6470.

IL 6481. Supply Chain Lab II. 1 Credit Hour.
This course integrates supply chain management techniques in the region through readings, case studies, meetings and site visits. Typically Supply Chain Lab II focuses on Europe. Credit not allowed for both IL 6481 and IL 6471.

IL 6483. Supply Chain Lab IV. 1 Credit Hour.
This course integrates supply chain management techniques in the region through readings, case studies, meetings and site visits. Typically Supply Chain Lab IV focuses on Asia. Credit not allowed for both IL 6483 and IL 6473.

IL 6484. Supply Chain Lab V. 1 Credit Hour.
This course integrates supply chain management techniques in the region through readings, case studies, meetings, and site visits. Typically Supply Chain Lab V focuses on Mexico and NAFTA. Credit not allowed for both IL 6484 and IL 6474.

IL 8801. Special Topics. 1 Credit Hour.

Internship (INTN)

INTN 2000. Professional Internship. 12 Credit Hours.
Academic related professional work experience.

INTN 2003. Internship. 3 Credit Hours.
Supervised professional work experience in the United States for undergraduate freshman or sophomore interns working 10-19 hours a week in their major field of study for a semester.

INTN 2006. P/T Professional Internship. 6 Credit Hours.
Supervised domestic work experience for freshmen and sophomore interns working 20-29 hours per week in their major field of study for a semester.
INTN 2009. P/T Professional Internship. 9 Credit Hours.
Supervised domestic work experience for freshmen and sophomore interns working 30 to 35 hours per week in their major field of study for a semester.

INTN 3011. Work Abroad Semester. 12 Credit Hours.
Undergraduate interns working outside the United States.

INTN 3016. Work Abroad Semester. 6 Credit Hours.
Supervised professional international experience for undergraduate interns working abroad full-time in their major field of study for approximately 50% of a semester.

INTN 3019. Work Abroad Semester. 9 Credit Hours.
Supervised professional international experience for undergraduate interns working abroad full-time in their major field of study for approximately 75% of a semester.

INTN 4000. Professional Internship. 12 Credit Hours.
Academies related professional work experience.

INTN 4003. Internship. 3 Credit Hours.
Supervised professional work experience in the United States for undergraduate junior or senior interns working 10-19 hours a week in their major field of study for a semester.

INTN 4006. P/T Professional Internship. 6 Credit Hours.
Supervised domestic work experience for junior or senior interns working 20-29 hours per week in their major field of study for a semester.

INTN 4009. P/T Professional Internship. 9 Credit Hours.
Supervised domestic work experience for junior or senior interns working 30-35 hours per week in their major field of study for a semester.

Intl Executive MBA (IMBA)

IMBA 6000. Decision Making. 1 Credit Hour.
A multifirm, competitive management simulation. The objective is to sharpen intra-firm communications skills using the internet as the communications channel and the art of compromise.

IMBA 6010. Cross Cultural Commun. 2 Credit Hours.
Participants learn tools and information to improve communications skills with new approaches and increased understanding while taking into account the effects of cross-cultural differences on communications.

IMBA 6021. Data Analysis for Bus. 2 Credit Hours.
Covers common statistical tools for the analysis of corporate data such as descriptive statistics, probability concepts, sampling and estimation, hypothesis testing, and regression analysis.

IMBA 6030. Org Behavior and Theory. 3 Credit Hours.
Students learn the basic concepts and principles of organizational behavior and utilize such to analyze and solve organizational decision-making problems.

IMBA 6031. Leadership & Org Behavior. 2 Credit Hours.
This course focuses on the challenges in leading teams and organizations in increasingly complex, global, and dynamic business environments.

IMBA 6040. Global Economics. 3 Credit Hours.
Participants are provided with a non-traditional approach using an analytical method with a global perspective to the concepts and role of economics in the world environment.

IMBA 6050. Fin & Managerial Account. 3 Credit Hours.
Course covers financial reporting and analysis issues facing firms, and managerial accounting information necessary for planning, controlling, and decision making within such firms.

IMBA 6061. Information Systems. 2 Credit Hours.
Tools and techniques to manage the information technology infrastructure that supports a global organization.

IMBA 6070. World Finance. 4 Credit Hours.
A two-part course providing an understanding of finance concepts and how they are used. The course then further integrates international and ethical considerations wherever applicable.

IMBA 6071. Financial Management. 3 Credit Hours.
An introduction to finance. Topics include time value of money, capital budgeting, risk and return, capital structure, dividend policy, and working capital management.

IMBA 6081. Manf and Service Mgt. 2 Credit Hours.
Covers the basic conceptual and analytical skills that are required in managing operations and confronting operational problems in competitive markets.

IMBA 6090. Marketing&Consumer Behav. 3 Credit Hours.
Students are provided with an understanding of marketing and consumer behavior concepts and tools with an international environment approach.

IMBA 6101. Prod Strat for Glob Mkts. 2 Credit Hours.
Developing and marketing new products and services with an emphasis on international markets.

IMBA 6110. Risk Management. 2 Credit Hours.
A course based upon a combination of cases, historical data, and theoretical interpretation on the analysis and allocation of risk in international investment and technology transfer.

IMBA 6121. Global Workforce Mgt. 2 Credit Hours.
A survey of global workforce management principles and the skills necessary to function effectively in a supervisory role in a global organization.

IMBA 6131. Strategic Management. 2 Credit Hours.
Integrate knowledge of the functional areas of a business to understand how firms gain and sustain a competitive advantage in a globally competitive environment.

IMBA 6140. Comparative Systems. 2 Credit Hours.
This course utilizes case studies of companies in various industries and in national cultures to highlight organizational and cultural differences between major economies in the global environment.

IMBA 6150. Entrepreneurship. 1 Credit Hour.
Participants explore the increasing importance of small and medium-sized businesses and new ventures in international business.

IMBA 6160. Business Regulations. 2 Credit Hours.
Deals with learning how to control the legal aspects of international decisions.

IMBA 6170. Quality,Sust Tech,Compet. 1 Credit Hour.
Students learn the philosophy and techniques of strategic quality management while focusing on assessment and group decisions centered on sustaining technology and competitiveness.

IMBA 6180. Leadership Skills. 1 Credit Hour.
Focuses on identifying and developing the attributes of successful leadership.

IMBA 6200. Strategic Bus Simulation. 2 Credit Hours.
A unifying course providing a simulated application of the material taught in the core courses of the program.
IMBA 6210. Analy of Emerging Tech. 2 Credit Hours.
A case-based course dealing with the role and impact of digital technology in large and small organizations, with special emphasis on multinational companies.

IMBA 6220. Entrepreneurship Seminar. 1 Credit Hour.
A case course building an information bank of theory and practice on start-up enterprises. Several entrepreneurs will co-teach the course with a faculty leader.

IMBA 6230. Intl Bus Negotiations. 1 Credit Hour.
A role-play course involving the complex international negotiation simulation dealing with an international business enterprise and its relationship with one or more governments.

IMBA 6240. Ethics in Global Bus. 1 Credit Hour.
Examines the appropriate roles of business in global society, the roles of government and regulation in monitoring business, and the ethical responsibilities of managers in global organizations.

IMBA 6250. International Finance. 2 Credit Hours.
Analysis of foreign exchange markets, exchange rate risk management, international portfolio investments, international asset pricing, cross-border M&A, and equilibrium conditions in international markets.

IMBA 6260. Glob Supp Chain & E-Comm. 2 Credit Hours.
Examines business, managerial and economic issues in the management of global supply chains and the role of electronic commerce in the supply chain.

IMBA 6300. Anal of Global Env I. 2 Credit Hours.
Analysis of a specific region through an international study tour with emphasis on understanding the economy, culture and business environment.

IMBA 6310. Anal of Global Env II. 3 Credit Hours.
Analysis of a specific region through an international study tour with emphasis on understanding the economy, culture and business environment.

IMBA 6311. Anal of Global Environ. 4 Credit Hours.
Analysis of a specific region through an international study tour with emphasis on understanding its economy, culture and business environment.

IMBA 6400. Global Strategy Proj I. 1 Credit Hour.
Students work on a real world problem related to global strategy. The focus in this course is on data collection and problem definition.

IMBA 6401. Global Strategy Proj I. 2 Credit Hours.
Students work on a real world problem related to global strategy. The focus in this course is on problem definition, data collection and client engagement management.

IMBA 6410. Global Strategy Proj II. 1 Credit Hour.
Students work on a real world problem related to global strategy. The focus in this course is on defining a preliminary solution that has desirable characteristics.

IMBA 6411. Global Strategy Proj II. 2 Credit Hours.
Students work on a real world problem related to global strategy. The focus in this course is on problem definition, data collection and client engagement management.

IMBA 6420. Global Strategy Proj III. 2 Credit Hours.
Students work on a real world problem related to global strategy. The focus in this course is on defining and presenting a comprehensive solution.

IMBA 6430. Bus Str Sustainability. 2 Credit Hours.
Cross-functional strategies to address competitive and regulatory demands placed on firms for achieving sustainable business practices.

Ivan Allen College (IAC)

IAC 2001. Global Religions. 3 Credit Hours.
This course prepares students for leadership in a multi-faith society through the study of global religions and active engagement with diverse religious communities of Atlanta.

IAC 2002. Science, Engineering and Rel. 3 Credit Hours.
This course gathers diverse students serious about faith to explore topics at the intersection of science, engineering, and religion.

IAC 2801. Special Topics in IAC. 1 Credit Hour.
Special Topics in IAC.

IAC 2803. Special Topics in IAC. 3 Credit Hours.
Special Topics courses for IAC.

IAC 2813. Special Topics in IAC. 3 Credit Hours.
Special Topics courses in IAC.

IAC 3803. Special Topics in IAC. 3 Credit Hours.
Special Topics courses in IAC.

IAC 3813. Special Topics in IAC. 3 Credit Hours.
Special Topics courses in IAC.

IAC 4803. Special Topics in IAC. 3 Credit Hours.
Special Topics courses in IAC.

IAC 4811. Special Topics in IAC. 1 Credit Hour.
Special Topics in IAC.

IAC 4813. Special Topics in IAC. 3 Credit Hours.
Special Topics courses in IAC.

Japanese (JAPN)

JAPN 1001. Elementary Japanese I. 4 Credit Hours.
Essential principles of Japanese grammar and phonetics, acquisition of vocabulary through conversational exercises, video, and tape material. Introduction to the kana writing system. Humanities credit is awarded for JAPN 1001 upon successful completion of JAPN 1002 or JAPN 2001.

JAPN 1002. Elementary Japanese II. 4 Credit Hours.
Continuation of JAPN 1001. Introduction to kanji symbols.

JAPN 10X1. Trans Elementary Japanese I. 1 Credit Hours.

JAPN 10X2. Trans Elementary Japanese II. 3 Credit Hours.

JAPN 1813. Special Topics. 3 Credit Hours.
Permits a group of students to pursue areas of the Japanese language and culture not extensively treated in other courses.

JAPN 1814. Special Topics. 4 Credit Hours.
Topics of current interest in Japanese.

JAPN 1815. Special Topics. 5 Credit Hours.

JAPN 1816. Special Topics. 6 Credit Hours.
Permits a group of students to pursue areas of the Japanese language and culture not extensively treated in other courses.

JAPN 1XXX. Japanese Elective. 1-21 Credit Hours.
JAPN 2002. Intermediate Japanese II. 3 Credit Hours.
Continuation of JAPN 2001.

JAPN 2698. Research Assistantship. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

JAPN 2699. Undergraduate Research. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

JAPN 2813. Special Topics. 3 Credit Hours.
Topics of current interest in Japanese.

JAPN 2XXX. Japanese Elective. 1-21 Credit Hours.

JAPN 3001. Advanced Japanese I. 3 Credit Hours.
Learn advanced grammar structures and develop the ability to produce longer conversations involving complex styles and levels of speech. More kanji.

JAPN 3061. Technical Japanese I. 3 Credit Hours.
Introduction to technical and scientific Japanese. Specialized vocabulary and concepts of chemistry, electrical engineering, computer science, and biology. Analysis and discussion of scientific issues in society.

JAPN 3691. Tech & Scientific Japn. 3 Credit Hours.
Reading of intermediate/advanced technical and scientific Japanese texts. Analysis and discussion of scientific issues in society. Part of the Japanese intensive summer language program. Admission by application only.

JAPN 3692. Business Japanese. 3 Credit Hours.
Acquisition of business terminology, protocols, decorum strategies, and improvement of oral communication skills. Reading and writing of notes, correspondence, and reports. Part of the Japanese intensive summer language program. Admission by application only.

JAPN 3693. Japan Today. 3 Credit Hours.
Development of awareness toward cultural differences and potential communication problems through exploration of current socio-economic and corporate-cultural issues in Japan. Part of the Japanese intensive summer language program. Admission by application only.

JAPN 3811. Special Topics. 1 Credit Hour.
Topics of current interest in Japanese.

JAPN 3812. Special Topics. 2 Credit Hours.

JAPN 3813. Special Topics. 3 Credit Hours.
Topics of current interest in Japanese.

JAPN 3823. Special Topics. 3 Credit Hours.
Topics of current interest in Japanese.

JAPN 3833. Special Topics. 3 Credit Hours.
Topics of current interest in Japanese.

JAPN 3XXX. Japanese Elective. 1-21 Credit Hours.

JAPN 4113. Adv Reading & Listening. 3 Credit Hours.
This course introduces advanced grammar and stylistic and idiomatic expressions in Japanese in both written and spoken contexts on a wide range of topics.

JAPN 4123. Tech&Bus Jpn Translation. 3 Credit Hours.
This is an applied language course that provides practical experience in translating technical and business documents to and from Japanese.

JAPN 4143. Ling Culture Relativism. 3 Credit Hours.
This course examines ‘cultural relativism’ (Eastern/ Western, Japan/U.S.) as evidenced through linguistic systems communication strategies, and even religious orientation. Taught in Japanese.

JAPN 4163. Jpn Literature Culture. 3 Credit Hours.
This is an introductory course in Japanese literature and culture where students read and interpret authentic literary texts and learn and discuss key cultural concepts. Taught in Japanese.

JAPN 4165. Crit Rdgs Jpn Cult/Arts. 3 Credit Hours.
This course helps improve reading skills of advanced learners by analyzing various written texts on topics of culture and society. Taught in Japanese.

JAPN 4173. Anime: Culture&Society. 3 Credit Hours.
Students will be able to appreciate anime's significance in historical, societal and cultural contexts, as well as the aesthetic quality of its form. Taught in Japanese.

JAPN 4183. JAPN Cul/Soc Thru Songs. 3 Credit Hours.
Students will be exposed to songs in different historical, societal and cultural contexts of Japan, and appreciate their aesthetic quality. Taught in Japanese.

JAPN 4231. Design Websites in Jpn. 3 Credit Hours.
This course provides instruction in text input in Japanese and explores language and intercultural communication issues when designing Web pages in Japanese. Taught in Japanese.

JAPN 4233. Cali Pedagogy for Jpn. 3 Credit Hours.
This course explores pedagogical issues in designing Computer-Assisted Language Instruction (CALI) programs for teaching Japanese. Taught in Japanese. Prerequisites: JAPN 3002 (JAPN 4231 highly recommended).

JAPN 4235. 3D RPG Develop. Japn.. 3 Credit Hours.
This course explores pedagogical issues in designing Japanese instructional materials based on the 3D, RPG platform of Second Life. Taught primarily in Japanese. Prerequisites: JAPN 3002 (JAPN 4231 and JAPN 4233 are highly recommended).

JAPN 4500. Intercultural Seminar. 3 Credit Hours.
Integrates cross-cultural research and reflection into discussion of current issues in Japan. Intended for students who have had some study-abroad experience in Japan. Conducted mostly in Japanese.

JAPN 4543. Adv Japanese For NLP Dev. 3 Credit Hours.
This course will explore advanced linguistic, semantic and pragmatic issues unique to Japanese required for developing a NLP system of text-based Japanese.

JAPN 4695. Japanese Internship. 1-3 Credit Hours.
Professional experience with a business/organization in which students enhance their language skills and cultural knowledge in Japanese in relation to the practical goals/objectives of the entity.

JAPN 4698. Research Assistantship. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

JAPN 4699. Undergraduate Research. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

JAPN 4743. Japan Society & Politics. 3 Credit Hours.

JAPN 4750. Japn Discourse & Grammar. 3 Credit Hours.
This course is about Japanese spoken and written discourse, designed for acquiring skills for managing interpersonal relationships through advanced discourse.
JAPN 4780. Jpn Applied Linguistics. 3 Credit Hours.
This course helps develop analytical skills to better understand human languages, particularly English and Japanese. Taught in English. Credit not allowed for both JAPN 4780 and LING 4780.

JAPN 4813. Special Topics. 3 Credit Hours.
Topics of interest not covered in the regular course offerings.

JAPN 4823. Special Topics. 3 Credit Hours.
Topics of current interest in Japanese.

JAPN 4833. Special Topics. 3 Credit Hours.
Topics of current interest in Japanese.

JAPN 4901. Special Problems. 1-21 Credit Hours.
Provides the special instruction required under special programs.

JAPN 4902. Special Problems. 1-21 Credit Hours.
Special problems course for advanced students. Topics to be arranged with instructor.

JAPN 4XXX. Japanese Elective. 1-21 Credit Hours.

Korean (KOR)

KOR 1001. Elementary Korean I. 4 Credit Hours.
Students will be able to speak, comprehend, read and write basic Korean sentences, and they will learn fundamentals in inter-personal relationships in Korean culture. Humanities credit awarded upon successful completion of KOR 1002 or KOR 2001.

KOR 1002. Elementary Korean II. 4 Credit Hours.
A continuation of Korean 1001.

KOR 10X1. Trans Elementary Korean I. 3 Credit Hours.
KOR 10X2. Trans Elementary Korean II. 3 Credit Hours.

KOR 1813. Special Topics. 3 Credit Hours.
Topics of current interest in Korean.

KOR 1814. Special Topics. 4 Credit Hours.
Topics of current interest in Korean.

KOR 1XXX. Korean Elective. 1-21 Credit Hours.

This course continues the introduction to modern colloquial Korean.

KOR 2002. Intermediate Korean II. 3 Credit Hours.

KOR 2698. Research Assistantship. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

KOR 2699. Undergraduate Research. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

KOR 2813. Special Topics. 3 Credit Hours.
Topics of current interest in Korean.

KOR 2823. Special Topics. 3 Credit Hours.
Topics of current interest in Korean.

KOR 2XXX. Korean Elective. 1-21 Credit Hours.

KOR 3001. Advanced Korean I. 3 Credit Hours.
Development of richer perspectives about Korean culture and enhanced skills in reading, writing, and vocabulary. Conducted in Korean.

KOR 3002. Advanced Korean II. 3 Credit Hours.
Further development of richer perspectives about Korean culture and enhanced skills in reading, writing, and vocabulary. Conducted in Korean.

KOR 3691. Business Korean. 3 Credit Hours.
This course aims to improve oral/written communication skills in business situations in Korea. Taught in Korean; part of Korean intensive summer language program.

KOR 3692. Issues & Tech In Korea. 3 Credit Hours.
This course introduces key terms and discusses advances in technology and science in Korea today. Taught in Korean; part of Korean intensive summer language program.

KOR 3693. Exploring Modern Korea. 3 Credit Hours.
This course equips students to understand contemporary Korea through reading and discussion about contemporary topics. Taught in Korean; part of Korean intensive summer language program.

KOR 3811. Special Topics. 1 Credit Hour.
Topics of current interest in Korean.

KOR 3812. Special Topics. 2 Credit Hours.
Topics of current interest in Korean.

KOR 3813. Special Topics. 3 Credit Hours.
Topics of current interest in Korean.

KOR 3823. Special Topics. 3 Credit Hours.
Topics of current interest in Korean.

KOR 3833. Special Topics. 3 Credit Hours.
Topics of current interest in Korean.

KOR 3XXX. Korean Elective. 1-21 Credit Hours.

KOR 4001. Contemporary Korean. 3 Credit Hours.
This course aims to further the students’ knowledge by exposing them to accurate and contemporary expressions in text and multimedia materials. Taught in Korean.

KOR 4002. Select Rdngs Of Mod Kor. 3 Credit Hours.
This course aims to enhance students’ Korean skills through advanced reading and comprehension, translation, grammar, and writing practice. Taught in Korean.

KOR 4698. Research Assistantship. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

KOR 4699. Undergraduate Research. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

KOR 4813. Special Topics. 3 Credit Hours.
Topics of current interest in Korean.

KOR 4823. Special Topics. 3 Credit Hours.
Topics of current interest in Korean.

KOR 4833. Special Topics. 3 Credit Hours.
Topics of current interest in Korean.

KOR 4901. Special Problems. 1-21 Credit Hours.
Special problems course for advanced students. Topics to be arranged with instructor.

KOR 4902. Special Problems. 1-21 Credit Hours.
Special problems for advanced students. Topics to be arranged with instructor.

KOR 4XXX. Korean Elective. 1-21 Credit Hours.
Learning Support (LS)

LS 0198. Reading Skills. 3 Credit Hours.
Development of reading comprehension and speed, vocabulary, and study skills. Review of grammar and usage.

LS 0298. English Skills. 3 Credit Hours.
Development of basic skills used in writing the sentence, paragraph, and short essay. Development of reading speed.

LS 0398. Mathematical Skills. 3 Credit Hours.
Intense review of arithmetic and algebra skills. Development of mathematics study skills.

Linguistics (LING)

LING 1813. Special Topics. 3 Credit Hours.
Topics of current interest in Linguistics.

LING 2100. Intro to Linguistics. 3 Credit Hours.
Introductory course that surveys various fields in linguistics, including first/second language acquisition, phonetics/phonology, morphology/syntax, semantics/pragmatics, language variation, computational linguistics/natural language processing, and writing systems. Credit not allowed for both LING 2100 and LING 2001.

LING 2698. Research Assistantship. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

LING 2699. Undergraduate Research. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

LING 2813. Special Topics. 3 Credit Hours.
Topics of current interest in Linguistics.

LING 3100. Apps of Linguistics. 3 Credit Hours.
Students will obtain a general understanding of the fields of language change, psycholinguistics, first- and second-language acquisition, and writing systems.

LING 3811. Special Topics. 1 Credit Hour.
Topics of current interest in Linguistics.

LING 3812. Special Topics. 2 Credit Hours.
Topics of current interest in Linguistics.

LING 3813. Special Topics. 3 Credit Hours.
Permits students to work in languages not treated in other courses and/or engage in special language research.

LING 3823. Special Topics. 3 Credit Hours.
Topics of current interest in Linguistics.

LING 3833. Special Topics. 3 Credit Hours.
Topics of current interest in Linguistics.

LING 3XXX. Linguistics Elective. 1-21 Credit Hours.
Topics of current interest in Linguistics.

LING 4698. Research Assistantship. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

LING 4699. Undergraduate Research. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

LING 4780. Jpn Applied Linguistics. 3 Credit Hours.
This course helps to develop analytical skills to better understand human languages, particularly English and Japanese. Taught in English. Credit not allowed for both LING 4780 and JAPN 4780.

LING 4813. Special Topics. 3 Credit Hours.
Topics of interest not covered in the regular course offerings.

LING 4823. Special Topics. 3 Credit Hours.
Topics of current interest in Linguistics.

LING 4833. Special Topics. 3 Credit Hours.
Topics of current interest in Linguistics.

LING 4901. Special Prob-Linguistics. 1-21 Credit Hours.
Special problems course for advanced students; topics to be arranged with instructor.

LING 4902. Special Prob-Linguistics. 1-21 Credit Hours.
Special problems for advanced students; topics to be arranged with instructor.

LING 4XXX. Linguistics Elective. 1-21 Credit Hours.

Lit, Communication & Culture (LCC)

LCC 1XXX. Lit, Comm&Culture Elective. 1-21 Credit Hours.
LCC 2XXX. Lit Comm&Culture Elective. 1-21 Credit Hours.
LCC 3XXX. Lit Comm&Culture Elective. 1-21 Credit Hours.
LCC 4XXX. Lit Comm&Culture Elective. 1-21 Credit Hours.

Literature, Media & Comm (LMC)

LMC 1XXX. Lit,Media,&Comm Elective. 1-21 Credit Hours.
LMC 2000. Intro-Lit, Media, & Comm. 3 Credit Hours.
An the introductory course to LMC, this course introduces students to key texts and modes of analysis associated with the study of literature, film, digital media, and communication.

LMC 2050. Lit, Media, Comm Seminar. 3 Credit Hours.
This course introduces second-semester majors to the intellectual movements, interpretive frameworks, and research skills central to the disciplines represented in LMC.

LMC 2100. Intro to STAC. 3 Credit Hours.
Relation to other courses, programs and curricula: As the introductory course to LMC, this course introduces students to key texts and modes of analysis associated with the study of literature, film, digital media, and communication.

LMC 2200. Intro to Gender Studies. 3 Credit Hours.
This course introduces the cultural concept of gender, examining topics such as biology and gender, social constructions of gender, and the psychology of sexual roles.

LMC 2300. Intro Biomedicine & Cult. 3 Credit Hours.
This course provides an introduction to central cultural topics in biomedicine, such as health care, medical practice, medical research, and the systems of cultural meaning within which ideas of health and disease circulate.

LMC 2400. Intro to Media Studies. 3 Credit Hours.
This course offers an introduction to the historical development and cultural impact of various forms of media print, radio, television, film, and interactive electronic applications.

LMC 2410. Intro to Game Studies. 3 Credit Hours.
Introduction to the games studies and game designs.
and literature, including Romanticism's imaginative responses to
Examines the relationships among romantic ideology, science,
urged by the sciences, technology, and culture of the Enlightenment.
Considers the conceptual reformulation of the internal and external world
in the late sixteenth and seventeenth centuries.

LMC 3104. Age Scientific Discovery. 3 Credit Hours.
Introduction to key concepts, methods, and achievements in
computational media, and the convergence of digital technology with
cultural traditions of representation.

LMC 2700. Intr-Computational Media. 3 Credit Hours.
Introduction to key concepts, methods, and achievements in
computational media, and the convergence of digital technology with
cultural traditions of representation.

LMC 2720. Prin of Visual Design. 3 Credit Hours.
Studio-based course that provides students with basic skills needed to
create digital visual images and to analyze designs from historical and
theoretical perspectives.

LMC 2730. Construct-Moving Image. 3 Credit Hours.
Provides the student with the conceptual, formal, aesthetic, and technical
approaches to reconsider film, videos, and animation within the context of
developing digital forms.

LMC 2813. Special Topics in STAC. 3 Credit Hours.
Study of one or more topics of current interest in the area of science,
technology, and culture.

LMC 2823. Special Topics-Lit/Cult. 3 Credit Hours.
Examination of one or more topics of current interest in literary and
cultural studies.

LMC 2XXX. Lit,Media,&Comm Elective. 1-21 Credit Hours.

LMC 3102. The Classical Tradition. 3 Credit Hours.
Explores the definition and transmission of science and technology
within Greek, Arabic, and medieval Latin contexts.

LMC 3104. Age Scientific Discovery. 3 Credit Hours.
Examines the relationships among texts representing the literary, artistic,
and scientific thought of the fifteenth and sixteenth centuries.

LMC 3106. Age Sci Revolution. 3 Credit Hours.
Examines interre联络 of technological, literary, artistic, and philosophical
thought in the late sixteenth and seventeenth centuries.

LMC 3108. Sci Tech & Enlightenment. 3 Credit Hours.
Considers the conceptual reformulation of the internal and external world
urged by the sciences, technology, and culture of the Enlightenment.

LMC 3110. Sci, Tech & Romanticism. 3 Credit Hours.
Examines the relationships among romantic ideology, science,
and literature, including Romanticism's imaginative responses to
Enlightenment science and the Industrial Revolution.
LMC 3219. Literature & Medicine. 3 Credit Hours.
This course examines works of literature dealing overtly with illness and healing, works about or by physicians and other caregivers, and works that raise questions about ethical behavior in the face of sickness.

LMC 3220. Theatre III. 3 Credit Hours.
The dramatic literature, theory, performance practices, and historical culture context of the theatre in the Renaissance and Restoration periods.

LMC 3222. Regionalism American Lit. 3 Credit Hours.
Explores the literary and cultural representations of a particular American region or locale (the South, the West, California, New York City, etc.) and the role such presentations have played in the formation of both regional and national identity.

LMC 3225. Gender Study-Disciplines. 3 Credit Hours.
This course explores the concept of gender and its usefulness as a theoretical category in a variety of disciplines. It includes cultural studies of literature, communication media, cultural anthropology, sociology, history, and science.

LMC 3226. Major Authors. 3 Credit Hours.
An examination of the works and career of a major author in historical and cultural context.

LMC 3228. Shakespeare. 3 Credit Hours.
An examination of Shakespeare's works with attention to generic conventions, historical context, and the relationship of text and performance. Major works of Shakespeare's contemporaries are studied as appropriate.

LMC 3234. Creative Writing. 3 Credit Hours.
This course explores a range of creative literary genres, and combines study and analysis of existing modes of one or more forms in order to establish a basis for original creative work by class members.

LMC 3244. Mod/Contemp Brit Poetry. 3 Credit Hours.
This course examines British poetry of the last 100 years in relation to modern and postmodern modes of cultural expression, philosophy, and literary criticism.

LMC 3248. Poetry & Digital Culture. 3 Credit Hours.
This course examines modernist, postmodern, and contemporary poetry in relation to digital culture, including the computer, World Wide Web, Web 2.0, social media, and apps.

LMC 3252. Film and Television. 3 Credit Hours.
Explores in depth a theoretical issue central to film and/or television. Among its concerns are authorship, genre history, spectatorship, ideology, narrative theory, and the relationship between these media and social history.

LMC 3253. Animation. 3 Credit Hours.
This course examines animation from its earliest days as a "cinema of attractions" to its current development as a predominantly digital practice.

LMC 3254. Film History. 3 Credit Hours.
Surveys the history of film from its machine origins to its present digital developments. It focuses on various movements, figures, and narrative developments in world cinema.

LMC 3255. Cinema & Digital Culture. 3 Credit Hours.
This course examines the impact of digital technologies on contemporary cinema as well as the influence of different cinematic traditions on new digital media.
LMC 3362. Sci, Tech & Performance. 3 Credit Hours.
Examines contemporary theories of performance in relation to the production of scientific knowledge and technologies of representation.

LMC 3402. Graphic & Visual Design. 3 Credit Hours.
Introduction to fundamentals of graphic and visual design of print and digital media. Familiarity with use of the World Wide Web, page layout, and computer graphic software recommended.

LMC 3403. Tech Communication. 3 Credit Hours.
This course introduces students to workplace document genres to develop visual and verbal skills in critical analysis and document development.

LMC 3406. Video Production. 3 Credit Hours.
An introduction to video production including basic skills in storyboarding, scripting, filming, editing, and sound.

LMC 3408. Rhetoric-Tech Narratives. 3 Credit Hours.
Focuses on the rhetorical problems posed by such narrative documents as technical proposals, recommendations reports, grant proposals, and marketing studies. Emphasis on document design, graphics, navigation systems, and editing.

LMC 3410. Non-Linear Documents. 3 Credit Hours.
Focuses on the rhetorical problems posed by hypertext documents. Emphasis in designing for multiple audiences, page and document design, and navigation in a nonlinear environment.

LMC 3412. Communicating Sci/Tech. 3 Credit Hours.
Examines both the theoretical and practical issues involved in communicating scientific and/or technological material to a variety of lay audiences.

LMC 3414. Intellectual Property. 3 Credit Hours.
This course introduces students to intellectual property issues, focusing on ways that policy shapes national character and on application of constitutional and statutory law.

LMC 3431. Tech Comm Approaches. 1 Credit Hour.
Part of a multi-semester sequence that students take in tandem with major-specific classes to develop professional written, visual, oral, and analytic strategies.

LMC 3432. Tech Comm Strategies. 2 Credit Hours.
Part of a multi-semester sequence that students take in tandem with major-specific classes to develop professional written, visual, oral, and analytic strategies.

LMC 3502. Medieval Lit & Culture. 3 Credit Hours.
Introduction to Greece, Rome, and Medieval Europe through an examination of one or a few major culture conflicts expressed in the literary genres and periods.

LMC 3504. Renaissance Lit&Culture. 3 Credit Hours.
An examination of literature and culture from 1450 to 1650 with an emphasis on both major achievements and divergent voices.

LMC 3506. Enlightenment Lit & Cult. 3 Credit Hours.
Examines the nature of the age from an initial boldness, optimism, and faith in reason to a recognition of its limits.

LMC 3508. American Culture I. 3 Credit Hours.
American literature from the Puritan period through the Civil War, including major movements, key authors and texts, study of literary works within broader historical and cultural context.

LMC 3510. American Culture II. 3 Credit Hours.
Examines presentations of the United States from its geographical expansion in the late-nineteenth century to the closing of the frontier and emergence as global power.

LMC 3512. Brit/Cont Romanticism. 3 Credit Hours.
Examines British and Continental Romanticism as it appeared during the latter part of the eighteenth century and the first half of the nineteenth century.

LMC 3514. Victorian Lit & Culture. 3 Credit Hours.
Investigates the period 1830 - 1901 in English literature and culture, focusing on how that period defined key questions, especially ones about human nature, society, and the relation of religion to science.

LMC 3516. Lit & Cultural Modernism. 3 Credit Hours.
A partial investigation of the aesthetic ferment that characterizes English-language cultural production from the turn of the century to the end of World War II.

LMC 3518. Lit/Cult Postmodernism. 3 Credit Hours.
A survey of major themes, representational techniques, and social and cultural concerns of postmodern art and literature.

LMC 3661. Theatre Production III. 1 Credit Hour.
In this "hands-on" course, students will create and execute a publicity campaign and operate the box office for DramaTech Theatre productions.

LMC 3662. Theatre Production IV. 1 Credit Hour.
This course provides students an opportunity to perform onstage in a production at DramaTech Theatre. Auditions are required.

LMC 3705. Prin Information Design. 3 Credit Hours.
Presents principles and practices guiding the development of emerging digital genres. Emphasis on maximizing the affordances of the computer in organizing and communicating complex information.

LMC 3710. Prin Interaction Design. 3 Credit Hours.
Examines principles of design for shaping the procedural and participatory affordances of digital environments, emphasizing the role of cultural context and media transitions.

LMC 3773. Global Issues&Leadership. 3 Credit Hours.
This project based class uses global issues to explore diverse viewpoints, cultures and cognitive biases to develop leadership and presentation skills in small diverse groups.

LMC 3823. Special Topics Lit/Cult. 3 Credit Hours.
Examination of one or more topics of current interest in literary and cultural studies.

LMC 3833. Special Topics in STAC. 3 Credit Hours.
Study of one or more current issues in science, technology, and culture.

LMC 3843. Spec Topic-Communication. 3 Credit Hours.
Examination of one or more topics of current interest in communication studies.

LMC 3853. Special Topics in Film. 3 Credit Hours.
Examines one or more current topics in film studies.

LMC 3863. Spec Topics-Performance. 3 Credit Hours.
Examination of one or more topics of current interest in performance studies.

LMC 3XXX. Lit,Media, & Comm Elective. 1-21 Credit Hours.

LMC 4100. Seminar in STAC. 3 Credit Hours.
A capstone seminar to the LMC major, this course will ask students to draw upon their training in order to engage topical issues in the cultural studies of science.
LMC 4102. Senior Thesis. 3 Credit Hours.
Preparation for and writing of a thesis through faculty-directed independent study.

LMC 4200. Seminar Lit/Cult Theory. 3 Credit Hours.
Concentration on a single literary or cultural theorist and/or a major school of literary or cultural theory. Schools of theory that will be considered include, among others, Materialist, Feminist, Structuralist, Post-Structuralist, and Cultural Studies.

LMC 4204. Poetry and Poetics II. 3 Credit Hours.
Advanced study of the traditions of poetic theory and practice with a special emphasis on processes of poetic conception and revision.

LMC 4300. Seminar Biomed & Culture. 3 Credit Hours.
This course offers an opportunity to investigate in-depth biomedical issues, biomedical concerns in a particular period, or the impact of technological development on biomedicine.

LMC 4400. Seminar in Media Studies. 3 Credit Hours.
Offers an in-depth investigation of the historical development and cultural impact of different forms of media including: television, film, and interactive electronic applications.

LMC 4406. Professional Comm. 3 Credit Hours.
Intended primarily for students planning careers in professional communication, this course will alternate among a number of issues including property law, integrating print and electronic media, and cultural studies of corporate environments.

LMC 4500. Seminar in Film Studies. 3 Credit Hours.
An in-depth investigation of a major movement, theory, period, or technological development in film studies.

LMC 4600. Seminar Perform Studies. 3 Credit Hours.
An in-depth investigation of a specific issue or theme in Performance Studies.

LMC 4602. Performance Practicum. 3 Credit Hours.
Practical experience and theoretical investigations in theatre and performance making including acting, directing, designing, playwriting, performance art, performance and new media.

LMC 4698. Research Assistantship. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

LMC 4699. Undergraduate Research. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

LMC 4701. US Rsch Proposal Writing. 1 Credit Hour.
This course is intended to guide undergraduate students from all disciplines through the stages of writing a proposal for their research option project and thesis.

LMC 4702. US Rsch Thesis Writing. 1 Credit Hour.
This course is intended to guide undergraduate students from all disciplines through the stages of writing their undergraduate thesis.

LMC 4710. Game Studio. 3 Credit Hours.
Project-based course in designing and implementing video games.

LMC 4720. Interactive Narrative. 3 Credit Hours.
Examines significant examples of this emerging genre, including its roots in experimental uses of older media, and engages students in creating their own interactive narrative.

LMC 4725. Game Design. 3 Credit Hours.
Emphasis is on the design elements common to games and the expressive possibilities and cultural concerns specific to digital games.

LMC 4730. Experimental Digital Art. 3 Credit Hours.
Provides students with key conceptual, formal, aesthetic and technical elements needed in creating artifacts in areas ranging from augmented and mixed reality to scientific visualization.

LMC 4731. Game AI. 3 Credit Hours.
Examines expressive possibilities of artificial intelligence techniques in computer games.

LMC 4733. Mixed Reality Design. 3 Credit Hours.
Project-based course in designing implementing experiences using the technologies of Augmented, Mixed, and Virtual Reality.

LMC 4811. Special Topics. 1 Credit Hour.
Topics of current interest not covered in the regular course offerings.

LMC 4812. Special Topics. 2 Credit Hours.
Topics of current interest not covered in the regular course offerings.

LMC 4813. Special Topics. 3 Credit Hours.
Topics of current interest not covered in the regular course offerings.

LMC 4814. Special Topics. 4 Credit Hours.
LMC 4815. Special Topics. 5 Credit Hours.
Topics of current interest not covered in the regular course offerings.

LMC 4904. Internship. 1-6 Credit Hours.
Offers students a workplace-based learning experience that stresses application of principles and skills gained in other STAC classes.

LMC 4XXX. Lit,Media,& Comm Elective. 1-21 Credit Hours.

LMC 4811-4815. Special Topics. 1-21 Credit Hours.

LMC 4904. Internship. 1-6 Credit Hours.
This course introduces students to a variety of perspectives on learning as they apply to work in educational technology. Students cannot receive credit for LMC 6213 and LCC 6213.

LMC 6215. Issues in Media Studies. 3 Credit Hours.
This course focuses on the study of mass media from historical, theoretical, and cultural perspectives. Students cannot receive credit for LMC 6215 and LCC 6215.

LMC 6310. The Computer Expressive. 3 Credit Hours.
Explores the development of the representational power of the computer and the interplay between digital technology and culture. Students cannot receive credit for LMC 6310 and LCC 6310.

LMC 6311. Visual Culture and Desi. 3 Credit Hours.
Explores visual media through a mutually instructive and integrated interplay between critical analyses and the creation of digital artifacts. Students cannot receive credit for LMC 6311 and LCC 6311.

LMC 6312. Dsgn Tech & Representati. 3 Credit Hours.
Explores historical, cultural, and theoretical issues raised by technologies of representation through critical analyses and the creation of digital artifacts. Students cannot receive credit for LMC 6312 and LCC 6312.

LMC 6313. Prin of Interaction Desi. 3 Credit Hours.
Explores visual media through a mutually instructive and integrated interplay between critical analyses and the creation of digital artifacts. Students cannot receive credit for LMC 6313 and LCC 6313.

LMC 6314. Design of Networked Medi. 3 Credit Hours.
Issues in hypertextual and multimedia design in networked environments, including the World Wide Web, interactive television, and wireless applications. Students cannot receive credit for LMC 6314 and LCC 6314.
LMC 6315. Produc Production. 3 Credit Hours.
Focuses on defining user and client needs, analysis of competing products, budgeting, scheduling and management of the production process, and the design of the testing process. Students cannot receive credit for LMC 6315 and LCC 6315.

LMC 6316. Historical Approaches Di. 3 Credit Hours.
Examines digital media in the context of earlier media, such as handwriting and printing as well as photography, radio, film, and television. Students cannot receive credit for LMC 6316 and LCC 6316.

LMC 6317. Interactive Fiction. 3 Credit Hours.
Students create interactive fictions in a variety of formats including intersecting story worlds, interactive characters, simulations, and replay worlds. Students cannot receive credit for LMC 6317 and LCC 6317, LMC 6317 and LCC 4720, or LMC 6317 and LMC 4720.

LMC 6318. Experimental Media. 3 Credit Hours.
Students will develop the critical, intellectual, and creative tools necessary to understand, work with, and reimagine design at the developmental stages of emerging technologies. Students cannot receive credit for LMC 6318 and LCC 6318.

LMC 6319. Intellectual Property. 3 Credit Hours.
Students examine constitutionally informed policy and pragmatic legal issues in intellectual property law, focusing on the effects of power structures and information digitization. Students cannot receive credit for LMC 6319 and LCC 6319.

LMC 6320. Globalization and New Me. 3 Credit Hours.
Historical and theoretical approach to the connections between modes of global integration and modes of representing information. Students cannot receive credit for LMC 6320 and LCC 6320.

LMC 6321. Architecture of Responsi. 3 Credit Hours.
Historical and theoretical approach to the connections between modes of global integration and modes of representing information. Students cannot receive credit for LMC 6321 and LCC 6321.

LMC 6325. Game Design and Analysis. 3 Credit Hours.
Focused topics in the theory and practice of game design, theory, and analysis, including issues of creation, and reception, such as a single sub-genre, procedural technique, or media tradition. Students cannot receive credit for LMC 6325 and LCC 6325, LMC 6325 and LCC 4725, or LMC 6325 and LMC 4725.

LMC 6330. Expressive Virtual Space. 3 Credit Hours.
Practical and theoretical investigation of virtual space in real-time 3D environments with a focus on meditation and functionality. Students cannot receive credit for LMC 6330 and LCC 6330.

LMC 6340. Reality Experience Desi. 3 Credit Hours.
This course introduces students to the design of digital experiences for education and entertainment using Augmented Reality, Tangible Computing, or other forms of Mixed Reality. Students cannot receive credit for LMC 6340 and LCC 6340.

LMC 6350. Spatial Construction. 3 Credit Hours.
Study of the way in which space is manipulated to construct meaning in design formulation. Emphasis on logical structure, geometry, and experiential correlates. Students cannot receive credit for LMC 6350 and LCC 6350.

LMC 6399. Discovery & Invention. 3 Credit Hours.
Required course for all DM majors. The purpose of this course is to give students a suite of methods they can use in professional settings to discover opportunities for inventive new computational products and services. It complements the design and production skills developed in 6310 and 6313 with applied research skills. For students in the MS DM and MS HCI programs it will also help them in the development of their MS proposals. Students cannot receive credit for LMC 6399 and LCC 6399.

LMC 6650. Project Studio. 3 Credit Hours.
This course offers students the opportunity to work on focused research within existing long-term projects of the New Media(NM) Center.

LMC 6743. STS Core Seminar. 3 Credit Hours.
This survey course covers key works Science, Technology & Society, and guest lectures introduce students to faculty doing STS-related research across the Ivan Allen College. Students cannot receive credit for LMC 6743 and LCC 6743, LMC 6743 and HTS 6743, or LMC 6743 and PUBP 6743.

LMC 6748. Social Justice & Design. 3 Credit Hours.
Focuses on social justice from a Science, Technology, and Society(STS) point of view that is informed by critical theory and philosophy of design. Students cannot receive credit for LMC 6748 and LCC 6748 or LMC 6748 and PUBP 6748.

LMC 6749. Feminist Theory and STS. 3 Credit Hours.
This course is an advanced science, technology and society (STS) seminar in feminist theory. Students cannot receive credit for LMC 6749 and LCC 6749 or LMC 6749 and PUBP 6749.

LMC 6753. HCI Prof Prep & Practice. 1 Credit Hour.
Preparation for a professional career in HCI. Speakers. Atlanta-area lab visits. Career trajectories. Project presentations. Technical, resume and interviewing skills, Atlanta-area HCI resources. Students cannot receive credit for LMC 6753 and CS 6753, LMC 6753 and LCC 6753, LMC 6753 and ID 6753, or LMC 6753 or PSYC 6753.

LMC 6770. Mix Reality Design. 3 Credit Hours.
This course introduces students to mixed reality design and prototyping with a focus on Augmented Reality. Students cannot receive credit for LMC 6770 and CS 4770.

LMC 6800. DM MS Project Course. 3 Credit Hours.
Final project course in Digital Media.

LMC 6998. HCI Master's Project. 1-9 Credit Hours.
Final project for students completing a Human-Computer Interaction master's degree in the Digital Media track. Repeatable for multi-semester projects.

LMC 6XXX. Lit,Media,&Comm Elective. 1-21 Credit Hours.
Preparation for Ph.D. Qualifying exam.

LMC 7000. Master's Thesis. 1-21 Credit Hours.
Final Thesis course in Digital Media.

LMC 7999. PhD Qualifying Prep. 1-21 Credit Hours.
Preparation for Ph.D. Qualifying exam.

LMC 8000. Media Theory. 3 Credit Hours.
Key traditions of media theory that contribute to the study of Digital Media. Students cannot receive credit for LMC 8000 and LCC 8000.

LMC 8001. Digital Media Studies. 3 Credit Hours.
Advanced work in production and critique of new media forms. Students cannot receive credit for LMC 8001 and LCC 8001.

LMC 8801. Special Topics. 1 Credit Hour.
Topic of current interest not covered in the regular course offerings.
LMC 8803. Special Topics. 3 Credit Hours.
Special Topics in Digital Media.

LMC 8813. Adv Issues Interactive. 3 Credit Hours.
Advanced Issues in Interactive Narrative.

LMC 8823. Special Topics in Game. 3 Credit Hours.
Advanced topics in the theory and practice of game design, theory, and analysis, including creation, reception, procedural technique, and tradition.

LMC 8831. Special Topics Tech Rep. 1 Credit Hour.
Special Topics in Technologies of Representation.

LMC 8903. Special Problems in HCl. 1-3 Credit Hours.
Small-group of individual investigation of advanced topics in human-computer interaction. Guided study and research.

LMC 8910. Special Problems. 1-21 Credit Hours.
An independent study course.

LMC 8997. Teaching Assistantship. 1-9 Credit Hours.
For graduate students holding teaching assistantships.

LMC 8998. Research Assistantship. 1-9 Credit Hours.
For graduate students holding research assistantships.

LMC 8999. PhD Doctoral Prep. 1-21 Credit Hours.
Doctoral Thesis Prep in Digital Media.

LMC 9000. Doctoral Thesis. 1-21 Credit Hours.
Doctoral Dissertation.

Management (MGT)

MGT 1XXX. Management Elective. 1-21 Credit Hours.

MGT 2106. Legal Aspects-Business. 3 Credit Hours.
Development and function of the law, court organization, procedure, and substantive law in contracts, business organizations, and agencies. Also exposes social responsibility and ethics in business.

MGT 2200. Information Technology. 3 Credit Hours.
An introduction to management computing with a focus on the support of management functions through information technology. Students are introduced to database and spreadsheet applications.

MGT 2250. Management Statistics. 3 Credit Hours.
This is the introduction to basic statistics for management students.

MGT 2255. Quant. Anlys. for Bus.. 3 Credit Hours.
This course focuses on the problem-solving and decision-making processes that use quantitative management science concepts and techniques. Credit will not be awarded for both MGT 2255 and MGT 2251.

MGT 2598. Management Internship. 1-12 Credit Hours.
Recognition for a paid, full or part time, employment experience that is relevant to a student's management education.

MGT 2599. Internship&Independent Study. 1-3 Credit Hours.
Independent study conducted for one student under the guidance of a faculty member in association with an unpaid internship.

MGT 2698. Research Assistantship. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

MGT 2699. Undergraduate Research. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

MGT 2803. Special Topics. 3 Credit Hours.
Permits a group of students and a professor to pursue areas of management not extensively treated in any other course.

MGT 2910. Special Problems. 1-3 Credit Hours.
Independent study conducted for one student under the guidance of a faculty member.

MGT 2911. Special Problems. 1-3 Credit Hours.
Independent study conducted for one student under the guidance of a faculty member.

MGT 2912. Special Problems. 1-3 Credit Hours.
Independent study conducted for one student under the guidance of a faculty member.

MGT 2XXX. Management Elective. 1-21 Credit Hours.

MGT 3000. Financ & Managerial Acct. 3 Credit Hours.
A foundation course in measuring and reporting the financial performance and status of the firm as well as basic concepts in cost and managerial accounting. No credit allowed for MGT majors. No credit allowed for MGT 3000 and ACCT 2101. Credit not allowed for MGT 3000 and ACCT 2102.

MGT 3062. Financial Management. 3 Credit Hours.
An introduction to finance. Topics include: time value of money, capital budgeting, risk and return, capital structure, dividend policy, and working capital management. No credit allowed for MGT 3062 and MGT 3078.

MGT 3075. Security Valuation. 3 Credit Hours.
The valuation of securities using fundamental and technical analysis. Topics include: DCF valuation, price multiples, free cash flow, and the construction of quantitative trading models.

MGT 3076. Investments. 3 Credit Hours.
Introduction to the securities markets and a study of the theory and practice of security analysis and portfolio management as applied to stocks and bonds. Credit not allowed for MGT 3076 and MGT 3078.

MGT 3078. Finance & Investments. 3 Credit Hours.
An introduction to finance and to the securities markets. Topics include: time value of money, risk and return, capital budgeting, security analysis and portfolio management of stocks, bonds, and derivatives. No credit allowed for MGT majors. Credit not allowed for MGT 3078 and MGT 3062. Credit not allowed for MGT 3078 and MGT 3076.

MGT 3079. Mgt of Fin Institutions. 3 Credit Hours.
Introduction to the various risks faced by financial institutions and a detailed analysis of the tools used to manage these risks.

MGT 3082. Fundmnt Real Estate Dev.. 3 Credit Hours.
An overview of the real estate development process from concept through design, feasibility, financing, construction, marketing, management and ultimate sale or long term financing.

MGT 3084. Derivative Securities. 3 Credit Hours.
An introduction to options, futures, and swaps is provided. Concepts of arbitrage, index trading, and portfolio insurance are discussed.

MGT 3101. Organizational Behavior. 3 Credit Hours.
Introduction to how the behavior of individuals, groups, and organizations affects organizational effectiveness. Credit not allowed for both MGT 3101 and 3150.

MGT 3102. Mgt Hum Res-Reg Environ. 3 Credit Hours.
Analysis of various frameworks for understanding the social regulatory environments of human resources management and how they influence management decision making.
MGT 3103. Leadership-Changing Env. 3 Credit Hours.  
The course focuses on the leadership challenges posed by recent changes in the business environment, and on the skills needed to adapt to those changes.

MGT 3118. Cross-Cultural Mgt. 3 Credit Hours.  
This course develops students' global awareness to better understand and cope with the issues and challenges that managers face when working across international boundaries.

MGT 3150. Prin of Management. 3 Credit Hours.  
Course explores functions of management: planning, organizing, staffing, leading, and controlling. Lectures, case studies, and business exercises are used to reinforce principles that are taught. Credit not allowed for both MGT 3150 and MGT 3101.

MGT 3300. Marketing Management I. 3 Credit Hours.  
The course presents and develops the primary marketing variables that are used in designing an overall marketing program. A systems approach is taken with the variables managed to optimize overall results.

MGT 3310. Marketing Research. 3 Credit Hours.  
This course covers the fundamentals of the qualitative aspects of marketing research. The course has an applied orientation with application to contemporary issues in marketing.

MGT 3325. Product Planning. 3 Credit Hours.  
Overviews issues inherent in product development and product management. These include product strategy, idea generation, market development, product positioning, test marketing, launch, and brand management.

MGT 3501. Operations Management. 3 Credit Hours.  
This course focuses on the issues and techniques relevant to the management of the operations function within an organization, emphasizing its strategic significance.

MGT 3510. Management of Technology. 3 Credit Hours.  
Focus on managing the design, assessment, and implementation-change strategy of a firm's manufacturing and information-based technological capabilities to improve competitive performance.

MGT 3599. Career Develmt Workshop. 1 Credit Hour.  
This workshop style class focuses on skills and strategies for identifying capabilities to improve competitive performance.

MGT 3601. Prin of Commercial Law. 3 Credit Hours.  
Course offers an in-depth examination of contracts, negotiable instruments and creditor/debtor issues, all essential for making informed decisions in commercial and financial business environments.

MGT 3606. Intl Business Law. 3 Credit Hours.  
International Business Law focuses on the legal environment of international trade and private commercial transactions.

MGT 3607. Business Ethics. 3 Credit Hours.  
This course introduces students to ethical aspects of the business decision-making process, including: theoretical underpinnings of ethics, stakeholders, and decision-making strategies.

MGT 3609. Legal Aspects Real Est. 3 Credit Hours.  
Legal Aspects of Real Estate introduces students to legal considerations in real estate, including ownership, sale transactions, leasing, title insurance, financing, zoning and environmental laws.

MGT 3614. Law for Entrepreneurs. 3 Credit Hours.  
This course will focus on legal issues which entrepreneurs face while growing a start-up business from infancy to a publicly held company.

MGT 3616. Corporate Governance. 3 Credit Hours.  
This course focuses on the U.S. corporate governance model examining the governance and management of business organizations, including board of director and officer responsibility.

MGT 3659. Foundations of Strategy. 3 Credit Hours.  
This course covers the basic concepts and frameworks of strategy analysis and strategy formulation. Credit will not be awarded for both MGT 3659 and MGT 4195.

MGT 3660. International Business. 3 Credit Hours.  
Examines the position of the U.S. in world markets, various types of international business transactions, and the relationship of business to global economic, political-legal and cultural forces.

MGT 3661. Adv Concepts-Int'l Bus. 3 Credit Hours.  
Covers significant aspects of international business with a particular focus on the challenges associated with transnational corporations.

MGT 3662. Mgt in Healthcare Sector. 3 Credit Hours.  
An exploration of the healthcare sector in its most comprehensive sense, analyzing the healthcare "system" and resulting management issues.

MGT 3663. Technology Strategy. 3 Credit Hours.  
Provides understanding of economic and strategic factors that guide firms' strategic decisions regarding the generation, commercialization, protection, and adoption of the technological innovations.

MGT 3664. Corporate Strategy. 3 Credit Hours.  
Provides frameworks and case studies to understand how companies create value across different businesses.

MGT 3742. Spreadsheet Modeling-Bus. 3 Credit Hours.  
Using advanced spreadsheet capabilities, macros, and add-ons to create decision support systems for business applications. Not an introductory course.

MGT 3743. Emerging Technologies. 3 Credit Hours.  
Analysis of emerging technologies and their impacts for firm practice, market practice, policy, and society. Credit not allowed for both MGT 3743 and ME 3743 or CS 3743.

MGT 3744. Mangn Prod Serv Tech Dev. 3 Credit Hours.  
Analysis of the managerial challenges of the product development process.

MGT 3745. Business Programming. 3 Credit Hours.  
An introduction to the basic concepts and skills of software programming and their applications to solving business problems.

MGT 3746. Adv Managerial Acct. 3 Credit Hours.  
The course will examine current issues in managerial accounting.

MGT 4026. Fin Report & Analysis I. 3 Credit Hours.  
Intermediate-level treatment of revenue recognition, inventories, contracts, interest capitalization, property and equipment, intangibles, long-term liabilities, and shareholder’s equity. Significant emphasis on financial analysis.
MGT 4027. Fin Report & Analysis II. 3 Credit Hours.
Advanced topics including tax reporting, leases, pensions, foreign currency transactions, hedging, statement translation, and business combinations and consolidations. Significant emphasis in financial analysis.

MGT 4028. Fin Analy&Rpt-Tech Firms. 3 Credit Hours.
An in-depth look at reporting standards for and the financial characteristics of technology firms, with an emphasis on the financial analysis of such firms.

MGT 4030. International Accounting. 3 Credit Hours.
An overview of accounting issues arising from the increased internationalization of business. Topics include comparative financial reporting among countries and accounting treatments of international transactions.

MGT 4041. Audit&Fin Control Sys. 3 Credit Hours.
This course covers professional issues surrounding auditing and financial control systems. Topics include management fraud, legal liability, audit evidence, etc.

MGT 4043. Advanced Fin Reporting. 3 Credit Hours.
Financial reporting and accounting for: mergers and acquisitions; consolidated financial statements; international transactions and hedges of exchange-rate fluctuations; partnerships; and governmental and not-for-profit organizations. Credit not allowed for both MGT 4043 and MGT 6043.

MGT 4045. Sem-Advanced Accounting. 3 Credit Hours.
An intensive treatment of a selection of contemporary accounting topics. Topical coverage may span subject matter ranging across the fields of auditing, systems, managerial and tax accounting.

MGT 4047. Ethics & Accounting. 3 Credit Hours.
The course is designed to expose students to issues surrounding accountants' professional ethics. Credit not allowed for both MGT 4047 and MGT 6047.

MGT 4050. Business Analytics. 3 Credit Hours.
This course teaches the process of transforming data into business insights. It covers the methodologies, algorithms, issues, and challenges related to analyzing business data.

MGT 4051. Decision Supp&Expert Sys. 3 Credit Hours.
This course discusses the basic features of decision support systems and expert systems. It covers the development tools and business applications.

MGT 4052. Systems Analysis&Design. 3 Credit Hours.
An introductory course on the development life cycle of business information systems. It covers analysis and design tools and methodology. Credit not allowed for both MGT 4052 and CS 4052.

MGT 4053. Bus Data Communications. 3 Credit Hours.
Introductory data communication concepts. Data communication applications in organizations. Overview of data communication products and services available from a technology consumer perspective.

MGT 4055. International IT Issues. 3 Credit Hours.
An overview of international issues in the Information Technology Management (ITM) area. Topics include: offshore software development, transborder data flow restrictions, and global connectivity issues.

MGT 4056. Electronic Commerce. 3 Credit Hours.
This course examines the business and technical issues related to electronic commerce applications, such as the Internet, WWW, EDI, and electronic linkages between trading partners.

MGT 4057. Bus Process Analy&Design. 3 Credit Hours.
Business processes are the mechanisms by which work is organized and performed. This course covers the analysis of business processes and efficient redesign through technology. Credit will not be awarded for both CS 4057 and MGT 4057.

MGT 4058. Database Management. 3 Credit Hours.
An introductory course on databases providing hands-on experience with a DBMS. Topics include data modeling, relational database design, and SQL.

MGT 4063. Behavioral and Ethical Issues. 3 Credit Hours.
This course examines the nature of ethical and behavioral issues in business. Credit not allowed for both MGT 4063 and MGT 6063.

MGT 4066. Corporate Restructuring. 3 Credit Hours.
This course examines the finance, economics, law, and business strategies that underlie major corporate restructuring transactions. Topics include valuation, acquisitions, divestitures, and high-leveraged transactions.

MGT 4067. Fncl Mkts Trading&Struct. 3 Credit Hours.
The course focuses on liquidity, market structure and trading. Attention is given to the efficiency of trading systems and the role of intermediaries on market structure issues.

MGT 4068. Fixed Income. 3 Credit Hours.
This course covers the important securities that trade in the fixed income market and the valuation models that are used to price them.

MGT 4070. International Finance. 3 Credit Hours.
Financial management in an international setting. Topics include: foreign exchange markets, exchange risk management, international portfolio investment, and foreign direct investment.

MGT 4071. Multinational Fin Mgt. 3 Credit Hours.
This course emphasizes decision making for the multimedia firm amidst exchange rate fluctuations, differing tax structures across countries, and political risk via lectures, case-discussion and analysis, and project-based learning.

MGT 4072. Entrepreneurial Finance. 3 Credit Hours.
This course has been developed to expand the student’s understanding and knowledge of the financial aspects of starting, funding, operating, and/or exiting an entrepreneurial venture. Credit not allowed for both MGT 4072 and MGT 6086.

MGT 4102. Management Consulting. 3 Credit Hours.
This course explores being a Management Consultant, and will introduce students to consulting frameworks and methods; simulate consulting activities and situations using cases.

MGT 4116. Gend, Race, Ethn Org Behav. 3 Credit Hours.
This course will examine how managers and employees become more effective leaders by understanding the role gender, race and ethnicity play in the life of the organization. Credit not allowed for both MGT 4116 and MGT 6116.

MGT 4117. Global Workforce Mgt. 3 Credit Hours.
This course examines how an organization deploys and manages a global workforce while considering cultural and economic differences across the world.

MGT 4119. Leading Teams. 3 Credit Hours.
This course prepares students to be an effective leaders and managers of teams by giving students frameworks to implement and diagnose effective team processes.

MGT 4181. Business Forecasting. 3 Credit Hours.
The course covers statistical tools to forecast using the past behavior of data. Topics include moving average and autoregressive models, trends, cycles and volatility.
MGT 4190. Strategic Quality Mgt. 3 Credit Hours.
This course examines the philosophy and techniques of strategic quality management (e.g. cycle time mgmt., learning organizations, quality control) as means to promote individual productivity and improve organizational competitiveness.

MGT 4191. Entrepreneurship Forum. 3 Credit Hours.
This course provides an understanding of the entrepreneurial process, explores the role of the entrepreneur, and identifies the critical issues in starting ventures and working in entrepreneurial organizations.

MGT 4192. IMPACT Forum. 3 Credit Hours.
With the a speaker series as an integral component, the class explores the competencies and aspects of making an impact. Through speakers, articles and case studies it presents examples for review and insights.

MGT 4193. Serv Lead Values Systems. 3 Credit Hours.
An exploration of the nature and integration of individual and organizational values, systemic thinking, and the concept of servant leadership. Learning occurs through case studies, simulations, readings, personal reflection and team activities.

MGT 4194. Social Entrepreneurship. 3 Credit Hours.
Social Entrepreneurship applies innovative solutions to the world’s pressing social problems by having students utilize leadership and managerial skills to address major challenges.

MGT 4195. Strategic Management. 3 Credit Hours.
The use of cases, guest lecturers, and gaming to integrate analysis and measurement tools, functional areas, and public policy issues. The objective is to develop skills in broad areas of rational decision-making in the administrative context of uncertainty.

MGT 4196. Strategy Consulting Prac. 3 Credit Hours.
Provides experiential learning in strategy processes of analysis, design, and execution. Emphasis on issues currently confronted by major corporations.

MGT 4220. Integrative Management. 3 Credit Hours.
Provides understanding of strategy implementation and the integration of different functional areas of the firm using lectures, cases, and a Capstone simulation. Credit will not be awarded for both MGT 4220 and MGT 4195.

MGT 4303. Personal Sell& Sales Mgt. 3 Credit Hours.
Students will obtain an understanding of the management of the sales function. The importance of the marketing-sales interface will be stressed.

MGT 4304. Strategic Brand Mgt. 3 Credit Hours.
This course teaches undergraduate students about the importance of brands, and makes them knowledgeable about, and able to apply instruments to create, monitor, and manage brands.

MGT 4305. Business to Business Mkt. 3 Credit Hours.
This course studies the marketing of products and services for resale, for use in producing other goods and services, and for the operations of an enterprise.

MGT 4307. Strategic Marketing. 3 Credit Hours.
Students will obtain an understanding of strategic marketing development and alternatives. Analysis and implementation through functional marketing strategies will be stressed.

MGT 4308. Adv&Prom: Integ Mktg Comm. 3 Credit Hours.
This course is designed to focus on the primary marketing of communication through advertising and promotion implemented with an integrated approach. Strategic and tactical dimensions are covered for both traditional media such as broadcast, print, out-of-home and direct, as well as new media including the internet, mobile, and other trends in the industry.

MGT 4309. Services Marketing. 3 Credit Hours.
Explores how many of the traditional marketing models can be adapted to the marketing of services, as well as introducing entirely new concepts and frameworks specifically applicable to services and services marketing.

MGT 4311. Digital Marketing. 3 Credit Hours.
This course explores the various components of the digital channel including social, mobile, and search engine marketing to understand how to implement an effective digital marketing strategy.

MGT 4313. Analytical Mktg. 3 Credit Hours.
Provides an understanding of analytic techniques and computer models in analyzing customer-centric data and developing customer relationship (CRM) strategy.

MGT 4335. International Marketing. 3 Credit Hours.
Students will obtain an understanding of marketing across national borders and cultures. The differences and similarities throughout the marketing functions are explored.

MGT 4341. Mgt Healthcare Operations. 3 Credit Hours.
Explore the roles of operations management practices and health information technologies in addressing the challenges in the healthcare enterprise and harnessing opportunities for transforming it.

MGT 4352. Operations Resource Plan. 3 Credit Hours.
The management of material flows within an enterprise will be covered by tracking the evolution of operational planning and execution systems through the enterprise resource planning (ERP) framework.

MGT 4353. Operations Strategy. 3 Credit Hours.
This course provides knowledge about developing, implementing and evaluating operations strategy. It stresses the relationships between the operations and other functions of the organization.

MGT 4360. Global Operations. 3 Credit Hours.
This course is designed to present issues critical to the globalization of operations, and addresses strategic and tactical issues pertaining to an organization's global operations and supply chain activities.

MGT 4365. Quality Control. 3 Credit Hours.
This course focuses on statistical process control, acceptance sampling, robust design, and other general methodologies for quality improvement.

MGT 4366. Service Operations Mgt. 3 Credit Hours.
This course analyzes operational performance for the service and for service-support functions of manufacturers. Industries include information services, health care, parking, transportation, distribution, and retail.

MGT 4367. Revenue Analytics. 3 Credit Hours.
This course examines how an organization deploys and manages model and data driven pricing techniques to maximize revenues.
MGT 4401. Supply Chain Modeling. 3 Credit Hours.
The objective of this course is to provide students with tools and models for matching supply and demand in the most cost effective way.

MGT 4450. Project Management. 3 Credit Hours.
Concepts, techniques, and tools from the project management body of knowledge covering initiating, planning, controlling, executing, and closing projects. Includes agile techniques and certification preparation. Credit will not be awarded for both MGT 4450 and MGT 6450.

MGT 4598. Management Internship. 1-12 Credit Hours.
Recognition for a paid, full or part time, employment experience that is relevant to a student's management education.

MGT 4599. Internship & Independent Study. 1-3 Credit Hours.
Independent study conducted for one student under the guidance of a faculty member in association with an unpaid internship.

MGT 4610. Law, Mgt, & Economics. 3 Credit Hours.
Interrelationships among law, economics, and management. Focuses on the legal and economic aspects of management decisions.

MGT 4611. Integrative Mgt Analysis. 3 Credit Hours.
Integrates the functional areas of management, economics, and the external environment in which businesses operate. The course is designed to broaden the student's perspective on management.

MGT 4670. Entrepreneurship. 3 Credit Hours.
Provides students with an understanding of the process of establishing a technology-based venture. Students learn how to evaluate market opportunities, conduct feasibility studies, create venture teams, and write business plans.

MGT 4698. Research Assistantship. 1-12 Credit Hours.
Independent research conducted for one student under the guidance of a faculty member.

MGT 4699. Undergraduate Research. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

MGT 4725. Info Security Policy. 3 Credit Hours.
Information security vulnerabilities and risks; legal, cost, privacy, and technology constraints; derivation of strategies; technical and procedural means of achieving desired ends. Credit will not be awarded for both MGT 4725 and MGT 6725 or CS 6725 or CS 4725.

MGT 4726. Privacy Tech Policy Law. 3 Credit Hours.
This course takes a multi-disciplinary approach to privacy, a topic of great interest in the technology, policy, ethics, law, and business realms. Credit will not be awarded for both MGT 4726 and CS 4726 or CS 6726 or MGT 6726.

MGT 4741. Int Mgt Dev-Proj Prep. 3 Credit Hours.
Individual and group-based experiential learning activities to develop integrated human system management skills that prepare students for more successful capstone collaboration and learning. Credit not allowed for both MGT 4741 and CS 4741 or ME 4741.

MGT 4742. Tech & Mgt Cap Proj. 4 Credit Hours.
Project-based course where students in the Technology and Management Program will work in inter-disciplinary teams on projects provided by corporate affiliates. Credit not allowed for both MGT 4742 and CS 4742 or ME 4742.

MGT 4803. Special Topics. 3 Credit Hours.
Permits a group of students and a professor to pursue areas of management not extensively treated in any other course.

MGT 4811. Special Topics. 1 Credit Hour.
Permits a group of students and a professor to pursue areas of management not extensively treated in other courses.

MGT 4812. Special Topics. 2 Credit Hours.
Permits a group of students and a professor to pursue areas of management not extensively treated in other courses.

MGT 4813. Special Topics. 3 Credit Hours.
Permits a group of students and a professor to pursue areas of management not extensively treated in other courses.

MGT 4814. Special Topics. 4 Credit Hours.
Permits a group of students and a professor to pursue areas of management not extensively treated in other courses.

MGT 4815. Special Topics. 5 Credit Hours.
Permits a group of students and a professor to pursue areas of management not extensively treated in other courses.

MGT 4823. Special Topics. 3 Credit Hours.
Permits a group of students and a professor to pursue areas of management not extensively treated in other courses.

MGT 4833. Special Topics. 3 Credit Hours.
Permits a group of students and a professor to pursue areas of management not extensively treated in other courses.

MGT 4910. Special Problems. 1-3 Credit Hours.
Independent study conducted for one student under the guidance of a faculty member.

MGT 4911. Special Problems. 1-3 Credit Hours.
Independent study conducted for one student under the guidance of a faculty member.

MGT 4912. Special Problems. 1-3 Credit Hours.
Independent study conducted for one student under the guidance of a faculty member.

MGT 4XXX. Management Elective. 1-21 Credit Hours.

MGT 6000. Financial & Mgrl Acct I. 3 Credit Hours.
A foundation course in measuring and reporting the financial performance and status of the firm, as well as basic concepts in cost and managerial accounting.

MGT 6010. Business Taxation. 3 Credit Hours.
Comprehensive survey of federal taxation of business. A focus on tax planning and decision making will extend the study of the tax code regulations.

MGT 6015. Managerial Accounting II. 3 Credit Hours.
The course covers cost estimation, standard costs, variable costing, relevant costs, transfer pricing, performance evaluation, cost of quality, and activity-based costing for service.

MGT 6020. Fin Reporting & Analay I. 3 Credit Hours.

MGT 6022. Fin Reporting & Analay II. 3 Credit Hours.
Advanced topics including tax reporting, leases, and pensions.

MGT 6028. Fin Analy & Rpt-Tech Firms. 3 Credit Hours.
An in-depth look at reporting standards for, and the financial characteristics of technology firms, with an emphasis on the financial analysis of such firms.
MGT 6030. International Accounting. 3 Credit Hours.
An overview of accounting issues arising from the increased internationalization of business. Topics include comparative financial reporting among countries and accounting treatments of international transactions.

MGT 6042. Audit & Fin Control Sys. 3 Credit Hours.
This course covers professional issues surrounding auditing and financial control systems. Topics include management fraud, legal liability, audit evidence, etc.

MGT 6043. Advanced Fin Reporting. 3 Credit Hours.
Financial reporting for mergers and acquisitions; consolidated financial statements; international transactions and hedges of exchange-rate fluctuations; partnerships; and governmental and not-for-profit financial reporting. Credit not allowed for both MGT 4043 and MGT 6043.

MGT 6045. Seminar-Adv Accounting. 3 Credit Hours.
An intensive treatment of a selection of contemporary accounting topics. Topical coverage may span subject matter ranging across the fields of auditing, systems, managerial, and tax accounting.

MGT 6047. Ethics & Accounting. 3 Credit Hours.
The course is designed to expose students to issues surrounding accountants' professional ethics. Credit not allowed for both MGT 4047 and MGT 6047.

MGT 6051. Database Devel & Appl. 3 Credit Hours.
The role of databases in the modern enterprise. Design and development of database systems. Applications in accounting marketing, operations, and human resource systems.

MGT 6053. Bus Data Communications. 3 Credit Hours.
Introductory data communication concepts. Data communication applications in organizations. Overview of data communications products and services available from a technology consumer perspective.

MGT 6056. Electronic Commerce. 3 Credit Hours.
This course examines the business and technical issues related to electronic commerce applications, such as the Internet, WWW, EDI, and electronic linkages between trading partners.

MGT 6057. Bus Process Anal&Design. 3 Credit Hours.
Business processes are the mechanisms by which work is organized and performed. This course covers the analysis of business processes and efficient redesign through technology.

MGT 6058. Info Tech Practicum. 3 Credit Hours.
Student teams will work on information technology management projects at participating organizations. They will identify key IT management issues and develop solutions.

MGT 6059. Emerging Technologies. 3 Credit Hours.
MGT 6060. Financial Management. 3 Credit Hours.
An introduction to finance. Topics include time value of money, capital budgeting, risk and return, capital structure dividend policy, and working capital management.

MGT 6066. Corporate Restructuring. 3 Credit Hours.
This course seeks to give students an understanding of issues in corporate restructuring. Topics include valuation, mergers, acquisitions, spin-offs, financial distress, corporate governance, and high leveraged transactions.

MGT 6067. Fin Commerical Real Est. 3 Credit Hours.
The course will examine commercial real estate assets from two perspectives: the unique nature of the financing and ownership structures and their role as an asset class in investment portfolios.

MGT 6070. International Finance. 3 Credit Hours.
Financial management in an international setting. Topics include: foreign exchange markets, exchange risk management, international portfolio investment, and foreign direct investments.

MGT 6071. Multinational Fin Mgt. 3 Credit Hours.
This course emphasizes decision making for the multinational firm amidst exchange rate fluctuations, differing tax structures across countries, and political risk via case discussion and analysis.

MGT 6078. Finance & Investments. 3 Credit Hours.
An introduction to finance, including the fundamental concepts of financial accounting, corporate finance and portfolio optimization. This course emphasizes basic concepts related to both equities and fixed income securities. Credit not allowed for MGT 6078 and MGT 6080.

MGT 6080. Investments. 3 Credit Hours.
Introduction to securities markets and study of theory and practice of security analysis and portfolio management concepts as applied to equities and fixed-income securities. Credit not allowed for MGT 6078 and MGT 6080.

MGT 6081. Derivative Securities. 3 Credit Hours.
An introduction to options, futures, and swaps is provided. Concepts of arbitrage, index trading, and portfolio insurance are discussed.

MGT 6082. Fundmnt Real Estate Dev.. 3 Credit Hours.
An overview of the real estate development process from concept through design, feasibility, financing, construction, marketing, management and ultimate sale or long term financing.

MGT 6083. Real Estate Practicum. 3 Credit Hours.
Designed for graduate students with an interest in real estate. It consists of a one semester case study for a specific company or competitive program.

MGT 6086. Entrep Financ&Pvt Equity. 3 Credit Hours.
This course teaches future managers and entrepreneurs the financial perspective of value creation. Issues related to venture capital and private equity industry are emphasized. Credit not allowed for both MGT 6086 and MGT 4072.

MGT 6090. Mgt of Fin Institutions. 3 Credit Hours.
Introduction to the various risks faced by financial institutions and a detailed analysis of the tools used to manage these risks.

MGT 6100. Organizational Behavior. 3 Credit Hours.
The focus of this course is on behavioral issues in the management of individual, team, and organizations' performance.

MGT 6101. Mging Human Resources. 3 Credit Hours.
An examination of the tools and procedures used by organizations to attract, select, and retain employees within the context of the legal and regulatory environment.

MGT 6106. Teamwork-Organizations. 3 Credit Hours.
The focus of the course is on understanding the use, management, and performance of teams and teamwork in organizational settings.

MGT 6107. Leadership & Org Change. 3 Credit Hours.
An examination of theories and practices for designing and implementing major organizational change and the role played by leadership, power, and influence in change process.

MGT 6110. Negotiation and Conflict. 3 Credit Hours.
This course covers the theory and process of negotiation and conflict resolution as it is practiced in different settings.
MGT 6111. Innov & Entrepreneur Behav. 3 Credit Hours.
An examination of organizational policies, practices, and cultures that foster innovative and entrepreneurial behavior even in the context of large organizations.

MGT 6113. NonProfit Team Cons Proj. 3 Credit Hours.
Teams work on a project developed in consultation with a not for profit organization, and present results to organizations and boards.

MGT 6114. Leadership Development. 3 Credit Hours.
Preparation for becoming leaders of organizations, to exercise leadership, and to embark on paths of personal leadership development through readings, lectures, speakers, and leadership groups.

MGT 6116. Gend, Race, Ethn Org Behav. 3 Credit Hours.
This course will examine how managers and employees become more effective leaders by understanding the role gender, race and ethnicity plays in the life of the organization.

MGT 6118. Cross-Cultural Mgt. 3 Credit Hours.
This course develops students' global awareness to better understand and cope with the issues and challenges that managers face when working across international boundaries.

MGT 6119. Leading Teams. 3 Credit Hours.
This course prepares students to be an effective leader and manager of teams by giving students frameworks to implement and diagnose effective team processes.

MGT 6123. Information Tech Mgt. 2 Credit Hours.
A study in understanding and managing information technology, strategic uses of IT, and electronic commerce.

MGT 6124. Legal Environment of Bus. 2 Credit Hours.
This course involves an examination of laws, rules, and standards of regulation and conduct, guidelines, and systems of conflict resolution relating to business operations and administration.

MGT 6125. Strategic Management. 2 Credit Hours.
Designed to provide a view of business organizations, with the focus on the total enterprise - the industry and competitive environment in which the organization operates.

MGT 6126. Integrative Mgt Exper. 1 Credit Hour.
IME is a team-based and project-based course that requires students to draw on all core skills areas for successful completion.

MGT 6127. Business Communications. 1 Credit Hour.
Designed to improve verbal and written communication skills and the use of effective visuals for presentation through the understanding and application of a wide range of techniques.

MGT 6128. Business Ethics. 1 Credit Hour.
A participative class consisting of lectures by the instructor, case analysis, discussion of contemporary ethical business issues and presentations by speakers.

MGT 6130. Managerial Economics. 1.5 Credit Hour.
This course is designed to provide students with an understanding of basic economic concepts and an ability to apply these concepts to business decision-making and public policy analysis.

MGT 6134. Managerial Economics II. 1.5 Credit Hour.
A continuation of MGT 6130. Microeconomics to include game theory, information economics, oligopoly and auction and bargaining models.

MGT 6135. Macroeconomics for Mgrs. 3 Credit Hours.
This course is designed to provide future managers with an understanding of macroeconomics as well as how macroeconomic shocks can effect business operations.

MGT 6165. Venture Creation. 3 Credit Hours.
Focuses on creating a new business venture. Requires completing a business plan, which describes and analyzes a proposed venture.

MGT 6176. Managing Growth. 3 Credit Hours.
This course examines the challenges associated with the successful management of growth. Models and theories of firm growth will be reviewed.

MGT 6185. Intl Business Environ. 3 Credit Hours.
This graduate course explores international environmental factors impacting firms' globalizing operations. Factors covered range from economic, political, and legal, to socio-cultural and technology forces.

MGT 6190. Cur Thinking in Strategy. 3 Credit Hours.
This course builds on the core strategic management course (MGT6125) and strives to provide an in-depth and reflective coverage of current and emerging topics in strategic management.

MGT 6197. Global Strategic Mgt. 3 Credit Hours.
This course provides a forum for the in-depth examination of the managerial and organizational demands associated with effectively competing in global industries.

MGT 6198. Corp Entrepreneurship. 3 Credit Hours.
This course examines how strategic pioneering actions and innovation are used by organizations to renew themselves, their markets, and their industries.

MGT 6203. Data Analytics Business. 3 Credit Hours.
Teaches the scientific process of transforming data into insights for making better business decisions. It covers the methodologies, algorithms, and challenges related to analyzing business data.

MGT 6300. Marketing Management I. 3 Credit Hours.
This course focuses on the activities of managers who make the everyday decisions that guide the marketing of goods and services. Students take the principles that they learn and apply them directly to solving relevant case problems.

MGT 6302. Consumer Behavior. 3 Credit Hours.
This course exposes students to behavior science concepts and approaches in understanding, and predicting the behavior of consumers.

MGT 6303. Sales Management. 3 Credit Hours.
Students will obtain an understanding of the management of the sales function. The importance of the marketing-sales interface will be stressed.

MGT 6304. Customer Relationship Mgt. 3 Credit Hours.
Provides an understanding of analytic techniques and computer models in analyzing customer-centric data and developing customer relationship management (CRM) strategy.

MGT 6306. Business to Business Mkt. 3 Credit Hours.
This course studies the marketing of products or services for resale, for use in producing other goods and service operations of an enterprise.

MGT 6307. Integrated Mktg Comm. 3 Credit Hours.
An exploration of frameworks, processes, and tools used by organizations to develop and sustain effective marketing communications, with an emphasis on emerging communication channels.

MGT 6308. Strategic Brand Mgt. 3 Credit Hours.
This course teaches students about the importance of brands, and makes them knowledgeable about and able to apply instruments to create, monitor and manage brands.
MGT 6310. Marketing Research. 3 Credit Hours.
A state-of-the-art course focusing on the qualitative aspects of marketing research. The course has a strong managerial orientation emphasizing applications in several areas including international marketing research.

MGT 6311. Digital Marketing. 3 Credit Hours.
An applied overview of digital marketing tools and strategy, emphasizing the diverse ways that contemporary marketers use digital channels to achieve strategic business objectives.

MGT 6315. Marketing Analysis. 3 Credit Hours.
This course seeks to impart an understanding of the various applied multivariate techniques available for analyzing and interpreting marketing data.

MGT 6320. Market Response Models. 3 Credit Hours.
Knowing that a company can take actions that affect its own sales market response models can be used to aid in planning and forecasting. The models are estimated by regression techniques.

MGT 6325. Product Planning. 3 Credit Hours.
Examines issues inherent in product development and product management. These include product strategy, idea generation market development, product positioning, and test marketing, and launched brand management.

MGT 6326. Collaborative Prod Dev. 3 Credit Hours.
Examines issues inherent in product development and product management. These include product strategy, idea generation, market development, product positioning, test marketing, and launched brand management.

MGT 6335. International Marketing. 3 Credit Hours.
Students will obtain an understanding of marketing across national borders and cultures. The differences and similarities throughout marketing functions are explored.

MGT 6345. Marketing Practicum. 3 Credit Hours.
The course is designed to help MBA students gain hands-on experience in solving marketing problems faced by companies by working on projects under faculty supervision.

MGT 6350. Operations Management. 3 Credit Hours.
This course focuses on the issues and techniques relevant to the management of the organization within and recognizing its strategic significance.

MGT 6351. Operations Resource Plan. 3 Credit Hours.
The management of material flows within an enterprise will be covered by tracking the evolution of operational planning and execution systems through the enterprise resource planning (ERP) framework.

MGT 6352. International Practicum. 3 Credit Hours.
A semester long project-based course that includes travel to a foreign country during the semester break.

MGT 6353. Operations Strategy. 3 Credit Hours.
This course provides knowledge about developing, implementing, and evaluating operations strategy. It stresses the relationships between the operations and other functions of the organization.

MGT 6357. Service Operations Mgt. 3 Credit Hours.
This course analyzes operational performance for the service sector and service support functions of manufacturers. Industries include information services, health care, banking, transportation, distribution, and retail.

MGT 6359. Bus Str Sustainability. 3 Credit Hours.
Introduces business strategies such as eco-efficiency, product stewardship, green marketing and sustainable development. Cases, speakers reflect current issues such as electronics waste and global warming.

MGT 6360. Global Operations. 3 Credit Hours.
This course is designed to present issues critical to the globalization of operations, and addresses strategic and tactical issues pertaining to an organization’s global operations and supply chain activities.

MGT 6369. Sustainabl Bus Practicum. 3 Credit Hours.
Students work on real-world consulting projects focused on sustainability related challenge for companies, non-profits, and/or government organizations.

MGT 6400. Pricing Analytics & Rev. 3 Credit Hours.
Focus in on increasing profit by measuring price responses and controlling capacity. Topics include forecasting, price optimization, and revenue management. Credit not allowed for both MGT 6400 and MGT 6362.

MGT 6401. Supply Chain Modeling. 3 Credit Hours.
Focus on development and implementation of successful Supply Chain Strategies. Topics include: supply chain design, supply chain coordination, capacity management, retailing, and supplier management. Credit not allowed for both MGT 6401 and MGT 6362.

MGT 6450. Project Management. 3 Credit Hours.
Provides exposure to the concepts, frameworks and techniques for managing projects, with real world examples from Information Technology and other types of projects.

MGT 6451. Bus Intell & Analytics. 3 Credit Hours.
Provides exposure to the concepts, frameworks and techniques for business intelligence and analytics, with real world examples from the business intelligence & analytics industry.

MGT 6500. Analytic Tools/Decisions. 1.5 Credit Hour.
Introduction to the most commonly use statistical and optimization-based analytical tools for decision support based on the data available.

MGT 6501. Operations Management. 1.5 Credit Hour.
This course focuses on the strategic design and management of operations processes and policies to match supply with demand in an economically sustainable manner. Credit will not be awarded for both MGT 6501 and MGT 6350.

MGT 6502. Leading People & Org. 1.5 Credit Hour.
This course focuses on how to lead individuals and teams within organizations. This course will develop a systematic understanding of behavior within formal organizational settings. Credit will not be awarded for both MGT 6502 and MGT 6100.

MGT 6503. Managing Info Resources. 1.5 Credit Hour.
Focuses on the information technology infrastructure in an organization, the information technology industry, and the tools to manage the information resources in an organization. Credit will not be awarded for both MGT 6503 and MGT 6123.

MGT 6504. Principles of Finance. 1.5 Credit Hour.
Basic principles of finance including time value of money, risk and return relationship, capital budgeting. Credit will not be awarded for both MGT 6504 and MGT 6060.
MGT 6505. Marketing Management. 1.5 Credit Hour.
This course discusses the core elements of the marketing and the major types of marketing decisions faced by organizations. Develop the relevant skills for critically analyzing marketing actions. Credit will not be awarded for both MGT 6505 and MGT 6300.

MGT 6506. Managerial Economics. 1.5 Credit Hour.
Microeconomics is about scarcity and how individuals make choices in the face of scarcity. Topics include supply/demand, markets and price system, risk/uncertainty, market limitations. Credit will not be awarded for both MGT 6506 and MGT 6130.

MGT 6507. Business Communications. 1.5 Credit Hour.
The purpose of this course is to provide future leaders and managers with the communication skills that enable them to sell themselves and their ideas. Credit will not be awarded for both MGT 6507 and MGT 6127.

MGT 6508. Strategic Management. 3 Credit Hours.
Strategic management builds on and integrates other functional core courses to understand how firms gain and sustain a competitive advantage. Credit will not be awarded for both MGT 6508 and MGT 6125 or MGT 6508 and MGT 6126.

MGT 6509. Legal & Ethical Business. 1.5 Credit Hour.
 Constitutional law; dispute resolution; torts; contracts; theories of ethical analysis; and the role of stakeholders. Credit will not be awarded for both MGT 6509 and MGT 6124 or MGT 6509 and MGT 6126.

MGT 6510. Leader Develop Workshop. 1.5 Credit Hour.
This course focuses on how to lead individuals and teams within organizations and will develop a systematic understanding of behavior within formal organizational settings.

MGT 6510P. Leader Development Prep. (null) Credit Hours.
This course focuses on how to lead individuals and teams within organizations and will develop a systematic understanding of behavior within formal organizational settings.

MGT 6600. Analytical Tools. 3 Credit Hours.
Exposes students to the most commonly used statistical and optimization-based analytical tools for decision support. The knowledge of these tools enables the decision maker to make informed decisions based on the data available.

MGT 6614. Law for Entrepreneurs. 3 Credit Hours.
This course will focus on legal issues which entrepreneurs face while growing a start-up business from infancy to becoming a publicly held company. Students will not receive credit for both MGT 6614 and MGT 3614.

MGT 6663. Technology Strategy. 3 Credit Hours.
Provides understanding of economic and strategic factors that guide firms’ strategic decisions regarding the generation, commercialization, protection, and adoption of technological innovations.

MGT 6664. Managing Innovation. 3 Credit Hours.
This course focuses on how firms (both new and old) can create and capture value from product, process, and service innovations.

MGT 6665. Strategy Execution. 3 Credit Hours.
This course, focusing on strategy execution, answers this question: After performing strategy analysis and strategy formulation, how do you succeed in achieving strategic results?

MGT 6667. Strat Entrepreneurship. 3 Credit Hours.
Strategic perspective on the entrepreneurial process, competition and strategic interactions between startups and incumbents, cooperation and open innovation strategies.

MGT 6725. Info Security Policies. 3 Credit Hours.
Information security vulnerabilities and risks; legal, cost, privacy, and technology constraints; derivation of strategies; technical and procedural means of achieving desired ends. Credit will not be awarded for both MGT 6725 and MGT 4725 or CS 4725 or CS 6725.

MGT 6726. Privacy Tech Policy Law. 3 Credit Hours.
This course takes a multi-disciplinary approach to privacy, a topic of great interest in the technology, policy, ethics, law, and business realms. Credit will not be awarded for both MGT 6726 and CS 4726 or CS 6726 or MGT 4726.

MGT 6748. Appld Analytics Pract. 6 Credit Hours.
Practical analytics project experience applying ideas from the classroom to a significant project of interest to a business, government agency, or other organization.

MGT 6753. Prin-Mgt for Engineers. 3 Credit Hours.
The course will provide an introduction to selected topics needed to be successful in the technology industries. Crosslisted with ME 6753.

MGT 6769. Fixed Income Securities. 3 Credit Hours.
Description, institutional features, and mathematical modeling of fixed-income securities. Use of both deterministic and stochastic models. Crosslisted with ISYE 6769 and MATH 6769.

MGT 6772. Mgt Resources-Tech Firms. 3 Credit Hours.
This course explores the competitive advantage manufacturing and service firms derive from effective management of their technology, workforce, materials, and information resources. Crosslisted with ISYE 6772.

MGT 6780. Knowledge Management. 3 Credit Hours.
The purpose of this course is to enable students to think conceptually about the modern organization as a knowledge-based, information-processing organization. Crosslisted with PUBP 6780.

MGT 6785. The Practice of QCF. 3 Credit Hours.
Case studies, visiting lecturers from financial institutions, student group projects of an advanced nature, and student reports, all centered around quantitative and computational finance. Crosslisted with ISYE and MATH 6785.

MGT 6789. Technology Ventures. 3 Credit Hours.
Team discussion and case studies in biomedical engineering technology transfer, including licensing, financial capital, safety and efficacy studies, clinical trials and strategic planning. Crosslisted with BMED, ECE, CHE, and ME 6789.

MGT 6793. Adv Topics in QCF. 3 Credit Hours.
Advanced foundational material and analysis techniques in quantitative and computational finance.

MGT 6799. Legal Issues-Tech Transf. 3 Credit Hours.
Study and analysis of U.S. law as it applies to the patenting and licensing processes. Crosslisted with BMED, ECE, CHE, and ME 6799.

MGT 6813. Economic Analysis. 3 Credit Hours.
Economic reasoning and principles useful in understanding and solving managerial and public policy questions. Practice in analyzing major domestic and international economic events is included.

MGT 6830. Fund of Innovation I. 3 Credit Hours.
First of a two-course sequence on various approaches needed to understand the innovation process, including patterns of technological change and intellectual property protection.
MGT 6831. Fund of Innovation II. 3 Credit Hours.
Second of two-course sequence on various approaches needed to understand the innovation process, including competitive market analysis and valuing new technology.

MGT 6832. Tech Commercialization. 3 Credit Hours.
Follow-up to year-long course on Fundamentals of Innovation, emphasizing business planning and understanding the business, technology, and legal aspects of Venture Lab technologies.

MGT 6901. Consulting. 3 Credit Hours.
Students work in teams for client firms in a consulting capacity. The client firms are preselected, but the problem definition is derived from client-team negotiations.

MGT 6XXX. Management Elective. 1-21 Credit Hours.

MGT 7000. Master's Thesis. 1-21 Credit Hours.

MGT 7060. Theory of Finance. 3 Credit Hours.
This Ph.D. course is an introduction to theoretical financial economics. This course focuses on individuals' consumption and investment decisions under uncertainty and their implications on the valuation of securities.

MGT 7061. Empirical Finance. 3 Credit Hours.
This Ph.D. course is a survey of selected current empirical research topics in finance and related econometric issues.

MGT 7062. Corporate Restructuring. 3 Credit Hours.
This PhD course is an analysis of empirical research in corporate finance with a focus on issues related to corporate restructuring.

MGT 7063. International Finance. 3 Credit Hours.
This Ph.D. course is an introduction to the foundations of modern international finance. Topics include: international portfolio diversification, design of country funds, tests of asset pricing, and international corporate finance.

MGT 7064. Microecon Theory for MGT. 3 Credit Hours.
This course focuses on behavior of individual economic agents and how they interact to form markets. Topics include organizations, efficiency, and equilibria with incomplete information.

MGT 7101. Human Resource Mgt. 3 Credit Hours.
A Ph.D. course that covers an analysis of advanced practice, research, and theory in human resource management. Topics will vary by instructor and student interest.

MGT 7102. Org Behav Research Meth. 3 Credit Hours.
This Ph.D. course is an overview and analysis of research methodologies used in conducting scientific research of organizational behavior.

MGT 7105. Individual Behav In Orgs. 3 Credit Hours.
This Ph.D. course is designed to investigate organizational behavior research topics at the individual level of analysis.

MGT 7106. Group Dynamics. 3 Credit Hours.
This Ph.D. course provides a fundamental understanding of group processes in organizations by analyzing and critiquing classic and contemporary theories and research on groups.

MGT 7107. Organizational Theory. 3 Credit Hours.
This Ph.D. course provides a review of contemporary organizational theories, and empirical studies of them to provide a framework to understand organizational structures, environments, and goals.

MGT 7305. Marketing Mgt & Strategy. 3 Credit Hours.
This Ph.D. course provides a survey of research and theory in the marketing management and strategy literature.

MGT 7306. Buyer Behavior. 3 Credit Hours.
Doctoral course in consumer behavior. Provides an introduction to the major theories in consumer behavior and discusses current research and methodology on theory development.

MGT 7308. Theory Construction. 3 Credit Hours.
Provides an understanding of key elements of a theory, and how influential theories are developed; a small part surveys topics in philosophy of science. Credit not allowed for both MGT 7308 and MGT 7307.

MGT 7320. Marketing Science. 3 Credit Hours.
This doctoral course addresses the literature on the state-of-the-art research on quantitative approaches to marketing problems.

MGT 7350. Operations Strategy I. 3 Credit Hours.
This Ph.D. seminar will discuss research papers dealing with strategic issues in operations management.

MGT 7352. Operation Plan & Ctrl I. 3 Credit Hours.
This doctoral seminar will discuss research papers dealing with tactical and operational (planning and control) issues in operations management.

MGT 7353. Operation Plan & Ctrl II. 3 Credit Hours.
This doctoral seminar is a continuation of MGT 7352 and will discuss advanced papers dealing with tactical and operational (planning and control) issues in operations management.

MGT 7354. Research Meth-Oper Mgt. 3 Credit Hours.
This doctoral seminar will discuss papers dealing with research methods in operations management.

MGT 7400. PhD Strat Mgt Research I. 3 Credit Hours.
Ph.D.-level research seminar in strategic management.

MGT 7501. Mgm Econometric Models. 3 Credit Hours.
The linear regression model in managerial research: topics include ordinary and generalized least squares, panel data, instrumental variables, discrete choice and censored data.

MGT 8803. Special Topics in Mgt. 3 Credit Hours.
Topics of current interest in the field of management.

MGT 8811. Special Topics. 1 Credit Hour.
Topics of current interest.

MGT 8812. Special Topics. 2 Credit Hours.
Topics of current interest.

MGT 8813. Special Topics. 3 Credit Hours.
Topics of current interest.

MGT 8823. Special Topics in Mgt. 3 Credit Hours.
Topics of current interest in the field of management.

MGT 8853. Research Topic-Marketing. 3 Credit Hours.
Coverage of special research topics of current interest in marketing.

MGT 8873. Special Topics-Org Behav. 3 Credit Hours.
Special research topics of interest in organizational behavior.

MGT 8903. Special Prob-Management. 1-21 Credit Hours.
Provides project work experience in the field of management.

MGT 8997. Teaching Assistantship. 1-9 Credit Hours.
For graduate students holding graduate teaching assistantships.

MGT 8998. Research Assistantship. 1-9 Credit Hours.
For graduate students holding graduate research assistantships.

MGT 9000. Doctoral Thesis. 1-21 Credit Hours.
Management of Technology (MOT)

MOT 6102. Econ Analy For Managers. 2 Credit Hours.
Studies the economic concepts that describe and explain the environment within which firms operate.

MOT 6103. Fin & Managerial Account. 2 Credit Hours.
Covers the basic concepts that underlie the use of accounting information. Includes balance sheet, income statement, alternative costing systems.

MOT 6104. Financial Management. 2 Credit Hours.
Change. Course focuses on financial concepts and how they are used to maximize the value of the firm and choose among alternative courses of action.

MOT 6105. Analytical Tools. 2 Credit Hours.
This course focuses on statistics and mathematical modeling of use to decision makers in technology environments with significant uncertainty.

MOT 6106. Technological Innovation. 2 Credit Hours.
This course addresses the processes involved in technological innovation, focusing on models, sources, flows, and the protection of innovation.

MOT 6107. Tech Strategies-Info Sys. 2 Credit Hours.
This course examines information systems and their impact in manufacturing and service operations.

MOT 6109. Managing People. 2 Credit Hours.
This course focuses on the management and leadership of people and human resource systems in modern organizations.

MOT 6110. Tech & Transformation. 2 Credit Hours.
This course focuses on how work processes within organizations can be designed and managed to optimize output effectiveness.

MOT 6111. Org Transformation Meth. 2 Credit Hours.
This course introduces methods to adapt, evolve, or create change in the way organizations structure themselves to increase effectiveness in responding to competitive demands.

MOT 6112. Marketing-Tech Environ. 2 Credit Hours.
This course focuses on the marketing function, its relationship to other functions within the firm, and its strategic significance to high-tech organizations.

MOT 6114. Seminar in MOT. 2 Credit Hours.
This seminar features senior executives from organizations that develop or use technology discussing current practices, policies, and issues.

MOT 6115. Technology Forecasting. 2 Credit Hours.
This course examines key emerging technologies, their development patterns, and the associated impact on industries, industrial competitiveness, and society.

MOT 6116. Strategy In Mot. 2 Credit Hours.
This course examines and discusses how technology-based firms develop and implement business, functional, and technology strategies.

MOT 6122. Mot Project III. 2 Credit Hours.
Participants complete their MOT project research, submit a written report, and present their results to their organization.

MOT 6124. Bus & Leadership Skills. 3 Credit Hours.
Participant’s technological, business, and leadership skills (communications, teamwork, conflict resolution, diversity) are enhanced.

MOT 6125. Creating Tech Ventures. 3 Credit Hours.
This course covers the issues associated with the earliest stages of new technology venture formation.

MOT 6126. Int’l Issues in MOT. 4 Credit Hours.
Global business issues and strategies are explored through an international study tour.

MOT 6127. Building Tech Ventures. 2 Credit Hours.
The focus of this course is on learning how to manage rapid growth in a technology venture.

MOT 6128. Venture Financing. 2 Credit Hours.
In this course students learn various methods for raising capital to fund new ventures.

MOT 6129. Int’l Business & Finance. 2 Credit Hours.
The purpose of this course is to develop students’ understanding of global business and finance.

MOT 6130. MOT Project I. 3 Credit Hours.
Participant’s develop and present a proposal for a technology-based team venture project.

MOT 6131. MOT Project II. 3 Credit Hours.
Participants’ execute their MOT venture project, including marketing and financial analyses.

MOT 6132. MOT Project I. 2 Credit Hours.
First in a sequence of three courses where students execute their new venture project. During this segment, they focus on concept definition and team formation.

MOT 6133. Ethical Decision Making. 1 Credit Hour.
This course focuses on understanding and applying ethical decision making practices in business.

MOT 6134. MOT Project II. 2 Credit Hours.
Second in a sequence of three courses where students execute their new venture project. During this segment, they focus on marketing and financial analyses of their new technology venture.

Manufacturing Leadership (MLDR)

MLDR 6701. Found Forest Bioproducts. 3 Credit Hours.
The course provides comprehensive foundational knowledge of the industry enabling the student to understand the role of diverse manufacturing operations and to strategically plan improvements. Cross-listed with CHBE 6701, CHBE 6741, ME 6741, CHEM 6741, M641, CHBE 6742, ME 6742, CHEM 6742, and MSE 6742.

MLDR 6800. Manuf Leadership Capstone. 3 Credit Hours.
Teams work to complete a capstone project provided at the beginning of the semester. Successful completion requires integration of the business, leadership and manufacturing courses.

MLDR 8803. Special Topics. 3 Credit Hours.
Special Topics in Manufacturing Leadership.

MLDR 8813. Special Topics. 3 Credit Hours.
Special Topics in Manufacturing Leadership.

MLDR 8823. Special Topics. 3 Credit Hours.
Special Topics in Manufacturing Leadership.

MLDR 8843. Special Topics. 3 Credit Hours.
Special Topics in Manufacturing Leadership.

Materials Science & Engr (MSE)

MSE 1111. Introduction to MSE. 1 Credit Hour.
A general introduction to the field of Materials Science and Engineering and the MSE curriculum at Georgia Tech.
MSE 1750. Intro to Bioengineering. 3 Credit Hours.
An introduction to the field of bioengineering, including the application of engineering principles and methods to problems in biology and medicine, the integration of engineering with biology, and the emerging industrial opportunities. Crosslisted with AE, BMED, CHE, ECE, and ME 1750.

MSE 1801. Special Topics. 1 Credit Hour.
Topics of current interest not covered in other courses.

MSE 1802. Special Topics. 2 Credit Hours.
Topics of current interest not covered in other courses.

MSE 1803. Special Topics. 3 Credit Hours.
Topics of current interest not covered in other courses.

MSE 1XXX. Mate Sci Engr Elective. 1-21 Credit Hours.

MSE 2001. Prin&Appl-Engr Materials. 3 Credit Hours.
The structure-property-processing-performance relationships of engineering materials are described. Materials selection is treated as a part of engineering design.

MSE 2021. Mats Characterization. 4 Credit Hours.
The fundamentals of basic microstructural and compositional materials characterization techniques are presented with an emphasis on tools using electromagnetic radiation and electrons as stimuli.

MSE 2698. Research Assistantship. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

MSE 2699. Undergraduate Research. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

MSE 2801. Special Topics. 1 Credit Hour.
Topics of current interest not covered in other courses.

MSE 2802. Special Topics. 2 Credit Hours.
Topics of current interest not covered in other courses.

MSE 2803. Special Topics. 3 Credit Hours.
Topics of current interest not covered in other courses.

MSE 2XX. Mate Sci Engr Elective. 1-21 Credit Hours.

MSE 3001. Chemical Thermo-Material. 3 Credit Hours.
Principles and applications of thermodynamics to materials science and engineering. Phase equilibria and the concepts necessary to interpret phase diagrams.

MSE 3002. Strct Trans-Met,Cer&Poly. 3 Credit Hours.
Principles that govern the important structural transformations that occur in engineering materials.

MSE 3005. Mech Behavior-Materials. 3 Credit Hours.
The correlation of mechanical properties with atomic bonding, microstructure, and micromechanics, for applications relevant to materials selection and design, mechanical forming, and failure of materials.

MSE 3012. Thermal&Transport Props. 3 Credit Hours.
The thermophysical and transport properties of solids and fluids, i.e. heat capacity, expansion, viscosity, conduction, convection, and radiation are discussed, along with thermal analysis instrumentation.

MSE 3015. Elec,Optical&Magnet Prop. 3 Credit Hours.
Introduction to quantum mechanics and the band theory of solids to describe semiconducting, superconducting, dielectric, optical, and magnetic properties of nano- and micro-structured materials.

MSE 3021. Materials Laboratory I. 2 Credit Hours.
Characterization of engineering properties of materials through hands-on experiments. Instruction on basic laboratory skills, safety, statistical analysis of data, use of laboratory notebooks and technical report writing.

MSE 3025. Stats&Numerical Methods. 3 Credit Hours.
Concepts of computational modeling and statistics, with examples based on materials science and engineering applications.

MSE 3210. Transport Phenomena. 3 Credit Hours.
An introduction to transport emphasizing applications to materials. Credit not allowed for both MSE 3210 and PTFE 3210.

MSE 3220. Operations & Mgt Methods. 3 Credit Hours.
Principles and applications of production and operations management to the manufacturing enterprise, including process flow analysis, production planning and scheduling, optimization, quality management and facilities planning. Restricted to MSE majors. Credit not allowed for both MSE 3220 and PTFE 3220.

MSE 3225. Rheology. 3 Credit Hours.
Introduction to non-Newtonian fluid mechanics and rheology.

MSE 3230. Polymer & Fiber Process. 3 Credit Hours.
Discussion of the principles of fiber formation from polymers including rheology, mechanics, energetics, phase transition, and polymer structure. High-performing fiber processing, and plastics processing. Credit not allowed for both MSE 3230 and PTFE 3230.

MSE 3720. Intro Poly/Fib Enterpris. 3 Credit Hours.
Approaches the manufacture of engineered fibrous structures from a manager’s viewpoint and gives a working knowledge and understanding of various processes used in producing polymers/fibers/fiber products. Restricted to non-MSE majors. Credit not allowed for both MSE 3720 and PTFE 3720.

MSE 3801. Special Topics. 1 Credit Hour.
Topics of current interest not covered in other courses.

MSE 3802. Special Topics. 2 Credit Hours.
Topics of current interest not covered in other courses.

MSE 3803. Special Topics. 3 Credit Hours.
Topics of current interest not covered in other courses.

MSE 3XXX. Mate Sci Engr Elective. 1-21 Credit Hours.

MSE 4002. Cer Mate-Prop,Proces&App. 3 Credit Hours.
Properties, processing, and applications of the industrially and technically important ceramic materials. Traditional and oxide ceramics in addition to glass and nonoxide ceramics.

MSE 4004. Materials-Electronic App. 3 Credit Hours.
Basics of photolithography, screen printing, and tape casting. Requirements for fuel cells, magnetic nanocomposites, flat-panel displays, gas sensors, piezoelectric actuators, photonic crystals, etc.

MSE 4006. Process&Apps-Eng Alloys. 3 Credit Hours.
Solidification, deformation, and powder processing of metals and alloy-, microstructural design at nano- and meso-length scales; and structure-property correlations.

MSE 4010. Environ Degradation. 3 Credit Hours.
Theory of environmental degradation of metals, ceramics, polymers, and biomaterials. Emphasis on the scientific principles of corrosion and physical degradation.
MSE 4022. Materials Laboratory II. 2 Credit Hours.
Processing, structure, properties relationships are explored through a series of hands-on experiments. Instruction on basic laboratory skills, safety, statistical analysis of data, use of laboratory notebooks and technical report writing.

MSE 4025. Fiber Product Mfg. 3 Credit Hours.
The manufacture of fiber products and their process-structure-property relationships are detailed, covering fibers, yarns, fabrics, nonwovens, carpets, composites, and related materials.

MSE 4026. Product Test Evaluation. 3 Credit Hours.
Properties influencing the end use performance of fiber and polymer products including that of plastic materials will be tested using standard ASTM, AATC and federal test methods. Standard statistical tools will be used to analyze and interpret the test data.

MSE 4100. Chem Appl Fiber Material. 2 Credit Hours.
The chemical, thermal, and mechanical processes used in the preparation, coloration, printing and finishing of polymeric fiber materials are explored. Credit not allowed for both MSE 4100 and PTFE 4100.

MSE 4122. Fiber Chemistry Lab. 1 Credit Hour.
Laboratory course in preparation, coloration and finishing of fiber materials. Credit not allowed for both MSE 4122 and PTFE 4122.

MSE 4140. Polymer Physics. 3 Credit Hours.
Physical chemistry of polymer solutions, polymer miscibility, adsorptions, sorptions, plasticization, molecular weights, molecular weight distributions. Study of polymer surfaces. Credit not allowed for both MSE 4140 and PTFE 4140.

MSE 4230. Industrial Ctrls In MFG. 3 Credit Hours.
Introduction to industrial controls in manufacturing, process modeling, control of continuous-variable processes, digital control, discrete control, and control of manufacturing systems.

MSE 4315. Nondestructive Eval. 3 Credit Hours.
Principles and theory of industrial nondestructive evaluation methods are covered. Emphasis is on testing the soundness and reliability of primary and secondary engineering structures.

MSE 4320. Electronic Pkg & Design. 3 Credit Hours.
Electronic packaging design, covering properties of materials, fabrication and assembly processes, thermal-chemical considerations, practical concerns regarding interconnection and processing issues, and reliability assessment.

MSE 4325. Thin Film Materials Sci. 3 Credit Hours.
Introduction to principal vapor deposition processes and vacuum technology. The fundamentals of the formation, characterization, and properties of inorganic nano- to micro-scale thin films.

MSE 4330. Fund Nanomats&Nanostrucs. 3 Credit Hours.
Introduction to nanotechnology. Description of various nanomaterials, their applications and synthesis methods.

MSE 4335. Soft Nano Bio Materials. 3 Credit Hours.
Introduction soft nanomaterials and nanostructures that have been discovered and synthesized for prospective applications in nanotechnology.

MSE 4410. Capstone Engr Design I. 3 Credit Hours.
A capstone engineering design course covering the principles of concurrent product/process design and development. Team-based projects will explore product/process design and development. Credit not allowed for both MSE 4410 and PTFE 4110.

MSE 4420. Capstone Engr Design II. 3 Credit Hours.
A team problem-solving approach is used to work on a project developed in cooperation with industry. Weekly communications, both oral and written, are required. Credit not allowed for both MSE 4420 and PTFE 4210.

MSE 4698. Research Assistantship. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

MSE 4699. Undergraduate Research. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

MSE 4740. Bio-Inspired Design. 3 Credit Hours.
We examine evolutionary adaptation as a source for engineering design inspiration, utilizing principles of scaling, adaptability, and robust multifunctionality that characterize biological systems. Credit not allowed for both MSE 4740 and (BIOL 4740 or PTFE 4740 or ISYE 4740 or ME 4740).

MSE 4751. Intro to Biomaterials. 3 Credit Hours.
Introduction to different classes of biomaterials (polymers, metals, ceramics) and physiological responses to biomaterial implantation. Topics include material properties, host response, and biomaterial characterization techniques. Crosslisted with BME 4751.

MSE 4754. Elec Packaging Assembly. 3 Credit Hours.
The course provides hands-on instruction in electronics packaging, including assembly, reliability, thermal management, and test of next-generation microsystems. Crosslisted with ECE and ME 4754.

MSE 4755. Packaging Substrate Fab. 3 Credit Hours.
This course provides students with hands-on instruction in basic SOP concepts and techniques, including interconnect design, substrate material selection and properties, photodielectric deposition, via formation and photolithography, copper metallization, and finally, substrate testing. Laboratory instructions are augmented by an interactive multimedia educational presentation that makes the course work material remotely accessible via the internet.

MSE 4759. Electrochem Storage. 3 Credit Hours.
An elective class for senior-level students interested in electrochemical storage and conversion, including the fundamentals of electrochemistry and practical battery and fuel cells. Cross-listed with ChBE and ME 4759.

MSE 4761. Industrial Ctrls & Mfg. 3 Credit Hours.
Students are introduced to industrial controls and the fundamentals of manufacturing with hands-on experience based on lab projects using industry software and hardware for communications and control. Credit not allowed for both MSE 4761 and PTFE 4761.

MSE 4766. Nanoscale Devices. 3 Credit Hours.
Fundamental properties at the nanoscale for photonics and sensors. Nanoscale fabrication methods including thin films, ion beam, lithography, electroplating, and example case studies in NEMS/MEMS and photonics. Credit not allowed for both MSE 4766 and ME 4766.

MSE 4775. Polymer Science & Engr I. 3 Credit Hours.
An introduction to the chemistry, structure, and formation of polymers, physical states and transitions, physical and mechanical properties of polymer fluids and solids. Crosslisted with CHE, CHEM, ME, and PTFE 4775.
MSE 4776. Polymer Science& Engr II. 3 Credit Hours.
Polymer fabrication processes and methods of characterization and identification of polymers are presented. Experiments in polymerization, processing, and property evaluation of polymers. Crosslisted with CHE, CHEM, ME, and TFE 4776.

MSE 4790. Materials Select& Design. 3 Credit Hours.
Principles of selecting materials and processes for engineering applications. Methodologies for designing new materials and conceiving hybrid solutions. Credit not allowed for both MSE 4790 and ME 4213 (or ME 4790).

MSE 4791. Mech Behavior-Composites. 3 Credit Hours.
Introduction to properties and structures of common matrix and reinforcing materials, mechanics of fiber-reinforced composites, lamina and laminate analysis, and mechanical performance. Crosslisted with AE, CEE, CHE, ME, and TFE 4791.

MSE 4793. Composite Mater& Process. 3 Credit Hours.
Basic principles of selecting component materials and manufacturing composites are presented. Polymeric, metallic, and ceramic systems are considered. Crosslisted with AE, CEE, CHE, ME, and TFE 4793.

MSE 4794. Composite Materials&Mfg. 4 Credit Hours.
Basic principles of selection and design of composite materials and their manufacturing and testing. Cost factors. Laboratory exercises on manufacturing and tests. Crosslisted with AE, CEE, CHE, ME, and TFE 4794.

MSE 4795. Nuclear Reactor Materials. 3 Credit Hours.
Introduction to fundamentals of nuclear reactor materials. Topics covered are basics of radiation damage, defect creation and evolution, microstructure-property correlations in cladding and fuel of nuclear materials.

MSE 4801. Special Topics. 1 Credit Hour.

MSE 4802. Special Topics. 2 Credit Hours.

MSE 4803. Special Topics. 3 Credit Hours.

MSE 4901. Special Problems. 1-21 Credit Hours.

MSE 4902. Special Problems. 1-21 Credit Hours.

MSE 4XXX. Mate Sci Engr Elective. 1-21 Credit Hours.

MSE 6001. Written & Visual Comm. 2 Credit Hours.
Writing and editing engineering documents; designing and explaining visuals; creating electronic presentations. May not be used for duplicate credit with MSE 6754.

MSE 6010. Functional Materials. 3 Credit Hours.
This course focuses on the effects of defects on physical properties; charge/mass transport; semiconductors, heterojunctions, electrical and magnetic polarization, interaction processes between various physical properties; electrical characterization techniques.

MSE 6105. Diffraction Studies. 3 Credit Hours.
Principles and theory of crystallography and diffraction analysis of materials are covered, emphasizing X-ray diffraction, including electron diffraction and diffraction-based imaging. Reciprocal lattice concepts are emphasized.

MSE 6110. Trans Electron Microscop. 3 Credit Hours.
Introduction to the kinematical electron scattering theory, optics in TEM, diffraction contrast imaging of defects, dynamical electron diffraction effects; and chemical microanalysis using EDS.

MSE 6120. Quant Charact-Microstruc. 3 Credit Hours.
Application of statistically unbiased methods for estimating geometrical attributes of microstructures and nonplanar fracture surfaces from plane sections and projections, digital image analysis, and computer simulations of microstructures.

MSE 6130. Surface Analysis. 3 Credit Hours.
Introduction to vacuum science and technology; structure of solid surfaces; electron and ion energy analyzers, electron spectroscopies (e.g., AES and XPS); ion-based techniques (e.g., SIMS and RBS); depth profiling; ion channeling.

MSE 6210. Defects. 3 Credit Hours.
Emphasis on the origin and character of point, line, and surface defects in crystalline materials and their influence on mechanical, chemical, magnetic, optical, and electronic properties.

MSE 6310. Thermo&Kinetic-Transform. 3 Credit Hours.
Classical thermodynamics and phase equilibria with applications to chemical reactions, control of phase transformations via reduction of chemical-free energy, strain energy, and interfacial energy.

MSE 6401. Thermodynamics of Matls. 3 Credit Hours.
To examine the principles of thermodynamics as applied to equilibria associated with solutions, mixtures, chemical reactions, and interfaces in materials.

MSE 6402. Cryo Struct and Defects. 3 Credit Hours.
Provides students with a fundamental understanding of crystal structures, symmetry, origin, character, defects in crystalline materials, and the influence of these defects on different properties.

MSE 6403. Kinetics of Phase Trans. 3 Credit Hours.
To introduce the fundamentals of thermodynamics and mathematics to the kinetics of diffusional and non-diffusional phase transformation in engineering materials.

MSE 6404. Scattering Theory. 3 Credit Hours.
A general introduction to the scattering/diffraction of electromagnetic radiation from solids. The kinematical formalism is developed emphasizing x-ray scattering as a characterization tool.

MSE 6405. Advanced Nanomaterials. 3 Credit Hours.
Topics include the synthesis and growth processes controlling quantum dot formation, nanowires, and three-dimensional self-assembled nanostructures. Additional characterization techniques and emerging applications are presented.

MSE 6406. Corrosion of Materials. 4 Credit Hours.
To introduce students to the basic kinetic mechanisms associated with the interactions of materials with liquids and gases.

MSE 6407. Biological Properties. 3 Credit Hours.
Addresses structure-property relationship of cellular components.

MSE 6411. Thermodynamics Of Materi. 3 Credit Hours.
This course introduces structural features of materials, including point/space groups, representative crystal structures, quasi-crystals, amorphous and rubbery state, liquid crystals, colloids, solutions, and effect of symmetry on properties.

MSE 6412. Structure of Materials. 3 Credit Hours.
This course introduces structural features of materials, including point/space groups, representative crystal structures, quasi-crystals, amorphous and rubbery state, liquid crystals, colloids, solutions, and effect of symmetry on properties.
MSE 6500. Thermo of Materials. 2 Credit Hours.
To examine the principles of thermodynamics as applied to equilibria associated with solutions, mixtures, chemical reactions, and interfaces in materials.

MSE 6501. Phase Equilibria. 1 Credit Hour.
The object of this course is to review the concepts of phase equilibria in ceramic and metallic systems and develop the methodology to calculate phase diagrams in these systems.

MSE 6502. Thermo Analysis. 1 Credit Hour.
To examine the principles of thermodynamics as applied to equilibria associated with mixtures and solutions.

MSE 6510. Polymer-Elec&Photo App I. 3 Credit Hours.
Review of fundamentals and principles of polymers used in electronics and photonics; relationships between the advances of semiconductor technology and the importance of polymers and their applications.

MSE 6500. Adv Polymer Processing. 3 Credit Hours.
Common polymer processing techniques and recent advancement; Modeling of polymer processing focusing on how to build a sound model; Computer aided engineering for polymer processing.

MSE 6600. Adv Polymer Processing. 3 Credit Hours.
Introduction to tensor analysis and mathematical techniques for solving problems encountered in materials physics, processing and characterization, particularly involving polymeric fluids and solids.

MSE 6601. Nanocomposites. 3 Credit Hours.

MSE 6602. Tensor Anal & Math Tech. 3 Credit Hours.
Introduction to tensor analysis and mathematical techniques for studying phase transformations in both human-made and natural polymers, including preparation and degradative reactions of polymer systems.

MSE 6750. Theoretical Chem-Polymer. 3 Credit Hours.
Thermodynamics and microscopic dynamics of polymers. Fundamental concepts, including scaling concepts, governing anisotropy of polarizability, phase transitions, morphology, time-dependent correlations, etc. are discussed. Crosslisted with CHEM and PTFE 6755.

MSE 6759. Mate-Envir Conscious Dgn. 3 Credit Hours.
Covers the environmental impact of materials choices and quantitative measure of life-cycle assessment and environmental burden. The Natural Step philosophy will be used as a model for the overall approach. Crosslisted with ME and PTFE 6759.

MSE 6754. Engr Communication. 3 Credit Hours.
Writing and editing engineering documents; designing and explaining visuals; creating and delivering electronic presentations. Crosslisted with CEE 6754.

MSE 6755. Materials Science & Engr (MSE) 2 Credit Hours.
To examine the principles of thermodynamics as applied to equilibria associated with solutions, mixtures, chemical reactions, and interfaces in materials.

MSE 6751. Phys Chem-Poly Solutions. 3 Credit Hours.
Study of polymer solutions, polymer miscibility, adsorption, sorptions, plasticization, molecular weights, molecular weight distribution, and interfacial phenomena using thermodynamics and statistical mechanics. Crosslisted with CHEM, CHE, and PTFE 6751.

MSE 6510. Polymer-Elec&Photo App I. 3 Credit Hours.
This course introduces the student to surface, near-surface and structural methods of polymer characterization. Specialized techniques critical to physical structure are emphasized. Crosslisted with CHEM, CHE, and PTFE 6752.
MSE 7140. Impedance & Dielec Spectro. 3 Credit Hours.
The basic theory of how current, voltage, and phase angle measurements over a wide frequency range (typically mHz-MHz) can provide information about microstructural features at all length scales.

MSE 7210. Dislocat & Deform Mechanic. 3 Credit Hours.
Emphasis on interactions of dislocations with other defects, dislocation dynamics, and their correlation with mechanical properties under different rates of loading.

MSE 7420. Solidification Process. 3 Credit Hours.
Fundamentals of thermodynamics, kinetics, mass transport, and physical materials are applied to the development of microstructure during solidification.

MSE 7510. Polym - Elec & Photo App II. 3 Credit Hours.
Review of fundamentals and principles of polymers used in electronics and photonics. The relationship between the recent advances of semiconductor technology and the importance of polymers will be discussed.

MSE 7757. Teaching Practicum. 3 Credit Hours.
Students will learn about what it takes to be a faculty through sills needed for "delivery of lecture" via the practice of teaching.

MSE 7771. Mech-Polymer Solid & Fluid. 3 Credit Hours.
Continuum mechanics of solids and fluids; mechanics of deformation of anisotropic polymers; yield, breaking and fatigue; non-Newtonian viscous and viscoelastic behavior of polymer fluids. Crosslisted with CHE, ME and PTFE 7771.

MSE 7772. Fund-Fracture Mechanics. 3 Credit Hours.
Advanced study of failure of structural materials under load, mechanics of fracture, and microscopic and macroscopic aspects of the fracture of engineering materials. Crosslisted with AE, CEE, CHE, and ME 7772.

MSE 7773. Adv Fracture Mechanics. 3 Credit Hours.
Nonlinear fracture mechanics including elastic-plastic and time-dependent fracture, advanced test methods, J-integral theory, and extensions. Crosslisted with AE, CEE, CHE, and ME 7773.

MSE 7774. Fatigue-Materials & Struct. 3 Credit Hours.
Mechanical and microstructural aspects of nucleation and growth of cracks under cyclic loading conditions, notch effects, cumulative damage, multiaxial loading, and fatigue crack propagation. Crosslisted with AE, CEE, CHE, and ME 7774.

MSE 7775. Fract & Fatigue-Structures. 3 Credit Hours.

MSE 7791. Damage & Fail - Composites. 3 Credit Hours.

MSE 7792. Mechanics of Composites. 3 Credit Hours.
Anisotropic elasticity, hygrothermal behavior, stress analysis of laminated composites including 3-D effects, stress concentrations, free-edge effects, thick laminates, adhesive and mechanical connections, fracture of composites. Crosslisted with AE, CHE, CEE, ME, and PTFE 7792.

MSE 7793. Manufacture-Composites. 3 Credit Hours.
Major manufacturing techniques for metal, ceramic, and polymer composites. Modeling of processes with emphasis on fundamental mechanisms and effects. Crosslisted with AE, CHE, CEE, ME, and PTFE 7793.

MSE 8001. Seminar. 1 Credit Hour.
The latest advances in research and development will be presented by the enrolled students from articles in recent issues of recognized periodicals.

MSE 8200. Adv Presentation Skills. 1 Credit Hour.
Designing and explaining visuals; creating and delivering scientific electronic presentations; learning to speak and present to a variety of audiences.

MATH 0999. GT-PKU. 12 Credit Hours.
For GT-PKU students during terms when they are not taking other GT courses. Placeholder course.

MATH 0399. Support for Precalculus. 2 Credit Hours.
Practicum for Learning Support students enrolled in MATH 1113 (Precalculus).

MATH 0999. Support for MATH 1111. 2 Credit Hours.
This Learning Support course provides corequisite support in mathematics for students enrolled in MATH 1111. Topics will parallel topics being studied in MATH 1111 and the essential quantitative skills needed to be successful.

MATH 1111. College Algebra. 4 Credit Hours.
Analytic geometry, the function concept, polynomials, exponential logarithms, the theory of equations.

MATH 1113. Precalculus. 4 Credit Hours.
Analytic geometry, the function concept, polynomials, exponential logarithms, trigonometric functions, mathematical induction, and the theory of equations. May only be used for degree credit with departmental approval.
MATH 11X3. Transfer Precalculus. 3 Credit Hours.

MATH 1501. Calculus I. 4 Credit Hours.
Differential calculus and basic integral calculus including the fundamental theorem of calculus. Credit not allowed for both MATH 1501 and 1512.

MATH 1502. Calculus II. 4 Credit Hours.
This course concludes the treatment of single variable calculus and begins linear algebra, the linear basis of the multivariable theory. Credit not allowed for both MATH 1502 and MATH 1522. Credit not allowed for both MATH 1502 and MATH 15X2.

MATH 1503. Calculus I For Life Sci. 4 Credit Hours.
Differential and basic calculus: sequences, difference equations, limits, continuity, differentiation, integration, applications. The topics parallel those of MATH 1501 with applications from life sciences.

MATH 1504. Calculus II For Life Sci. 4 Credit Hours.
Taylor approximations, introduction to differential equations, linear algebra, and introduction to multivariable calculus. Motivating examples drawn from life sciences.

MATH 1511. Honors Calculus I. 4 Credit Hours.
The topics covered parallel those of 1501 with a somewhat more intensive and rigorous treatment. Credit not allowed for both honors calculus and the corresponding regular calculus course.

MATH 1512. Honors Calculus II. 4 Credit Hours.
The topics covered parallel those of 1502 with a somewhat more intensive and rigorous treatment. Credit not allowed for both honors calculus and the corresponding regular calculus course. Credit not allowed for both MATH 1512 and MATH 1522. Credit not allowed for both MATH 1512 and MATH 15X2.

MATH 1522. Linear Algebra for Calc. 2 Credit Hours.
Basic topics in linear algebra, such as covered in MATH 1502, and needed for MATH 2401. May not be taken for credit by students who have taken MATH 1502 or MATH 1512.

MATH 1550. Intro to Diff Calculus. 3 Credit Hours.
An introduction to differential calculus including applications and the underlying theory of limits for functions and sequences. Credit not awarded for both MATH 1550 and MATH 1501, MATH 1551, or MATH 1503.

MATH 1551. Differential Calculus. 2 Credit Hours.
Differential calculus including applications and the underlying theory of limits for functions and sequences. Credit not awarded for both MATH 1551 and MATH 1501, MATH 1503, or MATH 1550.

MATH 1552. Integral Calculus. 4 Credit Hours.
Integral calculus: Definite and indefinite integrals, techniques of integration, improper integrals, infinite series, applications. Credit not awarded for both MATH 1552 and MATH 1502, MATH 1504, MATH 1512 or MATH 1555.

MATH 1553. Intro to Linear Algebra. 2 Credit Hours.
An introduction to linear algebra including eigenvalues and eigenvectors, applications to linear systems, least squares. Credit not awarded for both MATH 1553 and MATH 1522, MATH 1502, MATH 1504, MATH 1512, MATH 1554 or MATH 1564.

MATH 1554. Linear Algebra. 4 Credit Hours.
Linear algebra eigenvalues, eigenvectors, applications to linear systems, least squares, diagonalization, quadratic forms.
MATH 2413. Honors Diff Equations. 4 Credit Hours.
The course treats the theory of ordinary differential equations from an advanced perspective, delving into the theory as well as computational aspects. It is designed for mathematics majors, and others who wish to take advanced courses in the area.

MATH 24X1. Transfer Calculus III. 3 Credit Hours.
MATH 24X3. Transfer Diff Equations. 3 Credit Hours.

MATH 2550. Intro Multivariable Calc. 2 Credit Hours.
Vectors in three dimensions, curves in space, functions of several variables, partial derivatives, optimization, integration of functions of several variables. Vector Calculus not covered. Credit will not be awarded for both MATH 2550 and MATH 2605 or MATH 2401 or MATH 2551 or MATH 1555.

MATH 2551. Multivariable Calculus. 4 Credit Hours.
Multivariable calculus: Linear approximation and Taylor's theorems, Lagrange multiplies and constrained optimization, multiple integration and vector analysis including the theorems of Green, Gauss, and Stokes. Credit will not be awarded for both MATH 2551 and MATH 2401 or MATH 2411 or MATH 2561.

MATH 2552. Differential Equations. 4 Credit Hours.
Methods for obtaining numerical and analytic solutions of elementary differential equations. Applications are also discussed with an emphasis on modeling. Credit not awarded for both MATH 2552 and MATH 2403 or MATH 2413 or MATH 2562.

MATH 2561. Honors Multivar Calculus. 4 Credit Hours.
The topics covered parallel those of MATH 2551 with a somewhat more intensive and rigorous treatment. Credit not awarded for both MATH 2561 and MATH 2401 or MATH 2411 or MATH 2551.

MATH 2562. Honors Diff Equations. 4 Credit Hours.
The topics covered parallel those of MATH 2552 with a somewhat more intensive and rigorous treatment.

MATH 2602. Linear and Discrete Math. 4 Credit Hours.
Topics in linear algebra, sequences, differences, finite sums and difference equations, multivariate optimization with an emphasis in discrete and recursive methods.

MATH 2603. Intro Discrete Math. 4 Credit Hours.
Mathematical logic and proof, mathematical induction, counting methods, recurrence relations, algorithms and complexity, graph theory and graph algorithms. Credit not awarded for both MATH 2603 and MATH 2602.

MATH 2605. Calc III for Comput Sci. 4 Credit Hours.
Topics in linear algebra and multivariate calculus and their applications in optimization and numerical methods, including curve fitting, interpolation, and numerical differentiation and integration.

MATH 2698. Research Assistantship. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

MATH 2699. Undergraduate Research. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

MATH 26X2. Transfer Linear & Disc Math. 3 Credit Hours.
MATH 26X3. Transfer Discrete Math. 3 Credit Hours.

MATH 2801. Special Topics. 1 Credit Hour.
Courses on special topics of current interest in mathematics.

MATH 2802. Special Topics. 2 Credit Hours.
Courses on special topics of current interest in mathematics.

MATH 2803. Special Topics. 3 Credit Hours.
Courses on special topics of current interest in mathematics.

MATH 2804. Special Topics. 4 Credit Hours.
Courses on special topics of current interest in mathematics.

MATH 2805. Special Topics. 5 Credit Hours.
Courses on special topics of current interest in mathematics.

MATH 2X51. Transfer Multivariable Calc. 3,4 Credit Hours.
MATH 2X52. Transfer Differential Equation. 3,4 Credit Hours.

MATH 2XXX. Mathematics Elective. 1-21 Credit Hours.

MATH 3012. Applied Combinatorics. 3 Credit Hours.
Elementary combinatorial techniques used in discrete problem solving: counting methods, solving linear recurrences, graph and network models, related algorithms, and combinatorial designs.

MATH 3022. Honors App Combinatorics. 3 Credit Hours.
The topics covered parallel those of MATH 3012 with a more rigorous and intensive treatment. Credit is not allowed for both MATH 3012 and 3022.

MATH 3215. Probability & Statistics. 3 Credit Hours.
This course is a problem-oriented introduction to the basic concepts of probability and statistics, providing a foundation for applications and further study.

MATH 3225. Honors Prob & Statistics. 3 Credit Hours.
The topics covered parallel those of MATH 3215, with a more rigorous and intensive treatment. Credit is not allowed for both MATH 3215 and 3225.

MATH 3235. Probability Theory. 3 Credit Hours.
This course is a mathematical introduction to probability theory, covering random variables, moments, multivariable distributions, law of large numbers, central limit theorem, and large deviations. Credit not awarded for both MATH 3235 and MATH 3215 or 3225 or 3670.

MATH 3236. Statistical Theory. 3 Credit Hours.
An introduction to theoretical statistics for students with a background in probability. A mathematical formalism for inference on experimental data will be developed. Credit not awarded for both MATH 3236 and MATH 3215 or 3225 or 3670.

MATH 3406. Second Course Linear Alg. 3 Credit Hours.
This course will cover important topics in linear algebra not usually discussed in a first-semester course, featuring a mixture of theory and applications.

MATH 3670. Statistics and Applns. 3 Credit Hours.
Introduction to probability, probability distributions, point estimation, confidence intervals, hypothesis testing, linear regression and analysis of variance. Students cannot receive credit for both MATH 3670 and MATH 3770 or ISYE 3770 or CEE 3770.

MATH 3801. Special Topics. 1 Credit Hour.
Courses on special topics of current interest in mathematics.

MATH 3802. Special Topics. 2 Credit Hours.
Courses on special topics of current interest in mathematics.

MATH 3803. Special Topics. 3 Credit Hours.
Courses on special topics of current interest in mathematics.

MATH 3804. Special Topics. 4 Credit Hours.
Courses on special topics of current interest in mathematics.

MATH 3805. Special Topics. 5 Credit Hours.
Courses on special topics of current interest in mathematics.
MATH 3XXX. Mathematics Elective. 1-21 Credit Hours.

MATH 4012. Coding Theory. 3 Credit Hours.
Introduction to linear error correcting codes with an emphasis on the algebraic tools required, including matrices vector spaces, groups, polynomial rings, and finite fields.

MATH 4022. Intro to Graph Theory. 3 Credit Hours.
The fundamentals of graph theory: trees, connectivity, Euler torus, Hamilton cycles, matchings, colorings, and Ramsey theory.

MATH 4032. Combinatorial Analysis. 3 Credit Hours.
Combinatorial problem-solving techniques including the use of generating functions, recurrence relations, Polya theory, combinatorial designs, Ramsey theory, matroids, and asymptotic analysis.

MATH 4080. Senior Project I. 2 Credit Hours.
The first of a two-course sequence of faculty-directed independent research culminating in the writing of a senior thesis and its presentation.

MATH 4090. Senior Project II. 2 Credit Hours.
The second course of a two-course sequence of faculty-directed independent research culminating in the writing of a senior thesis and its presentation.

MATH 4107. Abstract Algebra I. 3 Credit Hours.
This course develops in the theme of "Arithmetic congruence and abstract algebraic structures". Strong emphasis on theory and proofs.

MATH 4108. Abstract Algebra II. 3 Credit Hours.
Continuation of Abstract Algebra I, with emphasis on Galois theory, modules, polynomial fields, and the theory of linear associative algebra.

MATH 4150. Intro To Number Theory. 3 Credit Hours.
Primes and unique factorization, congruences, Chinese remainder theorem, Diophantine equations, Diophantine approximations, quadratic reciprocity. Applications such as fast multiplication, factorization, and encryption.

MATH 4221. Stochastic Processes I. 3 Credit Hours.
Simple random walk and the theory of discrete time Markov chains.

MATH 4222. Stochastic Processes II. 3 Credit Hours.
Renewal theory, Poisson processes and continuous time Markov processes, including an introduction to Brownian motion and martingales.

MATH 4255. Monte Carlo Methods. 3 Credit Hours.
Probability distributions, limit laws, and applications through the computer.

MATH 4261. Math Statistics I. 3 Credit Hours.
Sampling distributions, Normal, t, chi-square, and f distributions. Moment-generating function methods, Bayesian estimation, and introduction to hypothesis testing.

MATH 4262. Math Statistics II. 3 Credit Hours.
Hypothesis testing, likelihood ratio tests, nonparametric tests, bivariate and multivariate normal distributions.

MATH 4280. Information Theory. 3 Credit Hours.
The measurement and quantification of information. These ideas are applied to the probabilistic analysis of the transmission of information over a channel along which random distortion of the message occurs.

MATH 4305. Linear Algebra. 3 Credit Hours.
Finite dimensional vector spaces, inner product spaces, least squares, linear transformations, the spectral theorem for normal transformations. Applications to convex sets, positive matrices, difference equations.

MATH 4317. Analysis I. 3 Credit Hours.
Real numbers, topology of Euclidean spaces, Cauchy sequences, completeness, continuity and compactness, uniform continuity, series of functions, Fourier series.

MATH 4318. Analysis II. 3 Credit Hours.
Differentiation of functions of one real variable, Riemann-Stieltjes integral, the derivative in Rn, and integration in Rn.

MATH 4320. Complex Analysis. 3 Credit Hours.
Topics from complex function theory, including contour integration and conformal mapping.

MATH 4347. Partial Diff Eqns I. 3 Credit Hours.
Method of characteristics for first- and second-order partial differential equations, conservation laws and shocks, classification of second-order systems and applications.

MATH 4348. Partial Diff Eqns II. 3 Credit Hours.
Green's functions and fundamental solutions. Potential, diffusion, and wave equations.

MATH 4431. Introduction to Topology. 3 Credit Hours.
Point set topology, topological spaces and metric spaces, continuity and compactness, homotopy, and covering spaces.

MATH 4432. Algebraic Topology. 3 Credit Hours.
Introduction to algebraic methods in topology. Includes homotopy, the fundamental group, covering spaces, simplicial complexes. Applications to fixed point theory and group theory.

MATH 4441. Differential Geometry. 3 Credit Hours.
The theory of curves, surfaces, and more generally, manifolds. Curvature, parallel transport, covariant differentiation, Gauss-Bonet theorem.

MATH 4541. Dynamics&Bifurcations I. 3 Credit Hours.
A broad introduction to the local and global behavior of nonlinear dynamical systems arising from maps and ordinary differential equations.

MATH 4542. Dynamics&Bifurcations II. 3 Credit Hours.
A continuation of Dynamics and Bifurcations I.

MATH 4580. Linear Programming. 3 Credit Hours.
A study of linear programming problems, including the simplex method, duality, and sensitivity analysis with applications to matrix games, integer programming, and networks.

MATH 4581. Math Methods in Engr. 3 Credit Hours.
The Laplace transform and applications, Fourier series, boundary value problems in differential equations.

MATH 4640. Numerical Analysis I. 3 Credit Hours.
Introduction to numerical algorithms for some basic problems in computational mathematics. Discussion of both implementation issues and error analysis.

MATH 4641. Numerical Analysis II. 3 Credit Hours.
Introduction to the numerical solution of initial and boundary value problems in differential equations.

MATH 4698. Research Assistantship. 1-12 Credit Hours.
Undergraduate internship for academic credit.

MATH 4699. Undergraduate Research. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.
MATH 4755. Mathematical Biology. 3 Credit Hours.
Problems from the life sciences and the mathematical methods for solving them are presented. The underlying biological and mathematical principles and the interrelationships are emphasized. Crosslisted with BIOL 4755.

MATH 4777. Vector&Parallel Sci Comp. 3 Credit Hours.
Scientific computational algorithms on vector and parallel computers. Speed-up and algorithm complexity, interprocesses communication, synchronization, modern algorithms for linear systems, programming techniques, code optimization. Crosslisted with CS 4777.

MATH 4782. Quantum Info&Quant Comp. 3 Credit Hours.
Introduction to quantum computing and quantum information theory, formalism of quantum mechanics, quantum gates, algorithms, measurements, coding, and information. Physical realizations and experiments. Crosslisted with PHYS 4782.

MATH 4801. Special Topics. 1 Credit Hour.
Courses on special topics of current interest in mathematics.

MATH 4802. Special Topics. 2 Credit Hours.
Courses on special topics of current interest in mathematics.

MATH 4803. Special Topics. 3 Credit Hours.
Courses on special topics of current interest in mathematics.

MATH 4804. Special Topics. 4 Credit Hours.
Courses on special topics of current interest in mathematics.

MATH 4805. Special Topics. 5 Credit Hours.
Courses on special topics of current interest in mathematics.

MATH 4999. Special Problems. 1-21 Credit Hours.
Reading or research in topics of current interest.

MATH 4XXX. Mathematics Elective. 1-21 Credit Hours.

MATH 6001. Intro to Graduate Math. 2 Credit Hours.
This course covers practical information helping students start their careers as a professional mathematician. It also satisfies the Georgia Tech RCR requirements for "in-person" training.

MATH 6014. Graph Theory. 3 Credit Hours.
Fundamentals, connectivity, matchings, colorings, extremal problems, Ramsey theory, planar graphs, perfect graphs. Applications to operations research and the design of efficient algorithms.

MATH 6021. Topology-Euclidean Space. 3 Credit Hours.
Metric spaces, normed linear spaces, convexity, and separation; polyhedra and simplicial complexes; surfaces; Brouwer fixed point theorem.

MATH 6112. Advanced Linear Algebra. 3 Credit Hours.
An advanced course in Linear Algebra and applications.

MATH 6121. Algebra I. 3 Credit Hours.
Graduate-level linear and abstract algebra including groups, finite fields, classical matrix groups and bilinear forms, multilinear algebra, and matroids. First of two courses.

MATH 6122. Algebra II. 3 Credit Hours.
Graduate-level linear and abstract algebra including rings, fields, modules, some algebraic number theory and Galois theory. Second of two courses.

MATH 6221. Classical Probability. 3 Credit Hours.
Classical introduction to probability theory including expectation, notions of convergence, laws of large numbers, independence, large deviations, conditional expectation, martingales, and Markov chains.

MATH 6235. Stoch Process-Finance II. 3 Credit Hours.
Advanced mathematical modeling of financial markets, derivative securities pricing, and portfolio optimization. Concepts from advanced probability and mathematics are introduced as needed.

MATH 6241. Probability I. 3 Credit Hours.
Develops the probability basis requisite in modern statistical theories and stochastic processes. Topics of this course include measure and integration foundations of probability, distribution functions, convergence concepts, laws of large numbers, and central limit theory. First of two courses.

MATH 6242. Probability II. 3 Credit Hours.
Develops the probability basis requisite in modern statistical theories and stochastic processes. Topics of this course include results for sums of independent random variables, Markov processes, martingales, Poisson processes, Brownian motion, conditional probability and conditional expectation, and topics from ergodic theory. Second of two classes.

MATH 6262. Statistical Estimation. 3 Credit Hours.
Basic theories of statistical estimation, including optimal estimation in finite samples and asymptotically optimal estimation. A careful mathematical treatment of the primary techniques of estimation utilized by statisticians.

MATH 6263. Testing Stat Hypotheses. 3 Credit Hours.
Basic theories of testing statistical hypotheses, including a thorough treatment of testing in exponential class families. A careful mathematical treatment of the primary techniques of hypothesis testing utilized by statisticians.

MATH 6265. Linear Statistical Model. 3 Credit Hours.
Basic unifying theory underlying techniques of regression, analysis of variance and covariance, from a geometric point of view. Modern computational capabilities are exploited fully. Students apply the theory to real data through canned and coded programs.

MATH 6267. Multivariate Stat Analy. 3 Credit Hours.
Multivariate normal distribution theory, correlation and dependence analysis, regression and prediction, dimension-reduction methods, sampling distributions and related inference problems, selected applications in classification theory, multivariate process control, and pattern recognition.

MATH 6300. Fractal Geometry. 3 Credit Hours.
Hausdorff dimension, box-counting dimension, iterated function systems, continued fractions, number theory, Julia sets.

MATH 6307. Ordinary Diff Eqns I. 3 Credit Hours.
This course develops the qualitative theory for systems of ordinary differential equations. Topics include stability, Lyapunov functions, Floquet theory, attractors, invariant manifolds, bifurcation theory, normal forms. First of two courses.

MATH 6308. Ordinary Diff Eqns II. 3 Credit Hours.
This course develops the qualitative theory for systems of differential equations. Topics include stability, Lyapunov functions, Floquet theory, attractors, invariant manifolds, bifurcation theory, and normal forms. Second of two courses.

MATH 6321. Complex Analysis. 3 Credit Hours.
Complex integration, including Goursat's theorem; classification of singularities, the argument principle, the maximum principle; Riemann Mapping theorem; analytic continuation and Riemann surfaces; range of an analytic function, including Picard's theorem.
MATH 6337. Real Analysis I. 3 Credit Hours.
Measure and integration theory. Topics include measures, measurable functions, integration and differentiation of measures.

MATH 6338. Real Analysis II. 3 Credit Hours.
Topics include Lp spaces, Banach and Hilbert spaces, basic functional analysis.

MATH 6341. Partial Diff Eqns I. 3 Credit Hours.
Introduction to the mathematical theory of partial differential equations covering the basic linear models of science and exact solution techniques.

MATH 6342. Partial Diff Eqns II. 3 Credit Hours.
This course covers the general mathematical theory of linear stationary and evolution problems plus selected topics chosen from the instructor’s interests.

MATH 6421. Algebraic Geometry I. 3 Credit Hours.
The study of zero sets of polynomials: algebraic varieties, regular and rational mappings, the Zariski topology.

MATH 6422. Algebraic Geometry II. 3 Credit Hours.
A continuation of Algebraic Geometry I.

MATH 6441. Algebraic Topology I. 3 Credit Hours.

MATH 6442. Algebraic Topology II. 3 Credit Hours.

MATH 6451. General Topology. 3 Credit Hours.

MATH 6452. Differential Topology. 3 Credit Hours.

MATH 6453. Geometric Topology. 3 Credit Hours.
Characteristic classes, Morse theory, three-manifolds, four-manifolds, symplectic and contact manifolds, knot theory.

MATH 6455. Differential Geometry I. 3 Credit Hours.
Core topics in differential, including: Lie groups, curvature, and relations with topology.

MATH 6456. Differential Geometry II. 3 Credit Hours.
Introduces students to topics of current interest in geometry.

MATH 6457. Geometry and Topology I. 3 Credit Hours.
The course is an introduction to the fundamental group, covering spaces and techniques used to describe and study differentiable Manifolds and smooth functions.

MATH 6458. Geometry and Topology II. 3 Credit Hours.
Introduction to differential geometry and (co) homology.

MATH 6514. Industrial Math I. 3 Credit Hours.
Applied mathematics techniques to solve real-world problems. Topics include mathematical modeling, asymptotic analysis, differential equations and scientific computation. Prepares the student for MATH 6515.

MATH 6515. Industrial Math II. 3 Credit Hours.
Applications of mathematical techniques from MATH 6514 to solve real-world problems. Group projects to solve industrial problems in topics chosen by the instructor.

MATH 6584. Special Functions. 3 Credit Hours.
Gamma function; exponential function; orthogonal polynomials; Bessel, Legendre, and hypergeometric functions; application to singular ordinary differential equations; and separation of variables for partial differential equations.

MATH 6635. Numerical Meth-Finance. 3 Credit Hours.
Basic numerical and simulation techniques used in the pricing of derivative securities and in related problems in finance. Some programming experience required.

MATH 6701. Math Meth-Appli Sci I. 3 Credit Hours.
Review of linear algebra and ordinary differential equations, brief introduction to functions of a complex variable.
MATH 6702. Math Meth-Appl Sci II. 3 Credit Hours.
Review of vector calculus and its applications to partial differential equations.

MATH 6705. Modeling and Dynamics. 3 Credit Hours.
Mathematical methods for solving problems in the life sciences. Models-based course on basic facts from the theory of ordinary differential equations and numerical methods of their solution. Introduction to the control theory, diffusion theory, maximization, minimization and curve fitting. Math majors may not use this course toward any degree in the School of Mathematics.

MATH 6710. Numerical Methods-CSE I. 3 Credit Hours.
Introduction to numerical algorithms widely used in computational science and engineering. Numerical linear algebra, linear programming, and applications. Crosslisted with CSE 6710.

MATH 6711. Numerical Methods-CSE II. 3 Credit Hours.
Efficient numerical techniques for solving partial differential equations and large-scale systems of equations arising from discretization of partial differential equations or variational problems in applications in science and engineering. Crosslisted with CSE 6711.

MATH 6759. Stoch Process-Finance I. 3 Credit Hours.
Mathematical modeling of financial markets, derivative securities pricing, and portfolio optimization. Concepts from probability and mathematics are introduced as needed. Crosslisted with ISYE 6759.


MATH 6762. Stochastic Processes II. 3 Credit Hours.

MATH 6767. Sys-Computation Finance. 3 Credit Hours.
Computational Finance Introduction to large scale system design to support computational finance for options, stocks, or other financial instruments. Some programming experience, and previous exposure to stocks, bonds, and options required. Crosslisted with ISYE 6767.

MATH 6769. Fixed Income Securities. 3 Credit Hours.
Description, institutional features, and mathematical modeling of fixed income securities. Use of both deterministic and stochastic models. Crosslisted with ISYE 6769.

MATH 6781. Reliability Theory. 3 Credit Hours.
Reliability systems and related distributions, failure rate functions and nonparametric classes, accelerated life testing, dependent failure analysis, statistical inference of reliability data. Crosslisted with ISYE 6781.

MATH 6783. Financial Data Analysis. 3 Credit Hours.
Fundamentals of statistical inference for models used in the modern analysis of financial data. Crosslisted with ISYE 6783.

MATH 6785. The Practice of QCF. 3 Credit Hours.
Case studies, visiting lecturers from financial institutions, student group projects of an advanced nature, and student reports, all centered around quantitative and computational finance. Crosslisted with ISYE and MGT 6785.

MATH 6793. Adv Topics in QCF. 3 Credit Hours.
Advanced foundational material and analysis techniques in quantitative and computational finance. Crosslisted with ISYE 6793.

MATH 6XXX. Mathematics Elective. 1-21 Credit Hours.

MATH 7000. Master's Thesis. 1-21 Credit Hours.

MATH 7012. Enumerative Combinatoric. 3 Credit Hours.
Fundamental methods of enumeration and asymptotic analysis, including the use of inclusion/exclusion, generating functions, and recurrence relations. Applications to strings over a finite alphabet and graphs.

MATH 7014. Advanced Graph Theory. 3 Credit Hours.
Advanced topics in graph theory. Selection of arguments varies every year.

MATH 7016. Combinatorics. 3 Credit Hours.
Fundamental combinatorial structures including hypergraphs, transversal sets, colorings, Sperner families, intersecting families, packings and coverings, perfect graphs, and Ramsey theory. Algebraic and topological methods, applications.

MATH 7018. Probab Combinatorics. 3 Credit Hours.
Applications of probabilistic techniques in discrete mathematics, including classical ideas using expectation and variance as well as modern tools, such as martingale and correlation inequalities.

MATH 7244. Stochastic Calculus I. 3 Credit Hours.
An introduction to the Itô stochastic calculus and stochastic differential equations through a development of continuous-time martingales and Markov processes. First of two courses.

MATH 7245. Stochastic Calculus II. 3 Credit Hours.
An introduction to the Itô stochastic calculus and stochastic differential equations through a development of continuous-time martingales and Markov processes. Continuation of MATH 7244.

MATH 7334. Operator Theory. 3 Credit Hours.

MATH 7337. Harmonic Analysis. 3 Credit Hours.
Fourier analysis in Euclidean space. Basic topics including L1 and L2 theory; advanced topics such as distribution theory, uncertainty, Littlewood-Paley theory.

MATH 7338. Functional Analysis. 3 Credit Hours.
Topics include the Hahn-Banach theorems, the Baire Category theorem and its consequences, duality in Banach spaces, locally convex spaces, and additional topics.

MATH 7510. Graph Algorithms. 3 Credit Hours.
Algorithms for graph problems such as maximum flow, covering, matching, coloring, planarity, minimum cuts, shortest paths, and connectivity. Crosslisted with ISYE 7510 and CS 7510.

MATH 7581. Calculus Variations. 3 Credit Hours.
Minimization of functionals, Euler-Lagrange equations, sufficient conditions for a minimum; geodesic, isoperimetric, and time of transit problems; variational principles of mechanics; applications to control theory.

MATH 7586. Tensor Analysis. 3 Credit Hours.
Review of linear algebra, multilinear algebra, algebra of tensors, coordinate and contravariant tensors, tensors in Riemann spaces, geometrical interpretation of skew tensors.
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<tr>
<th>Course Code</th>
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<td>MATH 8863</td>
<td>Topics in Graph Theory</td>
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Selection of topics vary with each offering.
MATH 8900. Special Problems. 1-21 Credit Hours.
MATH 8901. Special Problems. 1-21 Credit Hours.
MATH 8902. Special Problems. 1-21 Credit Hours.
MATH 8903. Special Problems. 1-21 Credit Hours.
MATH 8997. Teaching Assistantship. 1-9 Credit Hours.
For students holding graduate teaching assistantships.
MATH 8998. Research Assistantship. 1-9 Credit Hours.
For students holding graduate research assistantships.
MATH 9000. Doctoral Thesis. 1-21 Credit Hours.

Mechanical Engineering (ME)

ME 1750. Intro to Bioengineering. 3 Credit Hours.
An introduction to the field of bioengineering, including the application of engineering principles and methods to problems in biology and medicine, the integration of engineering with biology, and the emerging industrial opportunities. Crosslisted with AE, BMED, CHE, ECE, and MSE 1750.

ME 1770. Intro to Engr Graphics. 3 Credit Hours.
Introduction to engineering graphics and visualization including sketching, line drawing, and solid modeling. Development and interpretation of drawings and specifications for product realization. Crosslisted with AE and CEE 1770.

ME 1XXX. Mechanical Engr Elective. 1-21 Credit Hours.

ME 2016. Computing Techniques. 3 Credit Hours.
An introduction to the use of computers and MATLAB programming for the solution of mechanical engineering problems. Topics include: sources of error in computing, the use of modular software design, basic numerical methods, and signal processing.

ME 2110. Creative Decisions& Dsgn. 3 Credit Hours.
To learn fundamental techniques for creating, analyzing, synthesizing, and implementing design solutions to open-ended problems with flexibility, adaptability, and creativity through team and individual efforts.

ME 2202. Dynamics of Rigid Bodies. 3 Credit Hours.
Kinematics and dynamics of particles and rigid bodies in one, two, and three dimensions. Work-energy and impulse-momentum concepts.

ME 2698. Research Assistantship. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

ME 2699. Undergraduate Research. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

ME 2801. Special Topics. 1 Credit Hour.
Topics of current interest not offered in the regular course offerings.

ME 2803. Special Topics. 3 Credit Hours.
Topics of current interest not offered in the regular course offerings.

ME 2XXX. Mechanical Engr Elective. 1-21 Credit Hours.

ME 3015. Sys Dynamics & Control. 4 Credit Hours.
Dynamic modeling and response of systems with mechanical, hydraulic, thermal, and/or electrical elements. Linear feedback control systems design and analysis in time and frequency domains. Credit not allowed for both ME 3015 and ME 4452.

ME 3017. System Dynamics. 3 Credit Hours.
Dynamic modeling and simulation of systems with mechanical, hydraulic, thermal and/or electrical elements. Frequency response analysis, stability, and feedback control design of dynamic systems. Students cannot receive credit for ME 3017 and AE 3530.

ME 3057. Experimental Methodology. 3 Credit Hours.
Introduction to basic instrumentation and experimental methodology used in mechanical engineering, including calibration, use, precision and accuracy. Consideration errors, precision and accuracy in experimental measurements and technical reports.

ME 3141. Cutting-Edge Eng Seminar. 3 Credit Hours.
Seminar course on advanced engineering technologies directed to a non-technical audience. Distinguished guest speakers.

ME 3180. Machine Design. 3 Credit Hours.
The selection, analysis, and synthesis of springs, joining and fastening methods, bearings, shafts, gears, and other elements. Design of assemblies. Computer-based methods.

ME 3210. Design and Manufacture. 3 Credit Hours.
Major manufacturing processes, capabilities, and costs. Interaction between design, materials and manufacturing process selection.

ME 3322. Thermodynamics. 3 Credit Hours.
Introduction to thermodynamics. Thermodynamic properties, energy and mass conservation, entropy and the second law. Second-law analysis of thermodynamic systems, gas cycles, vapor cycles.

ME 3340. Fluid Mechanics. 3 Credit Hours.
The fundamentals of fluid mechanics. Topics include fluid statics; control-volume analysis; the Navier-Stokes equations; similitude; viscous, inviscid and turbulent flows; boundary layers.

ME 3345. Heat Transfer. 3 Credit Hours.
Introduction to the study of heat transfer, transport coefficients, steady state conduction, transient conduction, radiative heat transfer, and forced and natural convection.

ME 3700. Intro Energy Systems EGR. 3 Credit Hours.
Renewable, fossil, and nuclear energy and its conversion into various forms. Electrical grid, energy storage, energy conservation, and mitigation of adverse conversion.

ME 3720. Intro-Fluid&Thermal Engr. 3 Credit Hours.
Theory and application, but no exhaustive treatment of fluid mechanics, thermodynamics, and heat transfer in analysis and design of fluid and thermal energy systems.

ME 3734. Emerging Technologies. 3 Credit Hours.
Analysis of emerging technologies and their impacts for firm practice, market practice, policy, and society. Credit not allowed for both ME 3743 and MGT 3743 or CS 3743.

ME 3744. Mangn Prod Serv Tech Dev. 3 Credit Hours.
Analysis of the managerial challenges of the product development process.

ME 3XXX. Mechanical Engr Elective. 1-21 Credit Hours.

ME 4011. IC Engines. 3 Credit Hours.
Analysis and design of various types of engines used in transportation systems. Topics include advances in energy efficiency and emissions in automotive applications.

ME 4012. Motion Systems. 3 Credit Hours.
Motion systems consisting of mechanical, fluid and electrical components are analyzed, modeled, and controlled. Alternatives are considered for system optimization.
ME 4013. Hybrid Vehicle Powertrains. 3 Credit Hours.
Course details fundamentals of hybrid vehicle powertrains, to include architectures (series, parallel, etc.), components, operation, control, modeling & simulation, and design fundamentals.

ME 4041. Computer Graphics & Cad. 3 Credit Hours.
Principles of geometric modeling, finite-element method, and interactive computer graphics hardware and software. CAD and CAE applications in thermal and mechanical design problems. Design projects.

ME 4053. ME Systems Lab. 2 Credit Hours.

ME 4056. ME Systems Laboratory. 3 Credit Hours.

ME 4171. Environmental Dsgn & Mfg. 3 Credit Hours.
Including environmental considerations in engineering design; reducing environmental impact by design; recycling; material selection; de- and remanufacturing; life-cycle considerations, analyses, tradeoffs; ISO 14000.

ME 4172. Dsgn Sustainable Eng Sys. 3 Credit Hours.
Understanding sustainability in context of market forces, availability of resources, technology, society. Methods for identifying, modeling, and selecting sustainable designs.

ME 4182. Capstone Design. 3 Credit Hours.
Teams apply a systematic design process to real multidisciplinary problems. Problems selected from a broad spectrum of interest areas, including biomedical, ecological, environmental, mechanical, and thermal.

ME 4189. Structural Vibrations. 3 Credit Hours.
Single and multi-degree-of-freedom systems as well as continuous systems are analyzed for their vibrational response characteristics using both exact and approximate methods.

ME 4193. Tribological Design. 3 Credit Hours.
Analysis of tribological aspects of machine components, including friction, lubrication, and wear. Group design project to optimize system tribological performance.

ME 4214. Mech Behavior-Materials. 3 Credit Hours.
Problems involving resistance of materials to plastic deformation, fracture, fatigue, and creep; mechanical testing; computer-based methods; case studies of failure.

ME 4215. Mfg Process Analysis. 3 Credit Hours.
First principles based modeling and analysis of manufacturing processes. Process design and optimization.

ME 4315. Energy Systems Analy&Dgn. 3 Credit Hours.
Integrated concepts, laws, and methodologies from thermal sciences are used to analyze, model, and design energy systems and to predict system performance for fixed designs.

ME 4321. Refrigeration & Air Cond. 3 Credit Hours.
Application of thermodynamics principles to analysis and design of refrigeration and air conditioning systems, absorption and heat-driven systems, gas-vapor mixture psychrometrics, load estimates, delivery, and control.

ME 4324. Power Generation Tech. 3 Credit Hours.
Technology review and application of engineering sciences and economics to the analysis and design of power generation systems. Fossil, nuclear, and renewable energy systems are considered.

ME 4325. Intro Fuel Cell Systems. 3 Credit Hours.
Fuel cell systems are explained and analyzed, including single cells and stacks, and balance-of-plant fundamentals, with emphasis upon prevalent fuel cell types and their applications.

ME 4330. Heat and Mass Exchangers. 3 Credit Hours.
Heat transfer, fluid flow, and thermodynamics principles applied to the analysis and design of heat and mass exchangers, periodic regenerators, and cooling towers.

ME 4340. Applied Fluid Mechanics. 3 Credit Hours.
Advanced study in three areas of fluid mechanics. Topics may be chosen from turbomachinery, flow measurement, compressible flow, applied aerodynamics, and others.

ME 4342. Computational Fluid Dyn. 3 Credit Hours.
An introduction to computational fluid dynamics (CFD) in mechanical engineering. The theory and numerical techniques of CFD. Modern CFD software including grid generation and flow visualization tools will be used. Projects with complex fluid-flow systems.

ME 4405. Fund of Mechatronics. 3 Credit Hours.
Focuses on fundamentals of microcontrollers, analog and digital electronics, sensors, actuators and their applications to modern mechatronics systems and intelligent manufacturing. Knowledge gained from lectures will be used to complete lab exercises. Credit will not be awarded for both ME 4405 and ME 6405 or ME 4405 and ME 4777.

ME 4447. Microproces Ctrl Mfg Sys. 3 Credit Hours.
Lectures address the fundamental aspects of manufacturing elements and microprocessors and their applications. Hands-on application of machine and machine tool control will be stressed.

ME 4451. Robotics. 3 Credit Hours.
Mathematical modeling, simulation, and control of robotic systems with mechanical and sensory elements.

ME 4452. Control Dynamic Systems. 3 Credit Hours.
Modeling and simulation of dynamic systems in frequency and time domains. Feedback control analysis and design methods including root-locus, frequency response, and pole-placement. Introduction to digital control systems. Credit not allowed for both ME 4452 and ME 3015. Credit not allowed for both ME 4452 and AE 3531.

ME 4698. Research Assistantship. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

ME 4699. Undergraduate Research. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

ME 4701. Wind Engineering. 3 Credit Hours.
An introductory course on wind energy and its potential; modeling and design of wind turbines; analysis of the economic benefits of wind turbine systems. Credit not allowed for both ME 4701 and AE 4701.

ME 4720. Pulp Paper Manufacturing. 3 Credit Hours.
The course provides comprehensive foundational knowledge of the industry enabling the student to understand the role of diverse manufacturing operations and to strategically plan improvements. Cross-listed with ChBE 4720.

ME 4730. Eng Tech Forest Bioprods. 3 Credit Hours.
The course provides comprehensive knowledge of the manufacture of nontraditional products from forest biomaterials. It analyzes and assesses emerging manufacturing technologies, materials and products. Cross-listed with ChBE 4730.
ME 4740. Bio-Inspired Design. 3 Credit Hours.
We examine evolutionary adaptation as a source for engineering design inspiration, utilizing principles of scaling, adaptability, and robust multifunctionality that characterize biological systems. Credit not allowed for both ME 4740 and (BIOI 4740, or ISYE 4740 or PTFE 4740 or MEE 4740).

ME 4741. Int Mgt Dev-Proj Prep. 3 Credit Hours.
Individual and group-based experiential learning activities to develop integrated human system management skills that prepare students for more successful capstone collaboration and learning. Credit not allowed for both ME 4741 and CS 4741 or MGT 4741.

ME 4742. Tech & Mgt Cap Proj. 4 Credit Hours.
Project-based course where students in the Technology and Management Program will work in inter-disciplinary teams on projects provided by corporate affiliates. Credit not allowed for both ME 4742 and CS 4742 or MGT 4742.

ME 4744. Global Develop Capstone. 3 Credit Hours.
Teams develop solutions to multidisciplinary problems selected from globalization, food security, infrastructure, health, water, sanitation, hygiene, ecosystem resilience, services, capacity building, and urbanization.

ME 4753. Topics in Engr Practice. 3 Credit Hours.
Topics of current importance offered in collaboration with an approved partner of Georgia Tech's Distance Learning Program.

ME 4754. Elec Packaging Assembly. 3 Credit Hours.
The course provides hands-on instruction in electronics packaging, including assembly, reliability, thermal management, and test of next-generation microsystems. Crosslisted with ECE and MSE 4754.

ME 4757. Biofluid Mechanics. 3 Credit Hours.

ME 4758. Biosolid Mechanics. 3 Credit Hours.

ME 4759. Electrochem Storage. 3 Credit Hours.
An elective class for senior-level students interested in electrochemical storage and conversion, including the fundamentals of electrochemistry and practical battery and fuel cells. Cross-listed with ChBE and MSE 4759.

ME 4760. Acoustics & Noise Control. 3 Credit Hours.
Study of acoustics related to noise and its control; acoustic terminology, wave propagation, wave equation solutions, instrumentation, data processing, room acoustics, noise control, hearing, noise legislation. Crosslisted with AE 4760.

ME 4763. Pulping & Chem Recovery. 3 Credit Hours.
Pulping and chemical recovery processes are studied on the reaction, delignification, energy, and liquor reuse. The process optimization, air and water pollution minimization are taught. Crosslisted with CHE 4763.

ME 4764. Bleaching & Papermaking. 3 Credit Hours.
Pulp bleaching and formation of paper/board products are studied along with testing, end uses, chemical and mechanical treatment of pulp, non-wood and recycled fiber utilization. Crosslisted with CHE 4764.

ME 4766. Nanoscale Devices. 3 Credit Hours.
Fundamental properties at the nanoscale for photonics and sensors. Nanoscale fabrication methods including thin films, ion beam, lithography, electroplating, and example case studies in NEMS/MEMS and photonics. Credit not allowed for both ME 4766 and MSE 4766.

ME 4767. Pulp and Paper Lab. 3 Credit Hours.
The course offers the fundamentals of pulp and paper testing procedures. Cross-listed with ChBE 4767.

ME 4775. Polymer Science & Engr I. 3 Credit Hours.
An introduction to the chemistry, structure and formation of polymers, physical states and transitions, physical and mechanical properties of polymer fluids and solids. Crosslisted with CHEM, CHE, MSE, and PTFE 4775.

ME 4776. Polymer Science & Engr II. 3 Credit Hours.
Polymer fabrication processes and methods of characterization and identification of polymers are presented. Experiments in polymerization, processing, and property evaluation of polymers. Crosslisted with CHE, CHEM, MSE, and PTFE 4776.

ME 4781. Biomed Instrumentation. 3 Credit Hours.
A study of medical instrumentation from a systems viewpoint. Pertinent physiological and electro-physiological concepts will be covered. Credit not allowed for both ME 4781 and (CHE 4781 or CHBE 4781 or BMED 4781 or ECE 4781).

ME 4782. Biosystems Analysis. 3 Credit Hours.
Analytical methods for modeling biological systems, including white-noise protocols for characterizing nonlinear systems. Crosslisted with BMED, CHE and ECE 4782.

ME 4790. Materials Select & Design. 3 Credit Hours.
Principles of selecting materials and processes for engineering applications. Methodologies for designing new materials and conceiving hybrid solutions. Credit not allowed for both ME 4790 and ME 4213 or ME 4790.

ME 4791. Mech Behavior-Composites. 3 Credit Hours.
Stress-strain behavior of composites, properties of matrix and reinforcing materials, mechanics of fiber-reinforced composites, lamina and laminate analysis, and mechanical performance. Crosslisted with AE, CEE, CHE, MSE, and PTFE 4791.

ME 4793. Composite Mater & Process. 3 Credit Hours.
Basic principles of selection and design of composite materials and their manufacturing and testing. Cost factors. Laboratory exercises on manufacturing and tests. Crosslisted with AE, CEE, CHE, ME, MSE, and PTFE 4793.

ME 4794. Composite Materials & Mfg. 4 Credit Hours.
Basic principles of selection and design of composite materials and their manufacturing and testing. Cost factors. Laboratory exercises on manufacturing and tests. Crosslisted with AE, CEE, CHE, ME, and PTFE 4794.

ME 4795. Nuclear Reactor Materials. 3 Credit Hours.
Introduction to fundamentals of nuclear reactor materials. Topics covered are basics of radiation damage, defect creation and evolution, microstructure-property correlations in cladding and fuel of nuclear materials.
ME 4801. Special Topics-Mech Engr. 1 Credit Hour.
Special topic offerings of current interest not included in regular courses.

ME 4802. Special Topics-Mech Engr. 2 Credit Hours.
Special topic offerings of current interest not included in regular courses.

ME 4803. Special Topics-Mech Engr. 3 Credit Hours.
Special topic offerings of current interest not included in regular courses.

ME 4804. Special Topics-Mech Engr. 4 Credit Hours.
Special topic offerings of current interest not included in regular courses.

ME 4805. Special Topics-Mech Engr. 5 Credit Hours.
Special topic offerings of current interest not included in regular courses.

ME 4811. Special Topics. 1 Credit Hour.

ME 4812. Special Topics. 2 Credit Hours.

ME 4813. Special Topics. 3 Credit Hours.

ME 4814. Special Topics. 4 Credit Hours.

ME 4815. Special Topics. 5 Credit Hours.

ME 4821. Special Topics. 1 Credit Hour.

ME 4822. Special Topics. 2 Credit Hours.

ME 4823. Special Topics. 3 Credit Hours.

ME 4824. Special Topics. 4 Credit Hours.

ME 4825. Special Topics. 5 Credit Hours.

ME 4831. Special Topics. 1 Credit Hour.

ME 4832. Special Topics. 2 Credit Hours.

ME 4833. Special Topics. 3 Credit Hours.

ME 4834. Special Topics. 4 Credit Hours.

ME 4835. Special Topics. 5 Credit Hours.

ME 4843. Special Topics- ME Lab. 3 Credit Hours.
ME Special Topics with lab component.

ME 4853. Special Topics. 3 Credit Hours.
ME Special Topics with lab component.

ME 4901. Special Problems. 1-21 Credit Hours.
Individual studies in certain specialized areas, and mathematical analyses and/or experimental investigations of problems of current interest in mechanical engineering.

ME 4902. Special Problems. 1-21 Credit Hours.
Individual studies in certain specialized areas, and mathematical analyses and/or experimental investigations of problems of current interest in mechanical engineering.

ME 4903. Special Problems. 1-21 Credit Hours.
Individual studies in certain specialized areas, and mathematical analyses and/or experimental investigations of problems of current interest in mechanical engineering.

ME 4XXX. Mechanical Engr Elective. 1-21 Credit Hours.

ME 6101. Engineering Design. 3 Credit Hours.
Design concepts, processes, and methodologies, including quality and robustness. Group project.

ME 6102. Designing Open Engr Sys. 3 Credit Hours.
Decision-based integrated product and process development, meta-design, and decision support problems; mathematical modeling of decisions involving ambiguity and uncertainty; critical thinking and analysis; verification and validation; research issues.

ME 6103. Optimization Engr Design. 3 Credit Hours.
Use of single and multi-objective optimization in modeling and solving mechanical engineering design problems. Formulations, solution algorithms, validation and verification, computer implementation. Project.

ME 6104. Computer-Aided Design. 3 Credit Hours.
Fundamentals of CAD, including geometric and solid modeling, parametric representations, features, and human-machine interactions. Applications to design, analysis, and manufacturing.

ME 6105. Modeling&Simulation-Dsgn. 3 Credit Hours.
Modeling and simultaneous concepts, algorithms, and methods; modeling of energy-based and discrete-event systems; modeling of design decisions; information modeling and knowledge representation; project.

ME 6124. Finite-Element Method. 3 Credit Hours.
Line, plane, solid, plate, and shell elements-theory: practical aspects of modeling; applications in mechanical engineering; final project.

ME 6140. Physical Prop of Paper. 3 Credit Hours.
Structure and physical properties of paper and other fibrous composites. Fundamental concepts related to single fibers and web structures.

ME 6201. Principle-Continuum Mech. 3 Credit Hours.
Introductory treatment of the fundamental, unifying concepts of the mechanics of continua.

ME 6203. Inelastic Deform Solids. 3 Credit Hours.
Phenomenological aspects of nonlinear material behavior and deformation with emphasis on model development.

ME 6204. Micromechanics-Materials. 3 Credit Hours.
Fundamental concepts of micromechanics of solids with emphasis on application to composite materials.

ME 6222. Mfg Processes & Systems. 3 Credit Hours.

ME 6223. Auto Mfg Process Plan. 3 Credit Hours.

ME 6224. Machine Tool Analysis. 3 Credit Hours.
Mechanics and dynamics of machining, machine tool components and structures, sensors and control of machine tools, machine process planning and optimization.

ME 6225. Metrology & Measure Sys. 3 Credit Hours.
Metrology techniques and procedures. Precision manufacturing system design and analysis.

ME 6226. Semiconductor Mfg&Assembly. 3 Credit Hours.
Basic mechanical and materials processes in production including silicon boule growth, plastic encapsulation, interconnect metal migration, solder joining, printing, manufacturing process cost analysis.

ME 6229. Introduction to MEMS. 3 Credit Hours.
Principles of microfabrication for sensors and actuators. Lumped parameter analysis and computer-aided design; materials properties; case studies include cantilever beam, pressure sensor, and accelerometer.

ME 6242. Mechanics of Contact. 3 Credit Hours.
Mechanics of surface contact, with emphasis on tribological interactions as in rolling element bearings, slider bearings, mechanical seals, and materials processing.
ME 6243. Fluid Film Lubrication. 3 Credit Hours.
Analytical and numerical investigation of full film compressible and incompressible hydrodynamic lubrication problems for steady and unsteady conditions.

ME 6244. Rotodynamics. 3 Credit Hours.
Analysis and design of shafts for rotating machinery. Torsional vibration, synchronous and nonsynchronous whirl, stability, gyroscopic effects, hydrodynamic bearings, hysteresis, squeeze film dampers, and balancing.

ME 6281. Mech-Paper Forming&C. 3 Credit Hours.
Fundamentals of multiphase flow in paper forming and coating processes, and its impact on the physical properties of composite fiber structure and surface characteristics.

ME 6300. Intermediate Heat Transfr. 3 Credit Hours.
Intermediate topics including multidimensional transient conduction, diffusion, boundary layers, internal flows, radiation, phase change, heat exchangers, multimode transfer, and numerical methods with a project-oriented approach.

ME 6301. Conduction Heat Transfer. 3 Credit Hours.
Steady and transient one- and multi-dimensional conduction. Emphasis on analytical methods, numerical techniques, and approximate solutions.

ME 6302. Convection Heat Transfer. 3 Credit Hours.
Convection (forced and free) in laminar and turbulent, internal and external flows. Analogy between momentum and heat transfer. Scaling laws and modeling.

ME 6303. Radiation Heat Transfer. 3 Credit Hours.
Fundamentals of thermal radiation, blackbody radiation, surface characteristics, exchange in enclosures, radiation through continua, and combined mode heat transfer.

ME 6304. Prin of Thermodynamics. 3 Credit Hours.
Fundamentals of thermodynamics including energy, entropy, and energy analysis, property relations, equilibrium conditions, and evaluation of properties.

ME 6305. Apps of Thermodynamics. 3 Credit Hours.
Applications of the first and second laws of thermodynamics to analysis and design optimization of power and refrigeration systems incorporating heat exchangers and combustion processes.

ME 6309. Nanoscale Heat Transfr. 3 Credit Hours.
Microscopic concepts and methodology in thermal science, including equilibrium statistics. Boltzmann transport equation, and nanoscale heat conduction and radiation, with applications in contemporary technologies.

ME 6401. Linear Control Systems. 3 Credit Hours.
Theory and applications of linear systems, state space, stability, feedback controls, observers, LQR, LQG, Kalman filters. Credit will not be awarded for both ME 6401 and AE 6530.

ME 6402. Nonlinear Control System. 3 Credit Hours.
Analysis of nonlinear systems, geometric control, variable structure control, adaptive control, optimal control, applications.

ME 6403. Digital Control Systems. 3 Credit Hours.
Comprehensive treatment of the representation, analysis, and design of discrete-time systems. Techniques include Z- and W-transforms, direct method, control design, and digital tracking.

ME 6404. Adv Ctrl Dsgn Implement. 3 Credit Hours.
Analysis, synthesis, and implementation techniques of continuous-time and real-time control systems using classical and state-space methods.

ME 6405. Intro to Mechatronics. 3 Credit Hours.
Modeling and control of actuators and electro-mechanical systems. Performance and application of microprocessors and analog electronics to modern mechatronic systems.

ME 6406. Machine Vision. 3 Credit Hours.
Design of algorithms for vision systems for manufacturing, farming, construction, and the service industries. Image processing, optics, illumination, feature representation.

ME 6407. Robotics. 3 Credit Hours.
Analysis and design of robotic systems including arms and vehicles. Kinematics and dynamics. Algorithms for describing, planning, commanding, and controlling motion force.

ME 6408. Advanced Mechatronics. 3 Credit Hours.
Focusing on team projects, designing and building intelligent machines and products. Lectures - sensors and transducers, actuators, fluid power, power rectifiers, motion control and modeling of mechatronics systems.

ME 6441. Dynamics-Mechanical Sys. 3 Credit Hours.
Motion analysis and dynamics modeling of systems of particles and rigid bodies in three-dimensional motion.

ME 6442. Vibration-Mechanical Sys. 3 Credit Hours.
Introduction to modeling and oscillatory response analysis for discrete continuous mechanical and structural systems.

ME 6443. Variational Methods. 3 Credit Hours.
Calculus of variations, Hamilton's principle and Lagrange's equations, Sturm-Liouville problems, approximation techniques.

ME 6444. Nonlinear Systems. 3 Credit Hours.
Investigation of nonlinear systems using analytical and numerical techniques.

ME 6449. Transducers & Signals. 3 Credit Hours.
Acoustic instrumentation and methods of signal analysis.

ME 6452. Wave Propagation-Solids. 3 Credit Hours.
Wave motion in solids, wave equations, analytical and numerical solutions, ultrasonic NDE.

ME 6460. MEMS Devices. 3 Credit Hours.
Introduces fundamental concepts and tools needed for the design, simulation and analysis of MEMS devices. These include electrical, mechanical, radiant, thermal, magnetic and chemical domains.

ME 6601. Intro to Fluid Mechanics. 3 Credit Hours.
The fundamentals of fluid mechanics. Derivation of the governing equations of motion. An introduction to viscous, inviscid, turbulent, and boundary-layer flows.

ME 6602. Viscous Flow. 3 Credit Hours.
The mechanics of Newtonian viscous fluids. The use of modern analytical techniques to obtain solutions for flows with small and large Reynolds numbers.

ME 6622. Experimental Methods. 3 Credit Hours.
Experimental methods in mechanics. Includes measurement techniques, instrumentation, data acquisition, signal processing, and linear and digital electronics.

ME 6701. Wind Engineering. 3 Credit Hours.
An introductory course on wind energy and its potential; modeling and design of wind turbines; analysis of the economic benefits of wind turbine systems. Credit will not be awarded for both ME 6701 and AE 6701.
ME 6720. Biotransport. 3 Credit Hours.
This graduate level course covers the analysis of fluid flow phenomena in the human body, cardiovasculature, respiratory system and other organ systems. Credit will not be awarded for both ME 6720 and BMED 6720.

ME 6741. Pulp & Paper Mfg I. 3 Credit Hours.
The fundamentals of pulp and paper technology are presented. Applications to the several unit operations used are explored and augmented by field trips and recent case studies. Crosslisted with CHE 6741, CHBE 6701 and MLDR 6701.

ME 6742. Pulp & Paper Mfg II. 3 Credit Hours.
Papermaking technology is covered from a multidisciplinary engineering perspective with fundamental and practical considerations being addressed. Students participate in groups to run a pilot papermaking trial at the Henry Foundation in Savannah. Crosslisted with CHE 6742, CHBE 6701 MLDR 6701.

ME 6743. Tissue Mechanics. 3 Credit Hours.
Structure-function relationships and constitutive models for a variety of biological tissues, with an emphasis on understanding the mechanical behaviors of normal and pathological tissues. Credit not give for both ME/BMED 6783 and ME/BMED 6743. Crosslisted with BMED 6743.

ME 6744. Topics in Engr Practice. 3 Credit Hours.
Topics of current importance offered in collaboration with an approved partner of Georgia Tech's Distance Learning Program. Crosslisted with ECE 6744.

ME 6746. Rehab Engineering. 3 Credit Hours.
Students will participate in rehabilitation engineering as practiced in the assistive technology industry. Credit not allowed for both ME 6746 and APPH 6746.

ME 6753. Prin-Mgt for Engineers. 3 Credit Hours.
The course will provide an introduction to selected topics needed to be successful in the technology industries. Cannot count toward major area requirements on M.S. or Ph.D. programs of study. Crosslisted with MGT 6753.

ME 6754. Engr Database Mgt System. 3 Credit Hours.
Modeling and managing engineering information systems, integration of design and manufacturing functions in engineering product development, logical models of engineering product and processes. Crosslisted with CS 6754.

ME 6758. Numerical Methods in ME. 3 Credit Hours.
Numerical methods for solution of engineering problems; initial, eigenvalue, and boundary-value problems; computational stability for ordinary and linear partial differential equations. Crosslisted with NRE and HP 6758.

ME 6759. Mate-Envir Conscious Dgn. 3 Credit Hours.
Covers the environmental impact of materials choices and quantitative measure of life-cycle assessment and environmental burden. The Natural Step philosophy will be used as a model for the overall approach. Crosslisted with MSE and PTFE 6759.

ME 6760. Acoustics I. 3 Credit Hours.
Fundamental principles governing the generation, propagation, reflection, and transmission of sound waves in fluids. Crosslisted with AE 6760.

ME 6761. Acoustics II. 3 Credit Hours.
Radiation and scattering of sound waves in fluids, duct acoustics, dissipation phenomena. Crosslisted with AE 6761.

ME 6762. Applied Acoustics. 3 Credit Hours.
Mufflers, resonators, acoustic materials, barriers, industrial noise, room acoustics, active noise control. Crosslisted with AE 6762.

ME 6765. Kinetics & Thermo Gases. 4 Credit Hours.
Thermodynamics of nonreacting and reacting gas mixtures. Introductory quantum theory, statistical thermodynamics, and gas kinetic theory. Crosslisted with AE 6765.

ME 6766. Combustion. 3 Credit Hours.
Introductory chemical kinetics, deformations and deflagrations, laminar flame propagation in premixed gases, ignition and quenching, laminar diffusion flames, droplet burning, and turbulent reacting flows. Crosslisted with AE 6766.

ME 6767. Adv Topics in Combustion. 3 Credit Hours.
Turbulent combustion, combustion instability and control, solid propellants and explosives, chemical kinetics, pollutant formation and destruction, computational methods for reacting flow. Crosslisted with AE 6767.

ME 6768. Polymer Structure & Props. 3 Credit Hours.
Formulations and analysis of molecular and phenomenological models of elastic and viscoelastic behavior, development and description of structure, and fundamental aspects of structure-property relations. Crosslisted with CHE, MSE, and PTFE 6768.

ME 6769. Linear Elasticity. 3 Credit Hours.
Governing equations of linear elasticity, plane elasticity, boundary-value problems, airy stress function and complex variable methods, simple three-dimensional solutions. Crosslisted with AE 6769.

ME 6770. Energy Meth-Elast & Plast. 3 Credit Hours.
Applications in energy and variational methods in engineering mechanics to elastic, plastic, and dynamical behavior of deformable media. Crosslisted with AE 6770.

ME 6774. Biomaterial:Struct & Funct. 3 Credit Hours.
Structure-function relationships of biomaterials and biomaterial characterization will be covered. Materials for medical implants, tissue engineering, biosensing, imaging, and drug delivery will be covered. Crosslisted with BMED, CHE, and MSE 6774.

ME 6776. Microelec Sys Packaging. 3 Credit Hours.
Broad overview of system-level, cross-disciplinary microelectronics packaging technologies, including design, test, thermal, reliability, optoelectronics, and RF integration. Comparison of system-on-chip and system-on-package. Crosslisted with ECE and MSE 6776.

ME 6777. Advanced Biomaterials. 3 Credit Hours.
Advanced topics of biomaterials performance and engineering, including biointerfaces, host reactions to materials, and bio-inspired/smart-materials strategies. Crosslisted with BMED, CHE, and MSE 6777.

ME 6779. Therm Pkg-Micro/Nano Sys. 3 Credit Hours.
Passive, active, and hybrid thermal management techniques, and computational modeling of micro systems. Air cooling, single phase and phase change liquid cooling, heat pipes, and thermoelectrics. Crosslisted with ECE 6779.

ME 6782. Cellular Engineering. 3 Credit Hours.
Engineering analysis of cellular systems. Crosslisted with BMED and CHE 6782.

ME 6789. Technology Ventures. 3 Credit Hours.
Team discussion and case studies of issues in biomedical engineering technology transfer including licensing, financial capital, safety and efficacy studies, clinical trials, and strategic planning. Crosslisted with BMED, ECE, CHE, and MGT 6789.
ME 6792. Manufacturing Seminar. 1 Credit Hour.
Guest speakers on a broad range of manufacturing-related topics: research, applications, and technology. Required for Certificate in Manufacturing. Crosslisted with ECE and ISYE 6792.

ME 6793. Systems Pathophysiology. 3 Credit Hours.
Overview of human pathophysiology from a quantitative perspective. Emphasis on systems of interest to bioengineering faculty. Introduction to quantitative models for biological systems. Crosslisted with BMED, CHE, and ECE 6793.

ME 6794. Tissue Engineering. 3 Credit Hours.
Biological, engineering, and medical issues in developing tissue-engineered constructs. Emphasis in the integration of these disciplines at a basic molecular and cell biology level. Crosslisted with BMED and CHE 6794.

ME 6795. Math, Stat & Comp Tech-Mate. 3 Credit Hours.
Emphasizes the fundamental physical, analytical, and mathematical techniques commonly encountered in materials engineering including stress and strain, crystallographic and orientation transformations, X-ray, TEM, and solid-state concepts. Crosslisted with MSE and PTFE 6795.

ME 6796. Struct-Property Relation. 3 Credit Hours.
Introduction to the multi-scale structure effects on material properties. For MSE students, this course will prepare students for future in-depth courses. For non-MSE students, the course will provide a background in materials and may serve as part of the program of study for a minor in materials. Crosslisted with MSE and PTFE 6796.

ME 6797. Therm & Kinetic Microstruc. 3 Credit Hours.
The reduction of chemical-free energy, strain energy, and interfacial energy controls the kinetics of diffusional transformations. These factors are explored from the point of view of processing and stability of the microstructure during service. Crosslisted with MSE and PTFE 6797.

ME 6799. Legal Issues-Tech Transf. 3 Credit Hours.
Study and analysis of U.S. law as it applies to the patenting and licensing processes. Crosslisted with CHE, MGT, and BMED 6799.

ME 6XXX. Mech Engr Elective. 1-21 Credit Hours.

ME 7000. Master's Thesis. 1-21 Credit Hours.

ME 7056. GT-STUTTGART. 12 Credit Hours.
Placeholder for GT-STUTTGART students.

ME 7057. GT-SEOUL. 12 Credit Hours.
Placeholder for GT-SEOUL students.

ME 7101. Seminar in Engr Design. 3 Credit Hours.
Reading from the literature, presentations, and discussions on current theories and methods in engineering design.

ME 7201. Comp Mechanics-Materials. 3 Credit Hours.
Computational treatments of material and geometric nonlinearity, with emphasis on rate-dependent elasto-plasticity and fracture.

ME 7203. Constit Relations-Solids. 3 Credit Hours.

ME 7205. Nanomechanics & Devices. 3 Credit Hours.
Introduction to mechanics and transport processes of discrete atomistic and molecular systems, fabrication of nanodevices/structures and applications to nanoelectronics, tribology, actuation and sensors.

ME 7226. Interface & Surface Prop. 3 Credit Hours.

ME 7227. Rapid Prototype-Engr. 3 Credit Hours.
Rapid prototyping technologies in engineering design. Physical principles, materials, materials processing. Laboratory demonstrations and project.

ME 7228. Thermo-Mech Reliability. 3 Credit Hours.
Modeling and validation of thermomechanical behavior of printed wiring board and PWB assembly; microelectronic packaging, packaging materials, manufacturing process modeling, reliability, failure modes.

ME 7301. Trans Ph Multiphase Flow. 3 Credit Hours.
Gas-liquid, two-phase flow patterns, basic and empirical models; conservation equations and closure relations; pool and convective boiling; aerosol transport; condensation.

ME 7442. Vibration-Continuous Sys. 3 Credit Hours.
Equations of motion and oscillatory response of dynamic systems modeled as continuous media.

ME 7602. Hydrodynamic Stability. 3 Credit Hours.

ME 7751. Computational Fluid Mech. 3 Credit Hours.
Numerical methods for solving the time-dependent Navier-Stokes equations in complex geometrics, including theory, implementation, and applications. Crosslisted with CEE 7751.

ME 7757. Teaching Practicum. 3 Credit Hours.
Supervised teaching for doctoral students. Teaching techniques, course and curriculum design, student evaluation methods and criteria. Students may, in some instances, prepare and present lectures. Crosslisted with NRE, HP, and CHBE 7757.

ME 7764. Acoustic Propagation. 3 Credit Hours.
Propagation of sound in inhomogeneous fluids; ray acoustics, ocean and atmospheric acoustics, nonlinear acoustics. Crosslisted with AE 7764.

ME 7771. Mech-Polymer Solid & Fluid. 3 Credit Hours.
Continuum mechanics of solids and fluids; mechanics of deformation of anisotropic polymers; yield, breaking, and fatigue; non-Newtonian viscous and viscoelastic behavior of polymer fluids. Crosslisted with CHE, MSE, and PTFE 7771.

ME 7772. Fund-Fracture Mechanics. 3 Credit Hours.
Advanced study of failure of structural materials under load, mechanics of fracture, and microscopic and macroscopic aspects of the fracture of engineering materials. Crosslisted with AE, CEE, CHE, and MSE 7772.

ME 7773. Adv Fracture Mechanics. 3 Credit Hours.
Nonlinear fracture mechanics including elastic-plastic and time-dependent fracture, advanced test methods, J-integral theory, and extensions. Crosslisted with AE, CEE, CHE, and MSE 7773.

ME 7774. Fatigue-Materials & Struct. 3 Credit Hours.
Mechanical and microstructural aspects of nucleation and growth of cracks under cyclic loading conditions, notch effects, cumulative damage, multiaxial loading, and fatigue crack propagation. Crosslisted with AE, CEE, CHE, and MSE 7774.

ME 7775. Fract & Fatigue Structures. 3 Credit Hours.
ME 7785. Intro Robotics Research. 3 Credit Hours.
Familiarizes students with the core areas of robotics; mechanics, control, perception, AI, and autonomy. Provides an introduction to the mathematical tools required in robotics research.

ME 7791. Damage & Fail-Composites. 3 Credit Hours.

ME 7792. Mechanics of Composites. 3 Credit Hours.
Anisotropic elasticity, hygrothermal behavior, stress analysis of laminated composites including 3D effects, stress concentrations, free-edge effects, thick laminates, adhesive and mechanical connections, fracture of composites. Crosslisted with AE, CHE, CEE, MSE, and PTFE 7792.

ME 7793. Manufacture-Composites. 3 Credit Hours.
Major manufacturing techniques of metal-ceramic and polymer-matrix composites. Modeling of processes with emphasis on fundamental mechanisms and effects. Crosslisted with AE, CEE, CHE, MSE, and PTFE 7793.

ME 8001. Master Seminar I. 1 Credit Hour.
Seminars for MSME students. Credit not allowed for both ME 8001 and ECE 8001.

ME 8002. Master Seminar II. 1 Credit Hour.
Seminars for MSME students. Credit not allowed for both ME 8002 and ECE 8001.

ME 8010. Seminar-Mechanical Engr. 1 Credit Hour.
Seminars involving current research projects presented by graduate students, faculty, and invited speakers.

ME 8011. Seminar-Mechanical Engr. 1 Credit Hour.
Seminars involving current research projects presented by graduate students, faculty, and invited speakers.

ME 8012. Seminar-Mechanical Engr. 1 Credit Hour.
Seminars involving current research projects presented by graduate students, faculty, and invited speakers.

ME 8750. Robotics Research Fnd I. 3 Credit Hours.
Multidisciplinary research course supervised by two robotics faculty from different schools participating in the robotics Ph.D. program.

ME 8751. Robotics Research Fnd II. 3 Credit Hours.
Continuation of ME 8751 (Robotics Research Foundation I).

ME 8801. Spec Topic-Manufacturing. 1 Credit Hour.
Special topic offerings of current interest in manufacturing not included in regular courses.

ME 8802. Spec Topic-Manufacturing. 2 Credit Hours.
Special topic offerings of current interest in manufacturing not included in regular courses.

ME 8803. Spec Topic-Manufacturing. 3 Credit Hours.
Special topic offerings of current interest in manufacturing not included in regular courses.

ME 8804. Spec Topic-Manufacturing. 4 Credit Hours.
Special topic offerings of current interest in manufacturing not included in regular courses.

ME 8805. Spec Topic-Manufacturing. 5 Credit Hours.
Special topic offerings of current interest in manufacturing not included in regular courses.

ME 8806. Spec Topic-Manufacturing. 6 Credit Hours.
Special topic offerings of current interest in manufacturing not included in regular courses.

ME 8811. Spec Topic-CAE & Design. 1 Credit Hour.
Special topic offerings of current interest in computer-aided engineering not included in regular courses.

ME 8812. Spec Topic-CAE & Design. 2 Credit Hours.
Special topic offerings of current interest in computer-aided engineering not included in regular courses.

ME 8813. Spec Topic-CAE & Design. 3 Credit Hours.
Special topic offerings of current interest in computer-aided engineering not included in regular courses.

ME 8814. Spec Topic-CAE & Design. 4 Credit Hours.
Special topics offerings of current interest in computer-aided engineering not included in regular courses.

ME 8815. Spec Topic-CAE & Design. 5 Credit Hours.
Special topics offerings of current interest in computer-aided engineering not included in regular courses.

ME 8816. Spec Topic-CAE & Design. 6 Credit Hours.
Special topics offerings of current interest in computer-aided engineering not included in regular courses.

ME 8821. Spec Topics-Tribology. 1 Credit Hour.
Special topic offerings of current interest in tribology not included in regular courses.

ME 8822. Spec Topics-Tribology. 2 Credit Hours.
Special topic offerings of current interest in tribology not included in regular courses.

ME 8823. Spec Topics-Tribology. 3 Credit Hours.
Special topic offerings of current interest in tribology not included in regular courses.

ME 8824. Spec Topics-Tribology. 4 Credit Hours.
Special topic offerings of current interest in tribology not included in regular courses.

ME 8825. Spec Topics-Tribology. 5 Credit Hours.
Special topic offerings of current interest in tribology not included in regular courses.

ME 8826. Spec Topics-Tribology. 6 Credit Hours.
Special topic offerings of current interest in tribology not included in regular courses.

ME 8831. Spec Top-Thermal Science. 1 Credit Hour.
Special topics offerings of current interest in thermal sciences not included in regular courses.

ME 8832. Spec Top-Thermal Science. 2 Credit Hours.
Special topics offerings of current interest in thermal sciences not included in regular courses.

ME 8833. Spec Top-Thermal Science. 3 Credit Hours.
Special topic offerings of current interest in thermal sciences not included in regular courses.

ME 8834. Spec Top-Thermal Science. 4 Credit Hours.
Special topic offerings of current interest in thermal sciences not included in regular courses.

ME 8835. Spec Top-Thermal Science. 5 Credit Hours.
Special topic offerings of current interest in thermal sciences not included in regular courses.
ME 8836. Spec Top-Thermal Science. 6 Credit Hours.
Special topics offerings of current interest in thermal sciences not included in regular courses.

ME 8841. Spec Topic-Automation. 1 Credit Hour.
Special topic offerings of current interest in automation and mechatronics not included in regular courses.

ME 8842. Spec Topic-Automation. 2 Credit Hours.
Special topic offerings of current interest in automation and mechatronics not included in regular courses.

ME 8843. Spec Topic-Automation. 3 Credit Hours.
Special topic offerings of current interest in automation and mechatronics not included in regular courses.

ME 8844. Spec Topic-Automation. 4 Credit Hours.
Special topic offerings of current interest in automation and mechatronics not included in regular courses.

ME 8845. Spec Topics-Automation. 5 Credit Hours.
Special topic offerings of current interest in automation and mechatronics not included in regular courses.

ME 8846. Spec Topic-Automation. 6 Credit Hours.
Special topic offerings of current interest in automation and mechatronics not included in regular courses.

ME 8851. Spec Top-Acoustics&Dynam. 1 Credit Hour.
Special topic offerings of current interest in acoustics and dynamics not included in regular courses.

ME 8852. Spec Top-Acoustics&Dynam. 2 Credit Hours.
Special topic offerings of current interest in acoustics and dynamics not included in regular courses.

ME 8853. Spec Top-Acoustics&Dynam. 3 Credit Hours.
Special topic offerings of current interest in acoustics and dynamics not included in regular courses.

ME 8854. Spec Top-Acoustics&Dynam. 4 Credit Hours.
Special topic offerings of current interest in acoustics and dynamics not included in regular courses.

ME 8855. Spec Top-Acoustics&Dynam. 5 Credit Hours.
Special topic offerings of current interest in acoustics and dynamics not included in regular courses.

ME 8856. Spec Top-Acoustics&Dynam. 6 Credit Hours.
Special topic offerings of current interest in acoustics and dynamics not included in regular courses.

ME 8861. Spec Top-Fluid Mechanics. 1 Credit Hour.
Special topic offerings of current interest in fluid mechanics not included in regular courses.

ME 8862. Spec Top-Fluid Mechanics. 2 Credit Hours.
Special topic offerings of current interest in fluid mechanics not included in regular courses.

ME 8863. Spec Top-Fluid Mechanics. 3 Credit Hours.
Special topic offerings of current interest in fluid mechanics not included in regular courses.

ME 8864. Spec Top-Fluid Mechanics. 4 Credit Hours.
Special topic offerings of current interest in fluid mechanics not included in regular courses.

ME 8865. Spec Top-Fluid Mechanics. 5 Credit Hours.
Special topic offerings of current interest in fluid mechanics not included in regular courses.

ME 8866. Spec Top-Fluid Mechanics. 6 Credit Hours.
Special topic offerings of current interest in fluid mechanics not included in regular courses.

ME 8871. Spec Top-Bioengineering. 1 Credit Hour.
Special topic offerings of current interest in bioengineering not included in regular courses.

ME 8872. Spec Top-Bioengineering. 2 Credit Hours.
Special topic offerings of current interest in bioengineering not included in regular courses.

ME 8873. Spec Top-Bioengineering. 3 Credit Hours.
Special topic offerings of current interest in bioengineering not included in regular courses.

ME 8874. Spec Top-Bioengineering. 4 Credit Hours.
Special topic offerings of current interest in bioengineering not included in regular courses.

ME 8875. Spec Top-Bioengineering. 5 Credit Hours.
Special topic offerings of current interest in bioengineering not included in regular courses.

ME 8876. Spec Top-Bioengineering. 6 Credit Hours.
Special topic offerings of current interest in bioengineering not included in regular courses.

ME 8881. Sp Top-Mech of Materials. 1 Credit Hour.
Special topic offerings of current interest in mechanics of materials not included in regular courses.

ME 8882. Sp Top-Mech of Materials. 2 Credit Hours.
Special topic offerings of current interest in mechanics of materials not included in regular courses.

ME 8883. Sp Top-Mech of Materials. 3 Credit Hours.
Special topic offerings of current interest in mechanics of materials not included in regular courses.

ME 8884. Sp Top-Mech of Materials. 4 Credit Hours.
Special topic offerings of current interest in mechanics of materials not included in regular courses.

ME 8885. SP Top-Mech of Materials. 5 Credit Hours.
Special topic offerings of current interest in mechanics of materials not included in regular courses.

ME 8886. Sp Top-Mech of Materials. 6 Credit Hours.
Special topic offerings of current interest in mechanics of materials not included in regular courses.

ME 8901. Spec Prob-Manufacturing. 1-21 Credit Hours.
Individual studies and/or experimental investigation of problems of current interest in manufacturing.

ME 8902. Spec Prob-Manufacturing. 1-21 Credit Hours.
Individual studies and/or experimental investigation of problems of current interest in manufacturing.

ME 8903. Spec Prob-Manufacturing. 1-21 Credit Hours.
Individual studies and/or experimental investigation of problems of current interest in manufacturing.

ME 8904. Spec Prob-Manufacturing. 1-21 Credit Hours.
Individual studies and/or experimental investigation of problems of current interest in manufacturing.

ME 8905. Spec Prob-Manufacturing. 1-21 Credit Hours.
Individual studies and/or experimental investigation of problems of current interest in manufacturing.
ME 8906. Spec Prob-Manufacturing. 1-21 Credit Hours. Individual studies and/or experimental investigation of problems of current interest in manufacturing.

ME 8911. Spec Prob-CAE & Design. 1-21 Credit Hours. Individual studies and/or experimental investigation of problems of current interest in computer-aided engineering and design.

ME 8912. Spec Prob-CAE & Design. 1-21 Credit Hours. Individual studies and/or experimental investigations of problems of current interest in computer-aided engineering and design.

ME 8913. Spec Prob-CAE & Design. 1-21 Credit Hours. Individual studies and/or experimental investigations of problems of current interest in computer-aided engineering and design.

ME 8914. Spec Prob-CAE & Design. 1-21 Credit Hours. Individual studies and/or experimental investigation of problems of current interest in computer-aided engineering and design.

ME 8915. Spec Prob-CAE & Design. 1-21 Credit Hours. Individual studies and/or experimental investigation of problems of current interest in computer-aided engineering and design.

ME 8916. Spec Prob-CAE & Design. 1-21 Credit Hours. Individual studies and/or experimental investigations of problems of current interest in computer-aided engineering and design.

ME 8921. Spec Problems-Tribology. 1-21 Credit Hours. Individual studies and/or experimental investigations of problems of current interest in tribology.

ME 8922. Spec Problems-Tribology. 1-21 Credit Hours. Individual studies and/or experimental investigation of problems of current interest in tribology.

ME 8923. Spec Problems-Tribology. 1-21 Credit Hours. Individual studies and/or experimental investigation of problems of current interest in tribology.

ME 8924. Spec Problem-Tribology. 1-21 Credit Hours. Individual studies and/or experimental investigations of problems of current interest in tribology.

ME 8925. Spec Problems-Tribology. 1-21 Credit Hours. Individual studies and/or experimental investigations of problems of current interest in tribology.

ME 8926. Spec Problems-Tribology. 1-21 Credit Hours. Individual studies and/or experimental investigations of problems of current interest in tribology.

ME 8931. Spec Prob-Therm Sciences. 1-21 Credit Hours. Individual studies and/or experimental investigations of problems of current interest in thermal sciences.

ME 8932. Spec Prob-Therm Sciences. 1-21 Credit Hours. Individual studies and/or experimental investigations of problems of current interest in thermal sciences.

ME 8933. Spec Prob-Therm Sciences. 1-21 Credit Hours. Individual studies and/or experimental investigation of problems of current interest in thermal sciences.

ME 8934. Spec Prob-Therm Sciences. 1-21 Credit Hours. Individual studies and/or experimental investigations of problems of current interest in thermal sciences.

ME 8935. Spec Prob-Therm Sciences. 1-21 Credit Hours. Individual studies and/or experimental investigations of problems of current interest in thermal sciences.

ME 8936. Spec Prob-Therm Sciences. 1-21 Credit Hours. Individual studies and/or experimental investigations of problems of current interest in thermal sciences.

ME 8941. Special Prob-Automation. 1-21 Credit Hours. Individual studies and/or experimental investigations of problems of current interest in automation and mechatronics.

ME 8942. Special Prob-Automation. 1-21 Credit Hours. Individual studies and/or experimental investigations of problems of current interest in automation and mechatronics.

ME 8943. Special Prob-Automation. 1-21 Credit Hours. Individual studies and/or experimental investigations of problems of current interest in automation and mechatronics.

ME 8944. Special Prob-Automation. 1-21 Credit Hours. Individual studies and/or experimental investigations of problems of current interest in automation and mechatronics.

ME 8945. Special Prob-Automation. 1-21 Credit Hours. Individual studies and/or experimental investigations of problems of current interest in automation and mechatronics.

ME 8946. Special Prob-Automation. 1-21 Credit Hours. Individual studies and/or experimental investigations of problems of current interest in automation and mechatronics.

ME 8951. Spec Prob-Acoustic/Dynamic. 1-21 Credit Hours. Individual studies and/or experimental investigations of problems of current interest in acoustics and dynamics.

ME 8952. Spec Prob-Acoustic/Dynamic. 1-21 Credit Hours. Individual studies and/or experimental investigations of problems of current interest in acoustics and dynamics.

ME 8953. Spec Prob-Acoustic/Dynamic. 1-21 Credit Hours. Individual studies and/or experimental investigations of problems of current interest in acoustics and dynamics.

ME 8954. Spec Prob-Acoustic/Dynamic. 1-21 Credit Hours. Individual studies and/or experimental investigations of problems of current interest in acoustics and dynamics.

ME 8955. Spec Prob-Acoustic/Dynamic. 1-21 Credit Hours. Individual studies and/or experimental investigations of problems of current interest in acoustics and dynamics.

ME 8956. Spec Prob-Acoustic/Dynamic. 1-21 Credit Hours. Individual studies and/or experimental investigations of problems of current interest in acoustics and dynamics.

ME 8961. Spec Prob-Fluid Mechanic. 1-21 Credit Hours. Individual studies and/or experimental investigations of problems of current interest in fluid mechanics.

ME 8962. Spec Prob-Fluid Mechanic. 1-21 Credit Hours. Individual studies and/or experimental investigations of problems of current interest in fluid mechanics.

ME 8963. Spec Prob-Fluid Mechanic. 1-21 Credit Hours. Individual studies and/or experimental investigations of problems of current interest in fluid mechanics.

ME 8964. Spec Prob-Fluid Mechanic. 1-21 Credit Hours. Individual studies and/or experimental investigations of problems of current interest in fluid mechanics.

ME 8965. Spec Prob-Fluid Mechanic. 1-21 Credit Hours. Individual studies and/or experimental investigations of problems of current interest in fluid mechanics.
ME 8966. Spec Prob-Fluid Mechanic. 1-21 Credit Hours.
Individual studies and/or experimental investigations of problems of current interest in fluid mechanics.

ME 8971. Spec Prob-Bioengineering. 1-21 Credit Hours.
Individual studies and/or experimental investigations of problems of current interest in bioengineering.

ME 8972. Spec Prob-Bioengineering. 1-21 Credit Hours.
Individual studies and/or experimental investigations of problems of current interest in bioengineering.

ME 8973. Spec Prob-Bioengineering. 1-21 Credit Hours.
Individual studies and/or experimental investigations of problems of current interest in bioengineering.

ME 8974. Spec Prob-Bioengineering. 1-21 Credit Hours.
Individual studies and/or experimental investigations of problems of current interest in bioengineering.

ME 8975. Spec Prob-Bioengineering. 1-21 Credit Hours.
Individual studies and/or experimental investigations of problems of current interest in bioengineering.

ME 8976. Spec PRob-Bioengineering. 1-21 Credit Hours.
Individual studies and/or experimental investigations of problems of current interest in bioengineering.

ME 8981. Sp Prob-Mech of Material. 1-21 Credit Hours.
Individual studies and/or experimental investigations of problems of current interest in the mechanics of materials.

ME 8982. SP Prob-Mech of Material. 1-21 Credit Hours.
Individual studies and/or experimental investigations of problems of current interest in the mechanics of materials.

ME 8983. Sp Prob-Mech of Material. 1-21 Credit Hours.
Individual studies and/or experimental investigations of problems of current interest in the mechanics of materials.

ME 8984. Sp Prob-Mech of Material. 1-21 Credit Hours.
Individual studies and/or experimental investigations of problems of current interest in the mechanics of materials.

ME 8985. Sp Prob-Mech of Material. 1-21 Credit Hours.
Individual studies and/or experimental investigations of problems of current interest in the mechanics of materials.

ME 8986. SP Prob-Mech of Material. 1-21 Credit Hours.
Individual studies and/or experimental investigations of problems of current interest in the mechanics of materials.

ME 8997. Teaching Assistantship. 1-9 Credit Hours.
For graduate students holding graduate teaching assistantships.

ME 8998. Research Assistantship. 1-9 Credit Hours.
For graduate students holding graduate research assistantships.

ME 9000. Doctoral Thesis. 1-21 Credit Hours.

Medical Physics (MP)

MP 4750. Diagnostic Imaging Phys. 3 Credit Hours.
Physics and image formation methods for conventional X-ray CT, nuclear medicine, and magnetic resonance and ultrasound imaging.

MP 4XXX. Medical Physics Elective. 1-21 Credit Hours.

MP 6011. Seminar in Medical Physics I. 1 Credit Hour.
Weekly 1-hour seminar on topics related to medical physics.

MP 6012. Seminar in Medical Physics II. 1 Credit Hour.
Weekly 1-hour seminar on topics related to medical physics.

MP 6101. Nuclear Medicine Physics. 3 Credit Hours.
Radioisotope production, radiopharmacy, planar gamma cameras, SPECT systems, PET systems, medical internal radiation dose (MIRD) method, nuclear medicine facilities and regulations.

MP 6201. Radiation Therapy Phys. 3 Credit Hours.
Clinical radiation oncology, phantom systems, radiation machines, photon beams, electron beams, brachytherapy, dose modeling and treatment planning.

MP 6203. Rad Thrpy Treat Plan Lab. 1 Credit Hour.
Radiation therapy treatment planning course covering conventional radiation therapy treatment planning, monitor unit calculations, and advanced radiation treatment planning techniques.

MP 6204. Radiation Therapy Phys. 4 Credit Hours.
Measurement and calculation of absorbed dose, dose distributions, treatment planning, photon teletherapy, electron teletherapy, brachytherapy, clinical linear accelerators, quality assurance.

MP 6300. Radiological Anatomy. 1 Credit Hour.
A survey of the most clinically relevant anatomy as visualized by modern diagnostic imaging; plan radiographs, CT, MRI, and PET are emphasized.

MP 6401. Medical Health Physics. 3 Credit Hours.

MP 6402. Radiation Dosimetry. 2 Credit Hours.
Dosimetry of ionizing radiation: photons, neutrons, and charged particles; cavity theory; concept of exposure and absorbed dose; ion chambers and other types of integration dosimeters.

MP 6403. Monte Carlo in Med Phys. 3 Credit Hours.
Basic principles of the Monte Carlo method, Monte Carlo transport of photon and electron, various applications of the Monte Carlo method in medical physics.

MP 6405. Rad Protection&Dosimetry. 3 Credit Hours.
Radiation dosimetry quantities, calculational and experimental methods for assessing the absorbed dose, effective dose assessment, committed effective dose assessment, radiation shielding methods.

MP 6407. Radiation Bio&Oncology. 3 Credit Hours.
Radiation lesions and repair, mechanisms of cell death, cell cycle effect, radiation sensitizers and protectors, tumor radiobiology, relative sensitivities of human tissues, and radiation carcinogenesis.

MP 6756. Radiative Effects. 3 Credit Hours.
Characteristics of atomic and nuclear radiation, transition probabilities, radioactivity abd isotopes, cross sections, electromagnetic radiation, neutrons, and charges particle interaction with matter. Crosslisted with NRE 6756 and HP 6756.

MP 6757. Radiation Detection. 3 Credit Hours.
Introduction to the theory and application of radiation detectors, measurement methods, signal processing, and data analysis. Crosslisted with HP 6757 and NRE 6757.

MP 6759. Radiation Shielding. 3 Credit Hours.
Principles of Radiation Shielding; Design of Shields; Computational Methods for Analysis of Shielding; Emphasis on Monte Carlo Simulation as a Shielding Tool.

MP 6XXX. Medical Physics Elective. 1-21 Credit Hours.

MP 7000. Master’s Thesis. 1-21 Credit Hours.

MP 8011. Sem-Medical Physics I. 1 Credit Hour.
Weekly one hour seminars on topics related to medical physics.
MP 8012. Sem-Medical Physics II. 1 Credit Hour.
Weekly one hour seminar on topics related to medical physics.

MP 8101. Clinical Intern-Nucl Med. 1 Credit Hour.
One hundred supervised contact hours of clinical internship in the Nuclear Medicine Department of Emory University.

MP 8102. Clinic Intern-Diag Imag. 1 Credit Hour.
One hundred supervised contact hours of clinical internship in the Radiology Department of Emory University (or equivalent).

MP 8103. Clinic Intern-Rad Therpy. 1 Credit Hour.
Two hundred supervised contact hours of clinical internship in the Radiation Oncology Department of Emory University (or equivalent).

MP 8104. Clinic Rotation-Med Phys. 3 Credit Hours.
Four hundred supervised contact hours of clinical internship in diagnostic imaging, nuclear medicine, and radiation oncology at the affiliated clinical facilities.

MP 8801. Special Topics. 1 Credit Hour.
Special topics offerings of current interest in medical physics not included in regular courses.

MP 8802. Special Topics. 2 Credit Hours.
Special topics offerings of current interest in medical physics not included in regular courses.

MP 8803. Special Topics. 3 Credit Hours.
Special topics of current interest in medical physics not included in regular offerings.

MP 8804. Special Topics. 4 Credit Hours.
Special topics offerings of current interest in medical physics not included in regular courses.

MP 8805. Special Topics. 5 Credit Hours.
Special topics offerings of current interest in medical physics not included in regular courses.

MP 8806. Special Topics. 6 Credit Hours.
Special topics offerings of current interest in medical physics not included in regular courses.

MP 8901. Special Problems. 1-21 Credit Hours.
Individual studies and/or experimental investigations of problems of current interest in medical physics.

MP 8902. Special Problems. 1-21 Credit Hours.
Individual studies and/or experimental investigations of problems of current interest in medical physics.

MP 8903. Special Problems. 1-21 Credit Hours.
Individual studies and/or experimental investigations of problems of current interest in medical physics.

MP 8904. Special Problems. 1-21 Credit Hours.
Individual studies and/or experimental investigations of problems of current interest in medical physics.

MP 8905. Special Problems. 1-21 Credit Hours.
Individual studies and/or experimental investigations of problems of current interest in medical physics.

MP 8906. Special Problems. 1-21 Credit Hours.
Individual studies and/or experimental investigation of problems of current interest in medical physics.

MP 9000. Doctoral Thesis. 1-21 Credit Hours.

Military Science & Leadership (MSL)

MSL 1001. Leadership & Personal Dev. 3 Credit Hours.
Introduces cadets to the personal challenges and competencies that are critical for effective leadership. Cadets learn how the personal development of life skills such as critical thinking, goal setting, time management, physical fitness, and stress management relate to leadership, officership, and the Army profession. The focus is on developing basic knowledge and comprehension of Army leadership dimensions while gaining a big picture understanding of the ROTC program, its purpose in the Army, and its advantages for the student.

MSL 1002. Intr Tactical Leadership. 3 Credit Hours.
Overviews leadership fundamentals such as setting direction, problem-solving, listening, presenting briefs, providing feedback, and using elective writing skills. Cadets explore dimensions of leadership values, attributes, skills, and actions in the context of practical, hands-on, and interactive exercises. Continued emphasis is placed on recruitment and retention of cadets. Cadre role models and the building of stronger relationships among the cadets through common exercise and practical interaction are critical aspects of this course.

MSL 1XXX. Military Sci Elective. 1-21 Credit Hours.

MSL 2001. Innovative Team Leadership. 3 Credit Hours.
Explores the dimensions of creative and innovative tactical leadership strategies and styles by examining team dynamics and two historical leadership theories that form the basis of the Army leadership framework (trait and behavior theories). Cadets practice aspects of personal motivation and team building in the context of planning, executing, and assessing team exercises and participating in leadership labs. Focus is on continued development of the knowledge of leadership values and attributes through an understanding of Army rank, structure, duties and basic aspects of land navigation and squad tactics. Case studies provide tangible context for learning the Soldier’s Creed and Warrior Ethos as they apply in the contemporary operating environment (COE).

MSL 2002. Found Tatical Leadership. 3 Credit Hours.
Examines the challenges of leading tactical teams in the complex contemporary operating environment (COE). The course highlights dimensions of terrain analysis, patrolling, and operation orders. Further study of the theoretical basis of the Army leadership framework explores the dynamics of adaptive leadership in the context of military operations. Cadets develop greater self awareness as they assess their own leadership styles and practice communication and team building skills. COE case studies give insight into the importance and practice of teamwork and tactics in real-world scenarios.

MSL 2XXX. Military Sci Elective. 1-21 Credit Hours.

MSL 3001. Adapt Tactical Leadership. 4 Credit Hours.
Challenges cadets to study, practice, and evaluate adaptive leadership skills as they are presented with challenging scenarios related to squad tactical operations. Cadets receive systematic and specific feedback on their leadership attributes and actions. Based on such feedback, as well as their own self evaluations, cadets continue to develop their leadership and critical thinking abilities. The focus is developing cadets’ tactical leadership abilities to enable them to succeed at ROTC’s summer Leadership Development and Assessment Course (LDAC).
MSL 3002. Leadership-Changing Enviro. 4 Credit Hours.
Uses increasingly intense situational leadership challenges to build
cadet awareness and skills in leading tactical operations up to platoon
level. Cadets review aspects of combat, stability, and support operations.
They also conduct military briefings and develop proficiency in garrison
operation orders. The focus is on exploring, evaluating, and developing
skills in decision-making, persuading, and motivating team members in
the contemporary operating environment (COE). Cadets are evaluated on
what they know, and do as leaders as they prepare to attend the ROTC
summer Leadership Development Assessment Course (LDAC).

MSL 3XXX. Military Sci Elective. 1-21 Credit Hours.

MSL 4001. Develop Adaptive Leaders. 4 Credit Hours.
Develops cadet proficiency in planning, executing, and assessing
complex operations, functioning as a member of a staff, and providing
performance feedback to subordinates. Cadets assess risk, make ethical
decisions, and lead fellow ROTC cadets. Lessons on military justice and
personnel processes prepare cadets to make the transition to Army
officers. MSIV cadets analyze, evaluate, and instruct cadets at lower
levels. Both their classroom and battalion leadership experiences are
designed to prepare cadets for their first unit of assignment. They identify
responsibilities of key staff, coordinate staff roles, and use situational
opportunities to teach, train, and develop subordinates.

MSL 4002. Leadership-Complex World. 4 Credit Hours.
Explores the dynamics of leading in the complex situations of current
military operations in the contemporary operating environment (COE).
Cadets examine differences in customs and courtesies, military law,
principles of war, and rules of engagement in the face of international
terrorism. They also explore aspects of interacting with non-government
organizations, civilians on the battlefield, and host national support.
The course places significant emphasis on preparing cadets for their
first unit of assignment. It uses case studies, scenarios, and "What now
Lieutenant?" exercises to prepare cadets to face the complex ethical and
practical demands of leading as commissioned officers in the United
States Army.

MSL 4801. Special Topics. 1 Credit Hour.
Topics and research will pursue areas of military science not extensively
treated in other Military Science courses.

MSL 4802. Special Topics. 2 Credit Hours.
Topics and research will pursue areas of military science not extensively
treated in other Military Science courses.

MSL 4803. Special Topics. 1-3 Credit Hours.
Topics and research will pursue areas of military science not extensively
treated in other Military Science courses.

MSL 4804. Special Topics. 4 Credit Hours.
Topics and research will pursue areas of military science not extensively
treated in other Military Science courses.

MSL 4805. Special Topics. 5 Credit Hours.
Topics and research will pursue areas of military science not extensively
treated in other Military Science courses.

MSL 4901. Special Problems. 1-21 Credit Hours.
Permits independent study with a faculty member. Topics and research
will pursue areas of military science not extensively treated in any other
Military Science class.

MSL 4XXX. Military Sci Elective. 1-21 Credit Hours.

Modern Languages (ML)

ML 1803. Special Topics. 3 Credit Hours.
Topics of current interest in Modern Languages, including Korean and
Arabic.

ML 1804. Special Topics. 4 Credit Hours.
Topics of current interest in Modern Languages, including Korean and
Arabic.

ML 1813. Special Topics. 3 Credit Hours.
Topics of current interest in Modern Languages.

ML 1814. Special Topics. 4 Credit Hours.
Topics of current interest in Modern Languages.

ML 1815. Special Topics. 5 Credit Hours.
Topics of current interest in Modern Languages.

ML 1823. Special Topics. 3 Credit Hours.
Topics of current interest in Modern Languages.

ML 1824. Special Topics. 4 Credit Hours.
Topics of current interest in Modern Languages.

ML 1833. Special Topics. 3 Credit Hours.
Topics of current interest in Modern Languages.

ML 1834. Special Topics. 4 Credit Hours.
Topics of current interest in Modern Languages.

ML 2500. Intro Cross-Cult Studies. 3 Credit Hours.
This course introduces students to literature and film from around the
globe and teaches comparative literary and cultural studies analysis.

ML 2811. Special Topics. 1 Credit Hour.
Special Topics in Modern Languages.

ML 2813. Special Topics. 3 Credit Hours.
Topics of current interest in Modern Languages.

ML 3811. Special Topics. 1 Credit Hour.
Special Topics in Modern Languages.

ML 3812. Special Topics. 2 Credit Hours.
Topics of current interest in Modern Languages.

ML 3813. Special Topics. 3 Credit Hours.
Topics of current interest in Modern Languages.

ML 4813. Special Topics. 3 Credit Hours.
Topics of current interest in Modern Languages.

Music (MUSI)

MUSI 1008. Marching Band. 2 Credit Hours.
The Georgia Tech Marching Yellow Jackets perform at all home and
some away football games. Students are expected to attend a pre-season
camp. All conflicts must be approved by director.

MUSI 1009. Pep Band. 1 Credit Hour.
Performance ensemble for men's and women's basketball games.

MUSI 1102. Concert Band. 1 Credit Hour.
An instrumental ensemble that performs traditional and contemporary
wind literature and is offered to all students with wind, brass, or
percussion experience.

MUSI 1103. Concert Band. 1 Credit Hour.
An instrumental ensemble that performs traditional and contemporary
wind literature and is offered to all students with wind, brass, or
percussion experience.
MUSI 1112. Symphonic Band. 1 Credit Hour.
Audition required prior to the first day of class. An auditioned instrumental ensemble for the more accomplished student interested in band performance; focusing on musical excellence of challenging band literature. Contact director for audition requirements.

MUSI 1113. Symphonic Band. 1 Credit Hour.
Audition required prior to the first day of class. An auditioned instrumental ensemble for the more accomplished student interested in band performance; focusing on musical excellence of challenging band literature. Contact director for audition requirements.

MUSI 1114. Symphonic Band. 1 Credit Hour.
Audition required prior to the first day of class. An auditioned instrumental ensemble for the more accomplished student interested in band performance; focusing on musical excellence of challenging band literature. Contact director for audition requirements.

MUSI 1201. Chorale. 1 Credit Hour.
A large ensemble focused on rehearsal and performance of high quality music of all genres. Choral music experience recommended.

MUSI 1202. Chorale. 1 Credit Hour.
A large ensemble focused on rehearsal and performance of high quality music of all genres. Choral music experience recommended.

MUSI 1203. Chorale. 1 Credit Hour.
A large ensemble focused on rehearsal and performance of high quality music of all genres. Choral music experience recommended.

MUSI 1211. Vocal Ensemble. 1 Credit Hour.
An auditioned vocal ensemble for the more serious student of vocal music; focuses on rehearsal and performance of high-quality music of all genres. Audition and/or consent of instructor required.

MUSI 1212. Vocal Ensemble. 1 Credit Hour.
Audition and/or consent of instructor required. An auditioned vocal ensemble for the more serious student of vocal music; focused on rehearsal and performance of high-quality music of all genres.

MUSI 1213. Vocal Ensemble. 1 Credit Hour.
Audition and/or consent of instructor required. An auditioned vocal ensemble for the more serious student of vocal music; focused on rehearsal and performance of high-quality music of all genres.

MUSI 1221. Men's Glee Club. 1 Credit Hour.
An all-male choral ensemble focused on rehearsal and performance of male chorus literature.

MUSI 1222. Men's Glee Club. 1 Credit Hour.
An all-male choral ensemble focused on rehearsal and performance of male chorus literature.

MUSI 1223. Men's Glee Club. 1 Credit Hour.
An all-male choral ensemble focused on rehearsal and performance of male chorus literature.

MUSI 1301. Jazz Ensemble. 1 Credit Hour.
A traditional twenty member big band and small ensemble specializing in improvisation. Members learn various jazz styles, performance practices, and history.

MUSI 1302. Jazz Ensemble. 1 Credit Hour.
A traditional twenty member big band and small ensemble specializing in improvisation. Members learn various jazz styles, performance practices, and history.

MUSI 1303. Jazz Ensemble. 1 Credit Hour.
A traditional twenty member big band and small ensemble specializing in improvisation. Members learn various jazz styles, performance practices, and history.

MUSI 1401. Chamber Ensemble. 1 Credit Hour.
Small instrumental ensembles of various types selected by the director to perform literature for the specific ensemble.

MUSI 1402. Chamber Ensemble. 1 Credit Hour.
Small instrumental ensembles of various types selected by the director to perform literature for the specific ensemble.

MUSI 1403. Chamber Ensemble. 1 Credit Hour.
Small instrumental ensembles of various types selected by the director to perform literature for the specific ensemble.

MUSI 1501. Percussion Ensemble. 1 Credit Hour.
Percussion ensemble focuses on traditional and contemporary ensemble literature as well as transcriptions of popular music.

MUSI 1502. Percussion Ensemble. 1 Credit Hour.
Percussion ensemble focuses on traditional and contemporary ensemble literature as well as transcriptions of popular music.

MUSI 1503. Percussion Ensemble. 1 Credit Hour.
Percussion ensemble focuses on traditional and contemporary ensemble literature as well as transcriptions of popular music.

MUSI 1601. University Orchestra. 1 Credit Hour.
The Georgia Tech Orchestra maintains a full complement of woodwinds, brass, percussion, and strings and performs classical through contemporary literature. Contact director prior to the first day of class to arrange an audition.

MUSI 1602. University Orchestra. 1 Credit Hour.
The Georgia Tech Orchestra maintains a full complement of woodwinds, brass, percussion, and strings and performs classical through contemporary literature. Contact director prior to the first day of class to arrange an audition.

MUSI 1603. University Orchestra. 1 Credit Hour.
The Georgia Tech Orchestra maintains a full complement of woodwinds, brass, percussion, and strings and performs classical through contemporary literature. Contact director prior to the first day of class to arrange an audition.

MUSI 2008. Marching Band. 2 Credit Hours.
The Georgia Tech Marching Yellow Jackets perform at all home and some away football games. Students are expected to attend a pre-season camp. All conflicts must be approved by director.

MUSI 2009. Pep Band. 1 Credit Hour.
Performance ensemble for men's and women's basketball games.

MUSI 2010. Funds of Musicianship I. 3 Credit Hours.
First semester of integrated sequence in music theory, aural training, music technology, and music literature.

MUSI 2011. Funds of Musicianship II. 3 Credit Hours.
Second semester of integrated sequence in music theory, aural training, music technology, and music literature.

MUSI 2012. Fund of Musicianship III. 3 Credit Hours.
The third semester of integrated sequence in music theory, aural training, music technology, and music literature; focused on advanced theory, history, and technology topics.
MUSI 2223. Men's Glee Club. 1 Credit Hour.
An all-male choral ensemble focused on rehearsal and performance of male chorus literature.

MUSI 2301. Jazz Ensemble. 1 Credit Hour.
A traditional twenty member big band and small ensemble specializing in improvisation. Members learn various jazz styles, performance practices, and history.

MUSI 2302. Jazz Ensemble. 1 Credit Hour.
A traditional twenty member big band and small ensemble specializing in improvisation. Members learn various jazz styles, performance practices, and history.

MUSI 2303. Jazz Ensemble. 1 Credit Hour.
A traditional twenty member big band and small ensemble specializing in improvisation. Members learn various jazz styles, performance practices, and history.

MUSI 2401. Chamber Ensemble. 1 Credit Hour.
Small instrumental ensembles of various types selected by the director to perform literature for the specific ensemble.

MUSI 2402. Chamber Ensemble. 1 Credit Hour.
Small instrumental ensembles of various types selected by the director to perform literature for the specific ensemble.

MUSI 2403. Chamber Ensemble. 1 Credit Hour.
Small instrumental ensembles of various types selected by the director to perform literature for the specific ensemble.

MUSI 2501. Percussion Ensemble. 1 Credit Hour.
Percussion ensemble focuses on traditional and contemporary ensemble literature as well as transcriptions of popular music.

MUSI 2502. Percussion Ensemble. 1 Credit Hour.
Percussion ensemble focuses on traditional and contemporary ensemble literature as well as transcriptions of popular music.

MUSI 2503. Percussion Ensemble. 1 Credit Hour.
Percussion ensemble focuses on traditional and contemporary ensemble literature as well as transcriptions of popular music.

MUSI 2521. Elec Percuss Studio/Ens.. 3 Credit Hours.
Applied design construction and programming for performance.

MUSI 2522. Elec Percuss Studio/Ens.. 3 Credit Hours.
Applied design construction and programming for performance.

MUSI 2525. Intro to Audio Tech I. 3 Credit Hours.
Critical understanding of, and hands-on experience with the fundamentals of analog audio technology. Topics include signals and systems, electro-acoustics, sound effects, synthesis and music protocols.

MUSI 2526. Intro to Audio Tech II. 3 Credit Hours.
Critical understanding of, and hands-on experience with the fundamentals of digital audio technology. Topics include sampling, quantization, digital effects, music information retrieval and audio coding.

MUSI 2600. Music Theory I. 2 Credit Hours.
Fundamentals of music language to include basic notation, scales, key, signatures, and triads. Ability to read music required.

MUSI 2601. University Orchestra. 1 Credit Hour.
The Georgia Tech Orchestra maintains a full complement of woodwinds, brass, percussion, and strings and performs classical through contemporary literature. Contact director prior to the first day of class to arrange audition.
MUSI 2602. University Orchestra. 1 Credit Hour.
The Georgia Tech Orchestra maintains a full complement of woodwinds, brass, percussion, and strings and performs classical through contemporary literature. Contact director prior to the first day of class to arrange audition.

MUSI 2603. University Orchestra. 1 Credit Hour.
The Georgia Tech Orchestra maintains a full complement of woodwinds, brass, percussion, and strings and performs classical through contemporary literature. Contact director prior to the first day of class to arrange audition.

MUSI 2698. Research Assistantship. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

MUSI 2699. Undergraduate Research. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

MUSI 3008. Marching Band. 2 Credit Hours.
The Georgia Tech Marching Yellow Jackets perform at all home and some away football games. Students are expected to attend a pre-season camp. All conflicts must be approved by director.

MUSI 3009. Pep Band. 1 Credit Hour.
Performance ensemble for men's and women's basketball games.

MUSI 3018. Marching Band. 2 Credit Hours.
This course will prepare various traditional and contemporary music for scheduled performances throughout the semester in support various athletic events and School of Music concerts.

MUSI 3019. Pep Band. 1 Credit Hour.
This course will prepare a variety of traditional and contemporary music for scheduled performances throughout the semester in support of various athletic events and School of Music concerts.

MUSI 3102. Concert Band. 1 Credit Hour.
An instrumental ensemble that performs traditional and contemporary wind literature and is offered to all students with wind, brass, or percussion experience.

MUSI 3103. Concert Band. 1 Credit Hour.
An instrumental ensemble that performs traditional and contemporary wind literature and is offered to all students with wind, brass, or percussion experience.

MUSI 3112. Symphonic Band. 1 Credit Hour.
Audition required prior to the first day of class. An auditioned instrumental ensemble for the more accomplished student interested in band performance; focusing on musical excellence of challenging band literature. Contact director for audition requirements.

MUSI 3113. Symphonic Band. 1 Credit Hour.
Prerequisite: Audition prior to the first day of class. An auditioned instrumental ensemble for the more accomplished student interested in band performance; focusing on musical excellence of challenging band literature. Contact director for audition requirements.

MUSI 3121. Concert Band. 1 Credit Hour.
An advanced instrumental ensemble performing traditional and contemporary wind literature. Offered to all students with woodwind, brass, or percussion experience. Audition required.

MUSI 3131. Symphonic Band. 1 Credit Hour.
An advanced instrumental ensemble performing traditional and contemporary wind literature. Offered to all students with woodwind, brass, or percussion experience. Audition required.

MUSI 3101. Chorale. 1 Credit Hour.
A large ensemble focused on rehearsal and performance of high-quality music of all genres. Aural training in the performance of choral music is recommended.

MUSI 3102. Chorale. 1 Credit Hour.
Prerequisite: Aural training in the performance of choral music is recommended. An advanced choir focused on rehearsal and performance of high-quality music of all genres.

MUSI 3103. Chorale. 1 Credit Hour.
Prerequisite: Aural training in the performance of choral music is recommended. An advanced choir focused on rehearsal and performance of high-quality music of all genres.

MUSI 3211. Vocal Ensemble. 1 Credit Hour.
An auditioned vocal ensemble of the more serious student of vocal music; focuses on rehearsal and performance of high-quality music of all genres. Audition and/or consent of instructor required.

MUSI 3212. Vocal Ensemble. 1 Credit Hour.
Prerequisite: Audition and/or consent of instructor. An auditioned vocal ensemble for the more serious student of vocal music; focused on rehearsal and performance of high-quality music of all genres.

MUSI 3213. Vocal Ensemble. 1 Credit Hour.
Prerequisite: Audition and/or consent of instructor. An auditioned vocal ensemble for the more serious student of vocal music; focused on rehearsal and performance of high-quality music of all genres.

MUSI 3221. Men's Glee Club. 1 Credit Hour.
An all-male choral ensemble focused on rehearsal and performance of male chorus literature.

MUSI 3222. Men's Glee Club. 1 Credit Hour.
An all-male choral ensemble focused on rehearsal and performance of male chorus literature.

MUSI 3223. Men's Glee Club. 1 Credit Hour.
An all-male choral ensemble focused on rehearsal and performance of male chorus literature.

MUSI 3231. Chamber Choir. 1 Credit Hour.
An auditioned mixed ensemble focused upon the rehearsal, study and performance of choral music. Repertoire varies from various style eras and genres.

MUSI 3241. Chorale. 1 Credit Hour.
A non-auditioned mixed ensemble focused upon the rehearsal, study and performance of choral music. Repertoire varies from various style eras and genres.

MUSI 3251. Glee Club. 1 Credit Hour.
A non-auditioned male ensemble focused upon the rehearsal, study and performance of choral music. Repertoire varies from various style eras and genres.

MUSI 3261. Women's Choir. 1 Credit Hour.
A non-auditioned TREBLE ensemble focused upon the rehearsal, study and performance of choral music. Repertoire varies from various style eras and genres.

MUSI 3301. Jazz Ensemble. 1 Credit Hour.
A traditional twenty member big band and small ensemble specializing in improvisation. Members learn various jazz styles, performance practices, and history.

MUSI 3302. Jazz Ensemble. 1 Credit Hour.
A traditional twenty member big band and small ensemble specializing in improvisation. Members learn various jazz styles, performance practices, and history.
MUSI 3303. Jazz Ensemble. 1 Credit Hour.
A traditional twenty member big band and small ensemble specializing in improvisation. Members learn various jazz styles, performance practices, and history.

MUSI 3311. Jazz Ensemble. 1 Credit Hour.
Jazz Ensemble explores music from the 1920’s to the present, focusing on ensemble playing and improvisation.

MUSI 3321. Jazz Combo. 1 Credit Hour.
Jazz Combos explore small group jazz focusing on ensemble playing and improvisation.

MUSI 3401. Chamber Ensemble. 1 Credit Hour.
Small instrumental ensembles of various types selected by the director to perform literature for the specific ensemble.

MUSI 3402. Chamber Ensemble. 1 Credit Hour.
Small instrumental ensembles of various types selected by the director to perform literature for the specific ensemble.

MUSI 3403. Chamber Ensemble. 1 Credit Hour.
Small instrumental ensembles of various types selected by the director to perform literature for the specific ensemble.

MUSI 3411. Chamber Ensemble. 1 Credit Hour.
An advanced ensemble performing traditional and contemporary chamber ensemble literature. Audition and permit required.

MUSI 3450. Survey-Music Technology. 3 Credit Hours.
A detailed survey of historic and contemporary electronic music systems and their applications in the creation, production, and reproduction of music.

MUSI 3500. Intro-Computer Music. 2 Credit Hours.
Introduction of synthesized computer music familiarizes the student with basic sequencing and music engraving using fundamentals of music theory and composition.

MUSI 3501. Percussion Ensemble. 1 Credit Hour.
Percussion ensemble focuses on traditional and contemporary ensemble literature as well as Transcriptions of popular music.

MUSI 3502. Percussion Ensemble. 1 Credit Hour.
Percussion ensemble focuses on traditional and contemporary ensemble literature as well as Transcriptions of popular music.

MUSI 3503. Percussion Ensemble. 1 Credit Hour.
Percussion ensemble focuses on traditional and contemporary ensemble literature as well as Transcriptions of popular music.

MUSI 3511. Percussion Ensemble. 1 Credit Hour.
An advanced instrumental ensemble performing traditional and contemporary percussion literature. Offered to all students with percussion experience. Audition required.

MUSI 3521. Elec Percuss Studio/Ens.. 3 Credit Hours.
Applied design construction and programming for performance.

MUSI 3522. Elec Percuss Studio/Ens.. 3 Credit Hours.
Applied design construction and programming for performance.

MUSI 3531. New Music Ensemble. 1 Credit Hour.
An advanced instrumental chamber ensemble that performs new and contemporary literature often using technology. Offered to all students with advanced performing experience. Audition required.

MUSI 3541. Electronic Perc Ensemble. 1 Credit Hour.
An advanced instrumental ensemble performing percussion literature using student designed and built instruments, interfaces and software, as well as commercially available controllers. Offered to all students with percussion experience. Audition required.

MUSI 3551. Rock and Pop Ensemble. 1 Credit Hour.
A contemporary popular music ensemble performing historical and current popular music. Offered to all students with advanced performing experience. Audition required.

MUSI 3600. Music Theory II. 2 Credit Hours.
Advanced music theory including Roman numeral analysis, voice leading in four-part harmony, seventh chords, melodic organization, and modulation.

MUSI 3601. University Orchestra. 1 Credit Hour.
The Georgia Tech Orchestra maintains a full complement of woodwinds, brass, percussion, and strings and performs classical through contemporary literature. Contact director prior to the first day of class to arrange audition.

MUSI 3602. University Orchestra. 1 Credit Hour.
The Georgia Tech Orchestra maintains a full complement of woodwinds, brass, percussion, and strings and performs classical through contemporary literature. Contact director prior to the first day of class to arrange audition.

MUSI 3603. University Orchestra. 1 Credit Hour.
The Georgia Tech Orchestra maintains a full complement of woodwinds, brass, percussion, and strings and performs classical through contemporary literature. Contact director prior to the first day of class to arrange audition.

MUSI 3610. Composers 1500-1800. 2 Credit Hours.
The history of western music from the Renaissance to the period of classicalism.

MUSI 3611. Symphony Orchestra. 1 Credit Hour.
An advanced instrumental ensemble performing traditional and contemporary literature. Offered to all students with string, woodwind, brass, or percussion experience. Audition required.

MUSI 3620. Composers 1800-Present. 2 Credit Hours.
The history of western music from the period of classicism to present day.

MUSI 3621. Composers & Their Music. 3 Credit Hours.
The history of western music from the Renaissance to the modern era.

MUSI 3630. History of Jazz. 3 Credit Hours.
The history of the American musical art form, Jazz, from its roots within African American work songs through fusion and new directions in jazz.

MUSI 3710. Ind Applied Instruction. 1 Credit Hour.
Private instruction for vocal, wind, and percussion students admitted into the Minor of Music program.

MUSI 3720. Ind Applied Instruction. 1 Credit Hour.
Private instruction for vocal, wind, and percussion students admitted into the Minor of Music program.

MUSI 3730. Ind Applied Instruction. 1 Credit Hour.
Private instruction for vocal, wind, and percussion students admitted into the Minor of Music program.

MUSI 3740. Ind Applied Instruction. 1 Credit Hour.
Private instruction for vocal, wind, and percussion students admitted into the Minor of Music program.

MUSI 3750. Ind Applied Instruction. 1 Credit Hour.
Private instruction for vocal, wind, and percussion students admitted into the Minor of Music program.

MUSI 3770. Project Studio Tech. 4 Credit Hours.
The thematic project in music technology driven by a foundational research question.
MUSI 3771. Project Studio Analysis. 4 Credit Hours.
Thematic project connecting music theory, musicology, performance practice and musicianship through intensive study of a single musical genre or composer.

MUSI 3801. Special Topics. 1 Credit Hour.
Special ad hoc courses or projects not included in regular course offerings.

MUSI 3802. Special Topics. 2 Credit Hours.
Special ad hoc courses or projects not included in regular course offerings.

MUSI 3803. Special Topics. 3 Credit Hours.
Special ad hoc courses or projects not included in regular course offerings.

MUSI 4008. Marching Band. 2 Credit Hours.
The Georgia Tech Marching Yellow Jackets perform at all home and some away football games. Students are expected to attend a pre-season camp. All conflicts must be approved by the director.

MUSI 4009. Pep Band. 1 Credit Hour.
Performance ensemble for men's and women's basketball games.

MUSI 4102. Concert Band. 1 Credit Hour.
An instrumental ensemble that performs traditional and contemporary wind literature and is offered to all students with wind, brass, or percussion experience.

MUSI 4103. Concert Band. 1 Credit Hour.
An instrumental ensemble that performs traditional and contemporary wind literature and is offered to all students with wind, brass, or percussion experience.

MUSI 4112. Symphonic Band. 1 Credit Hour.
Audition required prior to the first day of class. An auditioned instrumental ensemble for the more accomplished student interested in band performance; focusing on musical excellence of challenging band literature. Contact director for audition requirements.

MUSI 4113. Symphonic Band. 1 Credit Hour.
Prerequisite: Audition prior to the first day of class. An auditioned instrumental ensemble for the more accomplished student interested in band performance; focusing on musical excellence of challenging band literature. Contact director for audition requirements.

MUSI 4201. Chorale. 1 Credit Hour.
A large ensemble focused on rehearsal and performance of high-quality music of all genres. Choral music experience recommended.

MUSI 4202. Chorale. 1 Credit Hour.
Prerequisite: Choral music experience recommended. A large ensemble focused on rehearsal and performance of high-quality music of all genres.

MUSI 4203. Chorale. 1 Credit Hour.
Prerequisite: Choral music experience recommended. A large ensemble focused on rehearsal and performance of high-quality music of all genres.

MUSI 4211. Vocal Ensemble. 1 Credit Hour.
An auditioned vocal ensemble of the more serious student of vocal music; focuses on rehearsal and performance of high-quality music of all genres. Audition and/or consent of instructor required.

MUSI 4212. Vocal Ensemble. 1 Credit Hour.
Prerequisite: Audition and/or consent of instructor. An auditioned vocal ensemble for the more serious student of vocal music; focused on rehearsal and performance of high-quality music of all genres.

MUSI 4213. Vocal Ensemble. 1 Credit Hour.
Prerequisite: Audition and/or consent of professor. An auditioned vocal ensemble for the more serious student of vocal music; focused on rehearsal and performance of high-quality music of all genres.

MUSI 4213. Vocal Ensemble. 1 Credit Hour.
Prerequisite: Audition and/or consent of professor. An auditioned vocal ensemble for the more serious student of vocal music; focused on rehearsal and performance of high-quality music of all genres.

MUSI 4221. Men's Glee Club. 1 Credit Hour.
An all-male choral ensemble focused on rehearsal and performance of male chorus literature.

MUSI 4222. Men's Glee Club. 1 Credit Hour.
An all-male choral ensemble focused on rehearsal and performance of male chorus literature.

MUSI 4223. Men's Glee Club. 1 Credit Hour.
An all-male choral ensemble focused on rehearsal and performance of male chorus literature.

MUSI 4301. Jazz Ensemble. 1 Credit Hour.
A traditional twenty member big band and small ensemble specializing in improvisation. Members learn various jazz styles, performance practices, and history.

MUSI 4302. Jazz Ensemble. 1 Credit Hour.
A traditional twenty member big band and small ensemble specializing in improvisation. Members learn various jazz styles, performance practices, and history.

MUSI 4303. Jazz Ensemble. 1 Credit Hour.
A traditional twenty member big band and small ensemble specializing in improvisation. Members learn various jazz styles, performance practices, and history.

MUSI 4401. Chamber Ensemble. 1 Credit Hour.
Small instrumental ensembles of various types selected by the director to perform literature for the specific ensemble.

MUSI 4402. Chamber Ensemble. 1 Credit Hour.
Small instrumental ensembles of various types selected by the director to perform literature for the specific ensemble.

MUSI 4403. Chamber Ensemble. 1 Credit Hour.
Small instrumental ensembles of various types selected by the director to perform literature for the specific ensemble.

MUSI 4450. Integrat Mus Multimedia. 3 Credit Hours.
Techniques for effectively utilizing music and audio in the context of digital multimedia.

MUSI 4455. Streaming Media. 3 Credit Hours.
To familiarize students with tools and techniques for the creation, production, distribution, and aesthetic analysis of audio, video, and live events for Internet and Internet2 dissemination.

MUSI 4456. Mus Tech Hist&Repertoire. 3 Credit Hours.
Overview of the history, aesthetics, and technology of electronic and computer music over the past century through selected readings, musical analysis, and individual research projects. Credit will not be awarded for both MUSI 4456 and MUSI 6003.

MUSI 4457. Computational Mus Any. 3 Credit Hours.
The course will survey fundamental techniques in the fast-growing area of Music Information Retrieval (MIR). Credit will not be awarded for both MUSI 4457 and MUSI 6201.

MUSI 4458. Comp Music Composition. 3 Credit Hours.
Realization of individual composition projects in music technology and consideration of related theory, aesthetics, and repertoire. Credit will not be awarded for both MUSI 4458 and MUSI 6304.
MUSI 4459. Dig Signal Process-Music. 3 Credit Hours.
This course will cover elements of digital audio signal processing, such as spectra, digital filters, Fourier analysis and their application to music synthesis and analysis. Credit will not be awarded for both MUSI 4459 and MUSI 6202.

MUSI 4501. Percussion Ensemble. 1 Credit Hour.
Percussion ensemble focuses on traditional and contemporary ensemble literature as well as transcriptions of popular music.

MUSI 4502. Percussion Ensemble. 1 Credit Hour.
Percussion ensemble focuses on traditional and contemporary ensemble literature as well as transcriptions of popular music.

MUSI 4503. Percussion Ensemble. 1 Credit Hour.
Percussion ensemble focuses on traditional and contemporary ensemble literature as well as transcriptions of popular music.

MUSI 4521. Elec Percuss Studio/Ens.. 3 Credit Hours.
Applied design construction and programming for performance.

MUSI 4522. Elec Percuss Studio/Ens.. 3 Credit Hours.
Applied design construction and programming for performance.

MUSI 4601. University Orchestra. 1 Credit Hour.
The Georgia Tech Orchestra maintains a full complement of woodwinds, brass, percussion, and strings and performs classical through contemporary literature. Contact director prior to the first day of class to arrange audition.

MUSI 4602. University Orchestra. 1 Credit Hour.
The Georgia Tech Orchestra maintains a full complement of woodwinds, brass, percussion, and strings and performs classical through contemporary literature. Contact director prior to the first day of class to arrange audition.

MUSI 4603. University Orchestra. 1 Credit Hour.
The Georgia Tech Orchestra maintains a full complement of woodwinds, brass, percussion, and strings and performs classical through contemporary literature. Contact director prior to the first day of class to arrange audition.

MUSI 4630. Music Recording & Mixing. 3 Credit Hours.
Overview of concepts, techniques, hardware, and software used in audio production, as well as aesthetic concerns and considerations.

MUSI 4650. Music & Sound Design. 3 Credit Hours.
An investigation of principles and practice of audio and music design, in both contemporary digital and traditional analog systems.

MUSI 4670. Music Interface Design. 3 Credit Hours.
Theory and practice of designing and prototyping new forms of music interfaces, including percussion, haptic, and augmented traditional constructs.

MUSI 4677. Music Percep & Cognition. 3 Credit Hours.
The course will examine how humans process musical sound, covering the basics of the human auditory system and the experience of musical sound. Credit will not be awarded for both MUSI 4677 and MUSI 6001.

MUSI 4698. Research Assistantship. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

MUSI 4699. Undergraduate Research. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

MUSI 4705. Music Tech Capstone I. 4 Credit Hours.
Students will implement their broad theoretical and practical knowledge and understanding of music technology in a hands-on project, culminating in public presentation.

MUSI 4706. Music Tech Capstone II. 4 Credit Hours.
Students will implement their broad theoretical and practical knowledge and understanding of music technology in a hands-on project, culminating in public and industry presentation.

MUSI 4801. Special Topics. 1 Credit Hour.
Special ad hoc courses or projects not included in regular course offerings.

MUSI 4802. Special Topics. 2 Credit Hours.
Special ad hoc courses or projects not included in regular course offerings.

MUSI 4803. Special Topics. 3 Credit Hours.
Special ad hoc courses or projects not included in regular course offerings.

MUSI 4813. Special Topics. 3 Credit Hours.
Special ad hoc courses or projects not included in regular course offerings.

MUSI 4823. Special Topics. 3 Credit Hours.
Special ad hoc courses or projects included in regular course offerings.

MUSI 4833. Special Topics. 3 Credit Hours.
Special ad hoc courses or projects not included in regular course offerings.

MUSI 4843. Special Topics. 3 Credit Hours.
Special Topics in MUSI.

MUSI 6001. Mus Perception&Cognition. 3 Credit Hours.
This course examines how humans process musical sound, including topics such as the auditory system, psychacoustics, music cognition, and psychology.

MUSI 6002. Interactive Music. 3 Credit Hours.
Theoretical and practical issues in computer supported interactive music. The course involves readings, class discussions, student presentations, and the design of a final project.

MUSI 6003. Mus Tech Hist&Repertoire. 3 Credit Hours.
Overview of the history, aesthetics, and technology of electronic and computer music over the past century through selected readings, musical analysis, and individual research projects.

MUSI 6004. Technology Ensemble. 3 Credit Hours.
Practice and performance of original and repertoire works in live audio settings using commercial and propriety technology.

MUSI 6005. Music Ensemble. 1 Credit Hour.
The graduate level of any music ensemble.

MUSI 6103. Music Recording & Mixing. 3 Credit Hours.
Overview of concepts, techniques, hardware, and software used in audio production as well as aesthetic concerns and considerations.

MUSI 6104. Integrat Musi-Multimedia. 3 Credit Hours.
To familiarize students with the tools and techniques for effectively utilizing music and audio in the context of digital multimedia and the internet.

MUSI 6105. Dig Media Prod&Mastering. 3 Credit Hours.
Tools and techniques for effectively mastering, optimizing, finalizing, and producing digital media for multimedia and the Internet.
MUSI 6201. Computational Music Anly. 3 Credit Hours.
This class addresses theory and techniques of Music Information Retrieval (MIR). Topics include computational analysis of audio signals, symbolic representations, and pattern recognition techniques. Credit will not be awarded for both MUSI 6201 and MUSI 4457.

MUSI 6202. Dig Signal Process-Music. 3 Credit Hours.
Research in music, as well as music production and composition increasingly relies on sophisticated digital signal processing techniques. This course will review fundamental elements of digital audio signal processing, such as sinusoids, spectra, digital filters, and Fourier analysis and their application to the fundamental music analysis problems of modeling and synthesis. The course will focus particularly on the algorithmic implementation sound transformation and synthesis techniques through intensive programming assignments in Matlab and Csound.

MUSI 6203. Proj Studio-Music Tech. 3 Credit Hours.
Discussion, design and development of computer music applications and performance controllers.

MUSI 6301. Music Interface Design. 3 Credit Hours.
Theory and practice of designing and prototyping new forms of music interfaces including percussion, haptic, and augmented traditional constructs.

MUSI 6302. The Musical Mind. 3 Credit Hours.
This course teaches the science of music, nature of music, perception of music, analysis of musical talent, development of musical skills, and approaches to musical esthetics.

MUSI 6303. Network Music. 3 Credit Hours.
Exploration of distributed music systems over local-area networks and Internet, including discussion of existing technologies, works, literature, and hands-on experimentation with tools and techniques.

MUSI 6304. Comp Music Composition. 3 Credit Hours.
Realization of individual composition projects in music technology and consideration of related theory, aesthetics, and repertoire. Credit will not be awarded for both MUSI 6304 and MUSI 4458.

MUSI 7000. Master's Thesis. 1-21 Credit Hours.
Advisor guided thesis writing.

MUSI 7100. Music Tech Research Lab. 1-21 Credit Hours.
Advisor guided research and creative work in music technology. Investigation of novel technological and artistic concepts. Design and develop new hardware, software, and musical artifacts.

MUSI 7998. Prep-Doct Qual Paper. 1-21 Credit Hours.
Preparation of qualifying paper for Ph.D. in Music Technology.

MUSI 7999. Prep-Doct Qual Exams. 1-21 Credit Hours.
Preparation for qualifying examinations for Ph.D. in Music Technology.

MUSI 8001. Research Methods. 3 Credit Hours.
Theoretical and practical issues in music technology research including design patterns, data sets, quantitative and qualitative evaluation standards, proper citation, and print and oral presentation.

MUSI 8002. Teaching Practicum. 3 Credit Hours.
Pedagogical approaches to music technology, focusing on hands-on teaching experience.

MUSI 8801. Special Topics. 1 Credit Hour.
Topics of current interest.

MUSI 8802. Special Topics. 2 Credit Hours.
Topics of current interest.

MUSI 8803. Special Topics. 3 Credit Hours.
Topics of current interest.

MUSI 8804. Special Topics. 4 Credit Hours.
Topics of current interest.

MUSI 8805. Special Topics. 5 Credit Hours.
Topics of current interest.

MUSI 8901. Special Problems. 1-21 Credit Hours.
Individualized study with an advisor.

MUSI 8902. Special Problems. 1-21 Credit Hours.
Individualized study with an advisor.

MUSI 8903. Special Problems. 1-21 Credit Hours.
Individualized study with an advisor.

MUSI 9000. Doctoral Thesis. 1-21 Credit Hours.

Neuroscience (NEUR)

NEUR 2001. Neuro-Principles. 4 Credit Hours.
Students will learn fundamental principles and methods in neuroscience from problem-based study of neural substrates of animal behavior.

NEUR 2698. Research Assistantship. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

NEUR 2699. Undergraduate Research. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

NEUR 3001. Neuro-Cell & Molecular. 3 Credit Hours.
An overview of principles and techniques in cell and molecular neuroscience: neuron excitability, synaptic transmission, learning and memory to basic mechanisms of neurological diseases.

NEUR 3010. Methods in Neuroscience. 3 Credit Hours.
The course is focused on understanding how information about brain and nervous system function can be determined from a wide range of experimental and data analysis techniques.

NEUR 4001. Neuro Research Project. 4 Credit Hours.
Focused on multidisciplinary perspectives in neuroscience, this course requires that students utilize and apply the skills and knowledge developed over the course of their major.

NEUR 4698. Research Assistantship. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

NEUR 4699. Undergraduate Research. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

NEUR 4801. Special Topics. 1 Credit Hour.
Topics of current interest not included in the regular course offerings.

NEUR 4802. Special Topics. 2 Credit Hours.
Topics of current interest not included in the regular course offerings.

NEUR 4803. Special Topics. 3 Credit Hours.
Topics of current interest not included in the regular course offerings.

NEUR 4804. Special Topics. 4 Credit Hours.
Topics of current interest not included in the regular course offerings.

NEUR 4805. Special Topics. 5 Credit Hours.
Topics of current interest not included in the regular course offerings.
NEUR 4806. Special Topics. 6 Credit Hours.
Topics of current interest not included in the regular course offerings.

NEUR 4814. Special Topics. 4 Credit Hours.
Topics of current interest not included in the regular course offerings.

**Naval Science (NS)**

NS 1321. Intro to Naval Sciences. 3 Credit Hours.
This course is an introduction and orientation class designed to give students a broad overview of the roles of the United States Navy and Marine Corps. This course also provides an introduction to the structure, terminology, customs, and uniforms of the Navy and Marine Corps.

NS 1323. Naval History. 3 Credit Hours.
This course surveys U.S. Naval history from its European origin to the present with emphasis on major developments and the geopolitical forces shaping these developments. The course also covers present day concerns in seapower and maritime affairs, including the economic and political issues of maritime commerce, the law of the sea, and the rise and decline of the Soviet Navy.

NS 2321. Naval Leadership I. 3 Credit Hours.
Survey of managerial functions, communication, and major theories of leadership and motivation applied to the Navy organization. Culminates with focus on Naval core values.

NS 2323. Navigation. 3 Credit Hours.
This course develops and broadens the student's understanding of basic piloting and the laws of vessel operations by applying the fundamentals of navigation at sea.

NS 3323. Evolution of Warfare. 3 Credit Hours.
A historical exploration of warfare practiced by great nations. Selected campaigns are studied with emphasis on leadership, evolution of tactics, weaponry, and principles of war.

NS 3324. Marine Weapons & Tactics. 3 Credit Hours.
This course is a preparatory course required by all Marines and Marine Options their junior year prior to Officer Candidates School. General military subjects, land navigation, history, tactics drill, leadership, and physical fitness will be taught and tested.

NS 3325. Naval Weapons Systems. 3 Credit Hours.
This course develops and broadens the student's understanding of basic engineering concepts and principles as applied to naval weapon systems.

NS 3326. Naval Engineering Sys. 3 Credit Hours.
This course develops and broadens the student's understanding of basic engineering concepts and principles as applied to naval engineering plants.

NS 4320. Naval Operations. 3 Credit Hours.
This course builds on the fundamentals presented in its prerequisites and further prepares soon-to-be commissioned officers to step aboard their new ship/submarine and stand watch.

NS 4322. Naval Leadership II. 3 Credit Hours.
Study of Naval values and ethics to include core values, Navy regulations, and military law. Duties and responsibilities of a junior naval officer.

NS 4333. Fund Maneuver Warfare. 3 Credit Hours.
Broad aspects of warfare and their interactions with maneuver warfare doctrine. Focus on the United States Marine Corps as the premier maneuver warfare fighting institution.

**Nuclear & Radiological Engr (NRE)**

NRE 2110. Intro to NRE. 2 Credit Hours.
Introduction to nuclear and radiological engineering; nuclear energy production and radiation technologies and their role of importance to society, their environmental impact.

NRE 2120. Elements of NRE. 3 Credit Hours.
Introduction to nuclear and radiological engineering concepts and applications.

NRE 2698. Research Assistantship. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

NRE 2699. Undergraduate Research. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

NRE 3026. Exptl Reactor Physics. 3 Credit Hours.
Introduction to experimental nuclear reactor physics techniques including criticality, flux mapping, buckling measurements, subcritical assembly measurements, diffusion length measurement, neutron spectral measurements, and foil activation methods.

NRE 3112. Radiation Detection. 3 Credit Hours.
An introduction to the principles and characteristics of basic detectors for nuclear radiation and the pulse processing electronics associated with them.

NRE 3208. Nuclear Reactor Phys I. 3 Credit Hours.
Intermediate treatment of reactor physics and associated advanced mathematics topics.

NRE 3212. Fundamentals of NRE. 3 Credit Hours.
Intermediate treatment of nuclear and radiological engineering, with emphasis on reactor physics and engineering, radiation protection, and radiation shielding.

NRE 3301. Radiation Physics. 3 Credit Hours.
Characteristics of atomic and nuclear radiations, transition probabilities, radioactivity, classical and quantum-mechanical derivations of cross sections, interactions of photon, neutron, and charged particles with matter.

NRE 3316. Radiation Protection Eng. 3 Credit Hours.
Covers radiation dosimetry, biological effects of radiation, radiation-protection criteria and exposure limits, external radiation protection, internal radiation protection, and sources of human exposure.

NRE 3XXX. Nuclear&Rad Eng Elective. 1-21 Credit Hours.

NRE 4206. Radiation Physics Lab. 2 Credit Hours.
Measurements of reactor parameters, such as approach to criticality, flux mapping, buckling, and diffusion length using subcritical assemblies. Neutron spectral measurements, shield transmission measurements, and other radiation field measurements.

NRE 4208. Nuclear Reactor Phys II. 4 Credit Hours.
Advanced treatment of reactor physics and associated advanced mathematics topics. Students may not receive credit for both NRE 4208 and NRE 4202.

NRE 4210. Nuclear Reactor Theory. 3 Credit Hours.
Students will learn physical nuclear reactor concepts, nuclear data and computational methodology required to understand the design process of nuclear fission reactors.
NRE 4214. Reactor Engineering. 3 Credit Hours.
Nuclear heat generation; fuel elements' thermal analysis; single and two-phase flow and heat transfer in reactor systems; core thermal design and treatment of uncertainties.

NRE 4232. NRE Design. 4 Credit Hours.
Introduction to the methodologies of nuclear and radiological design. An open-ended design project that integrates all relevant engineering aspects is to be completed in this course.

NRE 4234. Nuc Criticality Safe Eng. 3 Credit Hours.
This course covers the theoretical concepts, the computational techniques, and the principal methods of criticality safety.

NRE 4266. Light Water Reactor Tech. 3 Credit Hours.
A systematic survey of the technology of both pressurized and boiling water reactors with emphasis on the nuclear stream supply system and its associated safety and control systems.

NRE 4328. Radiation Sources & Appl. 3 Credit Hours.
Radiation Sources. Radioisotope production. Application of radiation and radioisotope technology in industry and medicine.

NRE 4350. Design Methods & Tools. 3 Credit Hours.
Introduction to selected methods and nuclear engineering analytic tools (computer codes) with tutorials.

NRE 4404. Rad Assessment&Waste Mgt. 3 Credit Hours.

NRE 4407. Radiobiology & Oncology. 3 Credit Hours.
This course will provide the student with a basic knowledge of radiation biology as it pertains to oncology and radiotherapy.

NRE 4430. Nucl Regulatory Require. 2 Credit Hours.
This course introduces regulatory organizations and delineates their jurisdictions. It covers the fundamentals of regulations, the impacts on occupational workers, the public, and the environment.

NRE 4610. Plasma Phys& Fusion Engr. 3 Credit Hours.
A first course in plasma physics and magnetic confinement fusion: basic plasma physics, magnetic confinement concepts, fusion engineering, and a review of the current status of fusion research.

NRE 4698. Research Assistantship. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

NRE 4699. Undergraduate Research. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

NRE 4750. Diagnostic Imaging Phys. 3 Credit Hours.
Physics and image formation methods for conventional X-ray CT, nuclear medicine, and magnetic resonance and ultrasound imaging.

NRE 4770. Nuclear Chemical Engr. 3 Credit Hours.
This course surveys the chemical engineering aspects of nuclear power. Topics include nuclear reactions, fuel cycles, solvent extraction of metals, the properties of actinides and other irradiated fuel materials, fuel reprocessing, and radioactive waste management. Crosslisted with CHE 4770.

NRE 4795. Nuclear Reactor Materials. 3 Credit Hours.
Introduction to fundamentals of nuclear reactor materials. Topics covered are basics of radiation damage, defect creation and evolution, microstructure-property correlations in cladding and fuel of nuclear materials. (null)

NRE 4801. Special Topics. 1 Credit Hour.
Special topic offerings of current interest not included in regular courses.

NRE 4802. Special Topics. 2 Credit Hours.
Special topic offerings of current interest not included in regular courses.

NRE 4803. Special Topics. 3 Credit Hours.
Special topic offerings of current interest not included in regular courses.

NRE 4804. Special Topics. 4 Credit Hours.
Special topics offerings of current interest not included in regular courses.

NRE 4805. Special Topics. 5 Credit Hours.
Special topics offerings of current interest not included in regular courses.

NRE 4901. Special Problems. 1-21 Credit Hours.

NRE 4902. Special Problems. 1-21 Credit Hours.

NRE 4903. Special Problems. 1-21 Credit Hours.

NRE 4XXX. Nuclear&Rad Eng Elective. 1-21 Credit Hours.

NRE 6101. Transport Fundamentals. 3 Credit Hours.
Neutral and charged particle transport. Fluid mass, energy, and momentum transport. Models used in nuclear radiation transport; fluid hydrodynamics, radiative and plasma transport.

NRE 6102. Plasma Physics. 3 Credit Hours.

NRE 6103. Computational Transport. 3 Credit Hours.
Deterministic and stochastic computational methods for solving transport equations of neutral particles.

NRE 6201. Reactor Physics. 3 Credit Hours.
Fundamentals of reactor physics for nuclear analysis of neutron chain reactors and for developing tools required for design of those reactors.

NRE 6301. Reactor Engineering. 3 Credit Hours.

NRE 6401. Adv Nuclear Engr Design. 3 Credit Hours.
Synthesis of principles of nuclear engineering in the design of nuclear reactors and other facilities.

NRE 6434. Nucl Crit Safety Engr. 3 Credit Hours.
Concepts, computational techniques, and the principal methods of criticality safety such as accident experience, standards, experiments, computer and hand calculations, limits and regulations. Application to overall facility operation.

NRE 6501. Nuclear Fuel Cycle. 3 Credit Hours.

NRE 6502. Nuclear Materials. 3 Credit Hours.
Materials science and engineering of metallic and ceramic fuels; cladding, structural, and control materials including radiation effects.

NRE 6755. Rad Assessment&Waste Mgt. 3 Credit Hours.
Critical analyses of sources and human exposures, mathematical models for movement through the biosphere, environmental transport, and exposure for nuclear facilities and waste disposal processing. Crosslisted with HP 6755.
NRE 6756. Radiation Physics. 3 Credit Hours.
Characteristics of atomic and nuclear radiation, transition probabilities, radioactivity and isotopes, cross sections, electromagnetic radiation, neutrons, and charged particle interaction with matter. Crosslisted with HP 6756.

NRE 6757. Radiation Detection. 3 Credit Hours.
Introduction to the theory and application of radiation detectors, measurement methods, signal processing, and data analysis. Crosslisted with HP 6757.

NRE 6758. Numerical Methods in ME. 3 Credit Hours.
Numerical methods for solution of engineering problems; initial, eigenvalue, and boundary-value problems; computational stability for ordinary and linear partial differential equations. Crosslisted with ME and HP 6758.

NRE 6759. Radiation Shielding. 3 Credit Hours.
Principles of Radiation Shielding; Design of Shields; Computational Methods for Analysis of Shielding; Emphasis on Monte Carlo Simulation as a Shielding Tool.

NRE 6XXX. Nuclear&Rad Eng Elective. 1-21 Credit Hours.

NRE 7000. Master's Thesis. 1-21 Credit Hours.

NRE 7103. Advanced Plasma Physics. 3 Credit Hours.
Classical and collective transport phenomena, plasma instabilities, plasma-materials interactions, and plasma edge physics. Emphasis on magnetic fusion, plasma processing, and other plasma applications research.

NRE 7203. Advanced Reactor Physics. 3 Credit Hours.
Advanced topics in reactor physics and transport theory.

NRE 7757. Teaching Practicum. 3 Credit Hours.
Supervised teaching for doctoral students. Teaching techniques, course and curriculum design, student evaluation methods and criteria. Students may, in some instances, prepare and present lectures. Crosslisted with HP, ME, and CHBE 7757.

NRE 8011. Seminar-Nuclear Engr. 1 Credit Hour.
Seminars involving current research projects presented by graduate students, faculty, and invited speakers.

NRE 8012. Seminar-Nuclear Engr. 1 Credit Hour.
Seminars involving current research projects presented by graduate students, faculty, and invited speakers.

NRE 8801. Spec Topic-Nuclear Engr. 1 Credit Hour.
Special topic offerings of current interest in nuclear engineering not included in regular courses.

NRE 8802. Spec Topic-Nuclear Engr. 2 Credit Hours.
Special topic offerings of current interest in nuclear engineering not included in regular courses.

NRE 8803. Spec Topic-Nuclear Engr. 3 Credit Hours.
Special topic offerings of current interest in nuclear engineering not included in regular courses.

NRE 8804. Spec Topic-Nuclear Engr. 4 Credit Hours.
Special topic offerings of current interest in nuclear engineering not included in regular courses.

NRE 8805. Spec Topic-Nuclear Engr. 5 Credit Hours.
Special topics offerings of current interest in nuclear engineering not included in regular courses.

NRE 8806. Spec Topic-Nuclear Engr. 6 Credit Hours.
Special topics offerings of current interest in nuclear engineering not included in regular courses.

NRE 8901. Spec Prob-Nuclear Engr. 1-21 Credit Hours.
Individual studies and/or experimental investigations of problems of current interest in nuclear engineering.

NRE 8902. Spec Prob-Nuclear Engr. 1-21 Credit Hours.
Individual studies and/or experimental investigations of problems of current interest in nuclear engineering.

NRE 8903. Spec Prob-Nuclear Engr. 1-21 Credit Hours.
Individual studies and/or experimental investigations of problems of current interest in nuclear engineering.

NRE 8904. Spec Prob-Nuclear Engr. 1-21 Credit Hours.
Individual studies and/or experimental investigations of problems of current interest in nuclear engineering.

NRE 8905. Spec Prob-Nuclear Engr. 1-21 Credit Hours.
Individual studies and/or experimental investigations of problems of current interest in nuclear engineering.

NRE 8906. Spec Prob-Nuclear Engr. 1-21 Credit Hours.
Individual studies and/or experimental investigations of problems of current interest in nuclear engineering.

NRE 8907. Teaching Assistantship. 1-9 Credit Hours.
For graduate students holding graduate teaching assistantships.

NRE 8908. Research Assistantship. 1-9 Credit Hours.
For graduate students holding graduate research assistantships.

NRE 9000. Doctoral Thesis. 1-21 Credit Hours.

Persian (PERS)

PERS 1001. Elementary Persian I. 4 Credit Hours.
Students acquire reading and writing skills and the ability to communicate in basic situations. Taught in Persian.

PERS 1002. Elementary Persian II. 4 Credit Hours.
Students acquire reading and writing skills and the ability to communicate in basic situations. Continuation of PERS 1001. Taught in Persian.

PERS 1814. Special Topics. 4 Credit Hours.
Topics of current interest in Persian Languages.

PERS 1824. Special Topics. 4 Credit Hours.
Topics of current interest in Persian Languages.

PERS 2813. Special Topics. 3 Credit Hours.
Topics of current interest in Persian Languages.

PERS 2823. Special Topics. 3 Credit Hours.
Topics of current interest in Persian Languages.

PERS 3811. Special Topics. 1 Credit Hour.
Topics of current interest in Persian.

PERS 3812. Special Topics. 2 Credit Hours.
Topics of current interest in Persian.

PERS 3813. Special Topics. 3 Credit Hours.
Topics of current interest in Persian Languages.

PERS 4813. Special Topics. 3 Credit Hours.
Topics of current interest in Persian Languages.

PERS 4823. Special Topics. 3 Credit Hours.
Topics of current interest in Persian Languages.
Philosophy (PHIL)

PHIL 1XXX. Philosophy, Sci & Tech Elec. 1-21 Credit Hours.

PHIL 2010. Intro Philosophy. 3 Credit Hours.
An introduction to the nature of philosophy through the critical analysis of selected works, such as Descartes, Hobbes, and Locke. The relationship of philosophy to science, religion, and culture will be emphasized. Credit not allowed for both PST 2025 and PHIL 2010.

PHIL 2025. Philosophical Analysis. 3 Credit Hours.
An introduction to philosophical questions that may arise in public policy debate and decision making and to resources from the philosophical tradition for addressing them. Credit not allowed for both PHIL 2025 and PST 2020 or PHIL 2025 and PST 2068.

PHIL 2698. Research Assistantship. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

PHIL 2699. Undergraduate Research. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

PHIL 2XXX. Philosophy, Sci & Tech Elec. 1-21 Credit Hours.

PHIL 3050. Political Philosophy. 3 Credit Hours.
An exploration of the main currents in political philosophy from antiquity to the present, seeking resources for analyzing contemporary debates about policy and political process. Credit not allowed for both PST 3050 and PHIL 3050.

PHIL 3102. Ancient Philosophy. 3 Credit Hours.
Development of philosophy in the classical works of Ancient Greek philosophy. Credit not allowed for both PHIL 3102 and PST 3102.

PHIL 3103. Modern Philosophy. 3 Credit Hours.
A study of the development of philosophy from the views of Bacon and Descartes to the beginning of the 20th century. Traces the philosophic response to modern science in the rational and empirical traditions. Credit not allowed for both PST 3103 and PHIL 3103.

PHIL 3105. Ethical Theories. 3 Credit Hours.
Surveys traditional ethical theories of value, obligation, and rights and applies these theories to contemporary social problems such as abortion, euthanasia, poverty, and distributional equity, and environmental problems. Credit not allowed for both PHIL 3105 and PST 3105.

PHIL 3109. Engineering Ethics. 3 Credit Hours.
Ethical reasoning in the context of professional work in science and technology. Prepares future technical professionals to approach decision with a coherent ethical framework. Credit not allowed for both PHIL 3109 and PST 3109.

PHIL 3113. Logic & Critical Thinking. 3 Credit Hours.
Symbolic logic and applications of logic in critical reading and thinking by exploring modern systems of symbolic logic and their implications for science. Emphasizes skills in critical thinking and writing based on the principles of logic. Credit not allowed for both PST 3113 and PHIL 3113.

PHIL 3115. Philosophy of Science. 3 Credit Hours.
Examination of the nature and processes of scientific inquiry, including the status of scientific knowledge, identification of pseudoscientific claims, and the role of values in generating and using scientific knowledge. Credit not allowed for both PHIL 3115 and PST 3115.

PHIL 3127. Sci, Tech & Human Values. 3 Credit Hours.
Exploration of the boundaries between science, religion, and social values, examining science and technology in a broader social context. Examines claims that science is isolated from social problems and values. Credit not allowed for both PHIL 3127 and PST 3127.

PHIL 3135. Philosophy of Technology. 3 Credit Hours.
The course considers philosophical accounts of how technologies can and should shape our understandings of politics, ethics, and daily life.

PHIL 3140. Philosophy of Food. 3 Credit Hours.
Examines a range of philosophical and political issues pertaining to the production and consumption of food.

PHIL 3790. Intro-Cognitive Science. 3 Credit Hours.
Multidisciplinary perspectives on cognitive science. Interdisciplinary approaches to issues in cognition, including memory, language, problem solving, learning, perception, and action. Credit not allowed for both PHIL 3790 and PST 3790 (or CS 3790, PSYC 3790, ISYE 3790).

PHIL 3XXX. Philosophy, Sci & Tech Elec. 1-21 Credit Hours.

PHIL 4110. Theories of Knowledge. 3 Credit Hours.
Critical examination of perception, verification, apriori and aposteriori knowledge, meaning and criteria of truth, and cognitive significance of scientific and philosophical propositions. Evolution of epistemology. Credit not allowed for both PHIL 4110 and PST 4110.

PHIL 4174. Perspectives-Sci & Tech. 3 Credit Hours.
Comparative analysis of frameworks for interpreting science and technology, discussed in light of case studies. Selected frameworks include philosophical, historical, cognitive, and sociological. Credit not allowed for both PHIL 4174 and PST 4174.

PHIL 4176. Environmental Ethics. 3 Credit Hours.
Conceptual and normative foundations of environmental attitudes and values. Impacts of traditional and modern beliefs that shape human attitudes toward nature on creating a more compatible relationship between humans and their environment. Credit not allowed for both PHIL 4176 and PST 4176.

PHIL 4698. Research Assistantship. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

PHIL 4699. Undergraduate Research. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

PHIL 4790. Semi-Cognitive Science. 3 Credit Hours.
a seminar-type course in cognitive science focusing on integrating and deepening students' cognitive science knowledge and skills. Topics include memory, language, problem solving, learning, perception, and action. Credit not allowed for both PHIL 4790 and PST 4790 (or CS 4790, PSYC 4790, ISYE 4790).

PHIL 4803. Special Topics. 3 Credit Hours.

PHIL 4811. Special Topics. 1 Credit Hour.
Topics of interest not covered in the regular course offerings.

PHIL 4812. Special Topics. 2 Credit Hours.
Topics of interest not covered in the regular course offerings.
PHIL 4813. Special Topics. 3 Credit Hours.
Topics of interest not covered in the regular course offerings.

PHIL 4814. Special Topics. 4 Credit Hours.
Topics of interest not covered in the regular course offerings.

PHIL 4815. Special Topics. 5 Credit Hours.
Topics of interest not covered in the regular course offerings.

PHIL 4901. Special Problems. 1-21 Credit Hours.

PHIL 4902. Special Problems. 1-21 Credit Hours.

PHIL 4903. Special Problems. 1-21 Credit Hours.

PHIL 4XXX. Philosophy, Sci&Tech Elec. 1-21 Credit Hours.

PHIL 6000. Responsible Conduct-Res. 1 Credit Hour.
An introduction to the concepts guiding the responsible conduct of research. Students will learn about the ethical norms and guidelines within different fields of research.

PHIL 6010. Biotech Research Ethics. 2 Credit Hours.
This course focuses on ethical issues in biotechnological fields. The course is designed to satisfy Georgia Tech RCR policy's requirements for "in-person" training.

PHIL 6710. Ethics Biotech Research. 3 Credit Hours.
This course examines the ethics of biotechnological research, including issues in the realm of research ethics, bioethics, and healthcare robotics.

Physics (PHYS)

PHYS 1000. Physics Orientation. 1 Credit Hour.
Guest lectures will describe career opportunities in physics; the role physicists play in education, government, and industrial laboratories; and programs available to physics majors.

PHYS 11X1. Transfer Non-Calc Phys I. 1-21 Credit Hours.

PHYS 11X2. Transfer Non-Calc Phys II. 1-21 Credit Hours.

PHYS 1XXX. Physics Elective. 1-21 Credit Hours.

PHYS 2001. Evolution of Physics. 2 Credit Hours.
The development of physics concepts and doctrines from early times to the near future, with social and philosophical correlates.

PHYS 2021. Solar System. 3 Credit Hours.
This course covers Ancient and Renaissance astronomy, gravity, sky phenomena, telescopes, and the solar system.

PHYS 2022. Stars, Galaxy & Universe. 3 Credit Hours.
This course covers optics, telescopes, stellar characteristics and evolution, galaxies, the universe, and the big bang. Physics topics include mechanics, optics, atomic physics, nuclear physics, and relativity.

PHYS 2030. Physics Of Music. 2 Credit Hours.
An introduction to the physical principles underlying the production, transmission, and detection of musical sounds.

PHYS 2211. Intro Physics I. 4 Credit Hours.
A calculus-based course with a laboratory covering classical mechanics, applications of classical mechanics, oscillations, and waves.

PHYS 2212. Intro Physics II. 4 Credit Hours.
A calculus-based course with laboratory covering electromagnetism, applications of electromagnetism, light, and modern physics.

PHYS 2213. Intro to Modern Physics. 3 Credit Hours.
A survey of twentieth century physics. Developments of several branches of physics up to their present frontiers, including historical and philosophical perspectives.

PHYS 2231. Honors Physics I. 5 Credit Hours.
Parallels introductory Physics I (PHYS 2211). Some topics treated in more depth or more extensively. A rigorous physics foundation requiring demonstrated competence in mathematics.

PHYS 2232. Honors Physics II. 5 Credit Hours.
Parallels introductory Physics II (PHYS 2212). Some topics treated in more depth or more extensively. No modern physics content. A rigorous physics foundation requiring demonstrated competence in mathematics.

PHYS 25X1. Transfer Physics I. 4 Credit Hours.

PHYS 2698. Research Assistantship. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

PHYS 2699. Undergraduate Research. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

PHYS 2750. Physics of the Weather. 3 Credit Hours.
An introductory treatment applying basic physical laws to understanding weather phenomena. Crosslisted with EAS 2750.

PHYS 2801. Special Topics. 1 Credit Hour.
Courses in special topics of current interest in physics are presented from time to time.

PHYS 2802. Special Topics. 2 Credit Hours.
Courses in special topics of current interest in physics are presented from time to time.

PHYS 2803. Special Topics. 3 Credit Hours.
Courses in special topics of current interest in physics are presented from time to time.

PHYS 2804. Special Topics. 4 Credit Hours.
Courses in special topics of current interest in physics are presented from time to time.

PHYS 2814. Special Topics. 4 Credit Hours.
Courses in special topics of current interest in physics are presented from time to time.

PHYS 2801. Special Problems. 1-21 Credit Hours.
Courses in special topics of current interest in physics are offered from time to time.

PHYS 2901. Special Problems. 1-21 Credit Hours.
Courses involving special problems in physics are offered from time to time.

PHYS 2902. Special Problems. 1-21 Credit Hours.
Courses involving special problems in physics are offered from time to time.

PHYS 2903. Special Problems. 1-21 Credit Hours.
Courses involving special problems in physics are offered from time to time.

PHYS 2904. Special Problems. 1-21 Credit Hours.
Courses involving special problems in physics are offered from time to time.

PHYS 2XXX. Physics Elective. 1-21 Credit Hours.

PHYS 3021. Stellar Astrophysics. 3 Credit Hours.
Develops a working knowledge of stellar and extra-stellar galactic astronomy. Includes stellar structure, nucleosynthesis, stellar evolution, and degenerate objects.

PHYS 3043. Wave Mechanics. 3 Credit Hours.
A first introduction to wave mechanics, with emphasis on practical calculations. The rules of quantum mechanics will be illustrated by many working examples.

PHYS 3122. Electro & Magnetostatics. 3 Credit Hours.
First of two courses on the physics of electromagnetism. Topics include Coulomb's Law, Ampere's Law, scalar and vector potentials, Laplace's equation and electric and magnetic fields in matter.
PHYS 3123. Electrodynamic. 3 Credit Hours.
Second of two courses on the physics of electromagnetism. Topics include time-dependent phenomena including Faraday's Law, the Maxwell equations, electromagnetic radiation, and electromagnetic waves.

PHYS 3141. Thermodynamics. 3 Credit Hours.
Introduction to the basic concepts of thermodynamics. Thermodynamic laws will be developed with an emphasis on the macroscopic point of view. Applications of the basic principles will be considered briefly.

PHYS 3143. Quantum Mechanics I. 3 Credit Hours.
First of two courses that develop the principles of quantum mechanics. Topics include the state vector concept. Heisenberg and Schrodinger pictures, uncertainty relations, and exact solvable models in one dimension.

PHYS 3151. Mathematical Physics. 3 Credit Hours.
A review of the mathematical techniques required for the description of physical systems encountered in mechanics, electromagnetism, thermal physics, and quantum mechanics.

PHYS 3201. Classical Mechanics I. 3 Credit Hours.
Dynamics of particles including oscillations and planetary motion, rotation of rigid bodies, and collisions.

PHYS 3202. Classical Mechanics II. 3 Credit Hours.
A continuation of PHYS 3201. Topics include Lagrangians and Hamiltonian techniques, and many body mechanics.

PHYS 3211. Electronics I. 5 Credit Hours.
A first course in both theoretical and applied electronics that is based on a thorough grounding in circuit as well as device physics.

PHYS 3223. Geometric Optics. 3 Credit Hours.
Principles of geometrical optics using ray tracing techniques. Stops, pupils, aberrations, and photometry. Design and analysis of lenses using current lens design software.

PHYS 3224. Geometrical Optics Lab. 2 Credit Hours.
Measurement of parameters of optical surfaces, lenses, and systems using a variety of techniques.

PHYS 3225. Modern Optics. 3 Credit Hours.
Principles of wave propagation, coherence, polarization, diffraction, and Fourier Optics; laser theory including the interaction of light with matter.

PHYS 3226. Modern Optics Lab. 2 Credit Hours.
Measurement of parameters of optical surfaces, lenses, and systems using a variety of modern optics techniques.

PHYS 3232. Optics I. 3 Credit Hours.
Optics principles, including waves, reflection, refraction, absorption, scattering, group velocity, lasers, polarization geometrical optics, the Fourier transform, coherence, interference, and diffraction.

PHYS 3265. Acoustics. 3 Credit Hours.
A course in classical acoustics and applied electroacoustics taught through the palliative of a study of sound reinforcement and reproduction systems.

PHYS 3266. Computational Physics. 4 Credit Hours.
Computer solutions of realistic physics problems such as projectiles in resistive media, electromagnetic sources and fields, atomic scattering, and band pass filters.

PHYS 3314. Special Topics. 4 Credit Hours.

PHYS 3801. Special Topics. 1 Credit Hour.
Courses in special topics of current interest in physics are presented from time to time.
PHYS 4262. Solid State Physics. 3 Credit Hours.
A first course in the physics of crystalline solids. Core topics include crystal lattices, diffraction, bonding, elastic properties, band theory, as well as others.

PHYS 4263. Nuclei, Particles & Fields. 3 Credit Hours.
An introduction to nuclear and subnuclear systems. Topics include nuclear models, radioactive decay, nuclear reactions, quarks, accelerators, reactors, and stellar nucleosynthesis.

PHYS 4267. Nonlinear Dynamics & Chaos. 3 Credit Hours.
A modern introduction to nonlinear phenomena. Topics include driven oscillators, entrainment, bifurcation, fractals, and control of chaos. Examples are drawn from physical systems.

PHYS 4321. Advanced Lab I. 3 Credit Hours.
Experiments are conducted that demonstrate basic principles from various fields of physics. An emphasis is placed on contemporary concepts in modern physics.

PHYS 4322. Advanced Lab II. 3 Credit Hours.
A continuation of PHYS 4321. Experiments are conducted that demonstrate basic principles from various fields of physics. An emphasis is placed on contemporary concepts in modern physics.

PHYS 4347. Fund of Astrophysics. 3 Credit Hours.
Theoretical investigation of astrophysical objects and processes, with an emphasis on the interstellar medium, extragalactic astrophysics, gas dynamics, and radiative transfer, and radiation processes.

PHYS 4421. Intro-Continuum Phys. 3 Credit Hours.
A modern introduction to continuum physics. Topics include elastic theory, dislocations and waves, fluid mechanics and dynamics, and instabilities in fluids.

PHYS 4601. Senior Seminar I. 1 Credit Hour.
Representative research programs in the School are described by advanced graduate students, post-doctoral fellows and faculty members.

PHYS 4602. Senior Seminar II. 1 Credit Hour.
Representative research programs in the School are described by advanced graduate students, post-doctoral fellows, and faculty members.

PHYS 4655. Intro-Diffraction Study. 4 Credit Hours.
Introductory theory and practice of x-ray and neutron diffraction techniques, including single crystals and powders. Laboratory work is strongly correlated with principles developed in the lectures.

PHYS 4698. Research Assistantship. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

PHYS 4699. Undergraduate Research. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

PHYS 4751. Laser Theory & Application. 3 Credit Hours.
Provides an introduction to the theory and applications of laser principles and related instrumentation. Emphasis is on the fundamental principles underlying laser action. Crosslisted with ECE 4751.

PHYS 4782. Quantum Info & Quant Comp. 3 Credit Hours.
Introduction to quantum computing and quantum information theory, formalism of quantum mechanics, quantum gates, algorithms, measurements, coding, and information. Physical realizations and experiments. Crosslisted with MATH 4782.

PHYS 4801. Special Topics. 1 Credit Hour.
Courses in special topics of current interest in physics are presented from time to time.

PHYS 4802. Special Topics. 2 Credit Hours.
Courses in special topics of current interest in physics are presented from time to time.

PHYS 4803. Special Topics. 3 Credit Hours.
Courses in special topics of current interest in physics are presented from time to time.

PHYS 4804. Special Topics. 4 Credit Hours.
Courses in special topics of current interest in physics are presented from time to time.

PHYS 4813. Special Topics. 3 Credit Hours.
Courses in special topics of current interest in physics are presented from time to time.

PHYS 4823. Special Topics. 3 Credit Hours.
Courses in special topics of current interest in physics are presented from time to time.

PHYS 4833. Special Topics. 3 Credit Hours.
Courses in special topics of current interest in physics are presented from time to time.

PHYS 4854. Special Topics. 4 Credit Hours.
Courses in special topics of current interest in physics are presented from time to time.

PHYS 4900. Special Problems. 1-21 Credit Hours.
Courses involving special problems in physics are offered from time to time.

PHYS 4901. Special Problems. 1-21 Credit Hours.
Courses involving special problems in physics are offered from time to time.

PHYS 4902. Special Problems. 1-21 Credit Hours.
Courses involving special problems in physics are offered from time to time.

PHYS 4903. Special Problems. 3 Credit Hours.
Courses involving special problems in physics are offered from time to time.

PHYS 4904. Special Problems. 4 Credit Hours.
Courses involving special problems in physics are offered from time to time.
PHYS 6106. Quantum Mechanics II. 3 Credit Hours.
Applications of quantum mechanics. Topics include systems with spin and angular momentum, atomic structure, time-dependent phenomena, scattering, and various methods of modeling and approximations.

PHYS 6107. Statistical Mechanics I. 3 Credit Hours.
Equilibrium statistical mechanics for closed and open systems. Probability distribution for classical and quantum systems. Partition functions and associated thermodynamical potentials.

PHYS 6110. Survey of Physics. 5 Credit Hours.
This course provides a review of basic theories in classical and quantum physics through the solution of problems. It provides an excellent preparation for students planning to take the doctoral qualifying exam. This course cannot be used for credit toward a graduate degree in physics.

PHYS 6124. Math Methods-Phys I. 3 Credit Hours.
First of two courses on mathematical methods used in classical mechanics, electromagnetism, quantum mechanics, and statistical physics. Topics include complex analysis, vectors and matrices, and Sturm-Liouville theory.

PHYS 6125. Math Methods-Phys II. 3 Credit Hours.
Second of two courses on mathematical methods. Topics include partial differential equations, random processes, and group theory.

PHYS 6201. Applied Quantum Mech. 3 Credit Hours.
Basic postulates of quantum mechanics, one-dimensional energy eigenvalue problems. Potential wells, tunneling phenomena.

PHYS 6202. Applied Electromagnetism. 3 Credit Hours.
A course centered on the solution of practical problems encountered in the transmission and reception of electromagnetic signals via transmission lines, waveguides, and radiation.

PHYS 6203. Solid State Physics. 3 Credit Hours.
A first course in the physics of crystalline solids. Core topics include crystal lattices, diffraction, bonding, elastic properties, band theory, as well as others.

PHYS 6204. Electronics I. 4 Credit Hours.
A first course in both theoretical and applied electronics that is based on a thorough grounding in circuit as well as device physics.

PHYS 6206. Electronics II. 4 Credit Hours.
A course in electronic instrumentation with an emphasis on signal processing, both analog and digital, and computer interfacing.

PHYS 6208. Fluid Dynamics. 3 Credit Hours.
A course centered on the solution of practical problems encountered in the transmission and reception of electromagnetic signals via transmission lines, waveguides, and radiation.

PHYS 6210. Condensed Matter Phys I. 3 Credit Hours.
Introduction to condensed matter physics. Crystal structure, electronic and thermal properties, response to external electric and magnetic fields.

PHYS 6211. Condensed Matter Phys II. 3 Credit Hours.
Collective and many-electron properties in condensed matter systems. Topics include second quantization, magnetism, phase transitions, and superconductivity.

PHYS 6255. Atomic Physics I. 3 Credit Hours.
This course provides a detailed description of atomic structures and interactions. It contains applications of advanced quantum mechanics to problems in modern atomic physics.

PHYS 6267. Atomic Physics II. 3 Credit Hours.
This course will provide detailed descriptions of non-relativistic atomic/molecular scattering/reaction processes.

PHYS 6268. Nonlinear Dynamics. 3 Credit Hours.
A modern introduction to nonlinear phenomena. Topics include driven oscillators, entrainment, bifurcation, fractals, and control of chaos. Examples are drawn from physical systems.

PHYS 6300. Graduate Laboratory. 3 Credit Hours.
Experiments are conducted that demonstrate basic principles from various fields of physics. An emphasis is placed on contemporary concepts in modern physics.

PHYS 6567. Ultrafast Optics. 3 Credit Hours.
A modern introduction to ultrafast optical phenomena. Topics include the generation, amplification, measurement, nonlinear optics, propagation, focusing, shaping and applications of ultrashort laser pulses.

PHYS 6771. Optoelectronics. 3 Credit Hours.
Optoelectronic materials, physical processes, and devices. Includes compound semiconductor materials, excitation, recombination, gain, and modulation processes, and devices such as emitters, detectors, and modulators. Crosslisted with ECE 6771.

PHYS 6787. Quantitative Electrophys. 3 Credit Hours.
A quantitative presentation of electrophysiological systems in biomedical organisms, emphasizing the electrical properties and modeling of neural and cardiac cells and systems. Crosslisted with BMED and ECE 6787.

PHYS 6XX. Physics Elective. 1-21 Credit Hours.

PHYS 7000. Master's Thesis. 1-21 Credit Hours.

PHYS 7123. Statistical Mechanics II. 3 Credit Hours.
Principles of nonequilibrium statistical mechanics, both classical and quantal. Emphasis is on the dynamics of fluctuations, their measurement, and their relationship to transport properties.

PHYS 7125. Gravity. 3 Credit Hours.
The theory of gravity, describing how matter curves spacetime and spacetime guides matter, with its experimental and theoretical applications.

PHYS 7141. Many-Particle Quant Mech. 3 Credit Hours.
Quantum mechanics of interacting Fermi and Bose particles. Topics include second quantization, diagrammatic perturbation theory, variational methods, and path integrals.

PHYS 7143. Group Theory&Quantum Mec. 3 Credit Hours.
Foundations of group representation theory with applications in atomic, molecular, nuclear, and solid state physics.

PHYS 7147. Quantum Field Theory. 3 Credit Hours.
Introduction to quantum field theory, with an emphasis in quantum electrodynamics. Second quantization, Dirac equation, Feynman diagrams, quantum electrodynamics, electro-weak interactions.

PHYS 7150. Quantum Logics. 3 Credit Hours.
The revision of classical logic and set theory to accommodate the phenomena of quantum interference, with experimental and theoretical consequences.

PHYS 7221. Statistical Optics. 3 Credit Hours.
Phenomena in optics where randomness is dominant. Topics include random variables and processes, partial coherence, polarization, photo statistics, and imaging in random media.

PHYS 7222. Quantum Optics I. 3 Credit Hours.
Basic course on the interaction of light with matter, based on quantum theory. Applications to the laser and to the study of coherence properties of light.
Political Science (POL)

POL 1101. Government of the U.S.. 3 Credit Hours.
The purposes, structure, and functions of national and state governments, focusing on participation, institutions, and the policy process. Foundations of law, civil rights and civil liberties, role of the media, parties and elections, and policy processes. Credit not allowed for both POL 1101 and INTA 1200.

POL 2101. State & Local Government. 3 Credit Hours.
Politics and government processes at the state and local levels.

Polymer, Textile and Fiber Eng (PTFE)

PTFE 9000. Doctoral Thesis. 1-21 Credit Hours.

Professional Pracitve (DOPP)

DOPP 2001. Prep for Work in Glo Ec. 1 Credit Hour.
Preparation for work in a global economy. May be used as free elective credit with departmental approval.

Psychology (PSYC)

PSYC 1101. General Psychology. 3 Credit Hours.
A survey of methods, findings, and theories of the science of mind and behavior.

PSYC 1XXX. Psychology Elective. 1-21 Credit Hours.

PSYC 2005. Expl Multicultural Ident. 3 Credit Hours.
This course explores multicultural identities and key multicultural competencies needed to succeed in a global and international society.

PSYC 2015. Research Methods. 4 Credit Hours.
Introduction to methods used in conducting research on human behavior. Experimental research emphasized, but course covers other methods and some statistics.

PSYC 2020. Psychological Statistics. 4 Credit Hours.
Introduction to probability and statistics as applied to psychological data. Tests for means, variances, correlation, ANOVA, and regression. Credit not allowed for both PSYC 2020 and PSYC 6022.

PSYC 2103. Human Development. 3 Credit Hours.
Theories and issues in human development including cognitive, social, and emotional development. The course is organized topically rather than chronologically.

PSYC 2130. Intro Ed Psych. 3 Credit Hours.
Introduction to Educational Psychology applies the basic principles of child and adolescent development to the study of teaching and learning.

PSYC 2210. Social Psychology. 3 Credit Hours.
Consideration of the behavior of individuals in social contexts, including interpersonal and group settings.

PSYC 2220. Industrial/Organiz Psy. 3 Credit Hours.
An introduction to industrial/organizational psychology providing an overview of behavior in the workplace and psychology applied in industrial and organizational settings.

PSYC 2230. Abnormal Psychology. 3 Credit Hours.
This course surveys the spectrum of psychiatric disorders (symptoms, epidemiology, etiology, and treatment) and provides a perspective on adaptive functioning and psychological resilience.
PSYC 2240. Personality Theory. 3 Credit Hours.
Introduction to major approaches to personality theory.

PSYC 2250. Cross-Cultural Psy. 3 Credit Hours.
This course provides students with an opportunity to learn about the similarities and differences in human behavior across cultures.

PSYC 2270. Engineering Psychology. 3 Credit Hours.
Engineering psychology presented as an integral component in the design and evaluation of human-machine systems. Applied problems and general methodological questions are examined.

PSYC 2280. Psys of Creativity & Art. 3 Credit Hours.
Evolutionary theories of art production and consumption; the psychology of aesthetics; psychological correlates of creative and artistic behavior.

PSYC 2400. Psy& Contemporary Issues. 3 Credit Hours.
Contributions of psychology to an appreciation of selected contemporary issues.

PSYC 2698. Research Assistanship. 1-12 Credit Hours.
Independent research conducted under the guidance of the faculty member.

PSYC 2699. Undergraduate Research. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

PSYC 2760. Human Language Process. 3 Credit Hours.
Theories and research in psycholinguistics: how people comprehend and speak human languages. Includes speech perception, word recognition, parsing, sentence interpretation, word production, and sentence generation. Crosslisted with LING 2760.

PSYC 2801. Special Topics. 1 Credit Hour.
Special topics of current interest.

PSYC 2802. Special Topics. 2 Credit Hours.
Special topics of current interest.

PSYC 2803. Special Topics. 3 Credit Hours.
Special topics of current interest.

PSYC 2901. Special Problems. 1-21 Credit Hours.
Special problems of current interest.

PSYC 2902. Special Problems. 1-21 Credit Hours.
Special problems of current interest.

PSYC 2903. Special Problems. 1-21 Credit Hours.
Special problems of current interest.

PSYC 2XXX. Psychology Elective. 1-21 Credit Hours.

PSYC 3011. Cognitive Psychology. 4 Credit Hours.
Exploration of the central aspects of human cognition including pattern recognition, attention, memory, language, categorization, problem solving, and decision making; phenomena and methods are stressed. Credit not allowed for both PSYC 3011 and PSYC 3012.

PSYC 3012. Intro Cognitive Psy. 3 Credit Hours.
Examines the foundations of Cognitive Psychology including methods, analysis techniques and psychological theories involved in perception, attention, memory, problem solving, decision making, and language. Credit not allowed for both PSYC 3012 and PSYC 3011.

PSYC 3020. Biopsychology. 3 Credit Hours.
Neurophysiological, endocrinological, and biochemical bases of sensory and motor functioning, motivation, learning, memory, and behavior dysfunction.

PSYC 3031. Exper Analys of Behavior. 4 Credit Hours.
History, theory, and methods of behavior analysis. Topics include shaping, stimulus-stimulus and response-consequence contingencies, stimulus control, and choice.

PSYC 3040. Sensation & Perception. 3 Credit Hours.
An examination of how sensations and perceptions are processed by humans. Topics covered will include vision, hearing, the skin senses, taste, smell, and the vestibular senses.

PSYC 3041. Human Sensation&Percept. 4 Credit Hours.
An examination of human sensory systems and perceptual processes. For Psychology majors only.

PSYC 3750. User Interface and Design. 3 Credit Hours.
Human computer interface is considered in terms of user-system compatibility. Concepts in human factors and interface design are covered in relation to capabilities of both humans and computers. Crosslisted with CS 3750.

PSYC 3790. Intro-Cognitive Science. 3 Credit Hours.
Multidisciplinary perspectives on cognitive science. Interdisciplinary approaches to issues in cognition, including memory, language, problem solving, learning, perception, and action. Crosslisted with CS, PST, and ISYE 3790.

PSYC 3XXX. Psychology Elective. 1-21 Credit Hours.

PSYC 4010. Human Abilities. 3 Credit Hours.
Introduction to differential psychology providing an overview of differences in humans. Topics such as abilities, temperament, and group differences (e.g., gender) are addressed.

PSYC 4011. Cognitive Psychology. 4 Credit Hours.
Exploration of the central aspects of human cognition including pattern recognition, attention, memory, language, categorization, problem solving, and decision making; phenomena and methods are stressed. Credit will not be awarded for both PSYC 4011 and PSYC 3011.

PSYC 4020. Biopsychology. 3 Credit Hours.
Neurophysiological, endocrinological, and biochemical bases of sensory and motor functioning, motivation, learning, memory, and behavior dysfunction. Credit will not be awarded for both PSYC 4020 and PSYC 3020.

PSYC 4025. Learning and Memory. 3 Credit Hours.
Research and applications concerning acquisition of new behavior and knowledge, including accounts based on classical and instrumental conditioning and information-processing models of memory and learning.

PSYC 4031. Applied Experimental Psy. 4 Credit Hours.
Consideration of the applications of methods and data of experimental psychology. Understanding of human capabilities and limitations is applied to design of technology and environments.

PSYC 4041. Human Sensation & Percep. 4 Credit Hours.
An examination of human sensory systems and perceptual processes. Credit will not be awarded for both PSYC 4041 and PSYC 3041.

PSYC 4050. History and Systems. 3 Credit Hours.
A survey of the history, methods, and content of modern psychological theory, research, and application. Schools of psychology (e.g., structuralism, functionalism, behaviorism, gestalt psychology) and central theories of psychology will be reviewed in their historical and philosophical context.
PSYC 4090. Cognitive Neuroscience. 3 Credit Hours.
Examination of the neural basis of cognitive function. Basic anatomy and methods are covered. Primary focus is on contemporary problems in the neurocognitive study of perception, memory, language, and attention, as well as disorders in these domains.

PSYC 4100. Behavioral Pharmacology. 3 Credit Hours.
An analysis of drug-behavior interactions with emphasis on basic pharmacology, role of contingencies in drug effects, mechanisms of drug dependency, drugs as stimuli, and basic neuropharmacology.

PSYC 4200. Adv Topics-Cognitive Psy. 3 Credit Hours.
An advanced survey in various topics in cognitive psychology. Topics will vary over time.

PSYC 4260. Psychology of Aging. 3 Credit Hours.
Survey of research concerned with the nature and causes of adult age differences in behavior.

PSYC 4270. Psychological Testing. 3 Credit Hours.
Fundamentals of psychological test construction (reliability and validity) and applications of intelligence, personality, and interest assessment. Topics will include theoretical, practical, ethical, and legal issues.

PSYC 4600. Senior Thesis I. 3 Credit Hours.
The first of a two course sequence in which selected students conduct original work under the direction of a faculty member. The student will produce a proposal for research that will be undertaken during the second course (PSYC 4601).

PSYC 4601. Senior Thesis II. 4 Credit Hours.
The second of a two course sequence in which selected students conduct original work under the direction of a faculty member.

PSYC 4698. Research Assistantship. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

PSYC 4699. Undergraduate Research. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

PSYC 4770. Environmental Design. 3 Credit Hours.

PSYC 4790. Sem-Cognitive Science. 3 Credit Hours.
A seminar-type course in cognitive science focusing on integrating and deepening students' cognitive science knowledge and skills. Topics include memory, language, problem solving, learning, perception, and action. Crosslisted with CS, PST, and ISYE 4790.

PSYC 4791. Integrative Proj-Cog Sci. 3 Credit Hours.
An integrative course in cognitive science focusing on the integration and use of concepts and skills from cognitive science. A different integrative project or set of projects will be taken on each semester; students will contribute on the basis of their background and skills. Crosslisted with CS, ISYE, and PST 4791.

PSYC 4792. Dsgn Proj-Cognitive Sci. 3 Credit Hours.
Individual project with a cognitive science faculty member, designed as a supplement to the student's senior design project or thesis in their major area. Crosslisted with CS, ISYE, and PST 4792.

PSYC 4803. Special Topics. 3 Credit Hours.
Special topics or courses of an experimental nature.

PSYC 4804. Special Topics. 3 Credit Hours.
Special topics or courses of an experimental nature.

PSYC 4813. Special Topics. 3 Credit Hours.
Special topics or courses of an experimental nature.

PSYC 4823. Special Topics. 3 Credit Hours.
Special topics or courses of an experimental nature.

PSYC 4833. Special Topics. 3 Credit Hours.
Special topics or courses of an experimental nature.

PSYC 4900. Special Problems. 1-21 Credit Hours.
Students engage in individual and group projects under the direction of a faculty member.

PSYC 4901. Special Problems. 1-21 Credit Hours.
Students engage in individual and group projects under the direction of a faculty member.

PSYC 4902. Special Problems. 1-21 Credit Hours.
Students engage in individual and group projects under the direction of a faculty member.

PSYC 4903. Special Problems. 1-21 Credit Hours.
Students engage in individual and group projects under the direction of a faculty member.

PSYC 4904. Special Problems. 1-21 Credit Hours.
Students engage in individual and group projects under the direction of a faculty member.

PSYC 4905. Special Problems. 1-21 Credit Hours.
Students engage in individual and group projects under the direction of a faculty member.

PSYC 4906. Special Problems. 1-21 Credit Hours.
Students engage in individual and group projects under the direction of a faculty member.

PSYC 4907. Special Problems. 1-21 Credit Hours.
Students engage in individual and group projects under the direction of a faculty member.

PSYC 4908. Special Problems. 1-21 Credit Hours.
Students engage in individual and group projects under the direction of a faculty member.

PSYC 4909. Special Problems. 1-21 Credit Hours.
Students engage in individual and group projects under the direction of a faculty member.

PSYC 4910. Special Problems. 1-21 Credit Hours.
Students engage in individual and group projects under the direction of a faculty member.

PSYC 4920. Special Problems. 1-21 Credit Hours.
Students engage in individual and group projects under the direction of a faculty member.

PSYC 4930. Special Problems. 1-21 Credit Hours.
Students engage in individual and group projects under the direction of a faculty member.

PSYC 4940. Special Problems. 1-21 Credit Hours.
Students engage in individual and group projects under the direction of a faculty member.

PSYC 4950. Special Problems. 1-21 Credit Hours.
Students engage in individual and group projects under the direction of a faculty member.

PSYC 4960. Special Problems. 1-21 Credit Hours.
Students engage in individual and group projects under the direction of a faculty member.

PSYC 4970. Special Problems. 1-21 Credit Hours.
Students engage in individual and group projects under the direction of a faculty member.

PSYC 4980. Special Problems. 1-21 Credit Hours.
Students engage in individual and group projects under the direction of a faculty member.

PSYC 4990. Special Problems. 1-21 Credit Hours.
Students engage in individual and group projects under the direction of a faculty member.

PSYC 4991. Special Problems. 1-21 Credit Hours.
Students engage in individual and group projects under the direction of a faculty member.

PSYC 4992. Special Problems. 1-21 Credit Hours.
Students engage in individual and group projects under the direction of a faculty member.

PSYC 4993. Special Problems. 1-21 Credit Hours.
Students engage in individual and group projects under the direction of a faculty member.

PSYC 4994. Special Problems. 1-21 Credit Hours.
Students engage in individual and group projects under the direction of a faculty member.

PSYC 4995. Special Problems. 1-21 Credit Hours.
Students engage in individual and group projects under the direction of a faculty member.

PSYC 4996. Special Problems. 1-21 Credit Hours.
Students engage in individual and group projects under the direction of a faculty member.

PSYC 4997. Special Problems. 1-21 Credit Hours.
Students engage in individual and group projects under the direction of a faculty member.

PSYC 4998. Special Problems. 1-21 Credit Hours.
Students engage in individual and group projects under the direction of a faculty member.

PSYC 4999. Special Problems. 1-21 Credit Hours.
Students engage in individual and group projects under the direction of a faculty member.

PSYC 4XXX. Psychology Elective. 1-21 Credit Hours.
Topics include research misconduct, data management, use of animal and human subjects, conflicts of interest and commitment, authorship, publication, peer review, and collaboration and mentoring.

PSYC 6000. Resp. Conduct Research. 1 Credit Hour.
Topics include research misconduct, data management, use of animal and human subjects, conflicts of interest and commitment, authorship, publication, peer review, and collaboration and mentoring.

PSYC 6011. Cognitive Psychology. 3 Credit Hours.
Survey course on human cognition including pattern recognition, attention, memory, categorization, problem solving, consciousness, decision making, intention, and the relation between mind and brain.

PSYC 6012. Social Psychology. 3 Credit Hours.
Fundamental theory and research in social behavior including social perception/cognition, attitude formation and change, social influences, and group processes.
PSYC 6013. Biopsychology. 3 Credit Hours.
Neurophysiological, endocrinological, and biochemical bases of sensory and motor functioning, motivation, learning, memory, and behavioral dysfunction.

PSYC 6014. Sensation & Perception. 3 Credit Hours.
This course examines how sensations and perceptions of the outside world are processed by humans, including physiological, psychophysical, ecological, and computational perspectives.

PSYC 6015. Developmental Psychology. 3 Credit Hours.
Overview of concepts, assumptions, methods, theories, and research in human development across the life span including cognitive, emotional, and social behavior.

PSYC 6016. Analysis of Behavior. 3 Credit Hours.
Conceptual, methodological, and theoretical issues in the experimental analysis of behavior with special emphasis on classical and operant conditioning as foundations for complex behavior.

PSYC 6017. Human Abilities. 3 Credit Hours.
Theory, methods, and applications of research on human abilities, including intelligence, aptitude, achievement, learning, aptitude treatment interactions, information processing correlates, and measurement issues.

PSYC 6018. Research Design. 3 Credit Hours.
Introduction to basic principles and practices of empirical research in psychology. Covers both experimental and correlational methods and designs.

PSYC 6019. Statistical Analysis I. 5 Credit Hours.
Introductory treatment of descriptive and inferential statistics as applied to psychological research.

PSYC 6020. Statistical Analysis II. 5 Credit Hours.
Introductory treatment of inferential statistics, especially the general linear model, as applied to psychological research.

PSYC 6021. Personality Theories. 3 Credit Hours.
Survey of personality theories, research, and methods of assessment.

PSYC 6022. Psych Stat for HCI. 4 Credit Hours.
Introduction to statistical methods as applied to psychological data within the HCI domain. Credit not allowed for both PSYC 6022 and PSYC 2020.

PSYC 6023. Psych Res Methods for HCI. 4 Credit Hours.
Introduction to psychological research methods within the HCI domain. Credit not allowed for both PSYC 6023 and PSYC 2020.

PSYC 6031. Eng Psych Analysis Tech. 2 Credit Hours.
This course covers the basic analysis techniques used to investigate human-machine systems and human performance.

PSYC 6032. Eng Psych Stressors. 1 Credit Hour.
This course covers environmental stressors and their influence on human performance. Emphasis will be placed on noise, lighting, micro-gravity and atmospheric conditions.

PSYC 6033. Eng Psych Cognitive Ergo. 1 Credit Hour.
This course applies the research findings from cognitive psychology to the design of products and systems that involve people.

PSYC 6034. Eng Psych Displays. 1 Credit Hour.
This course covers the basic human factors principles involved in display formatting.

PSYC 6035. Eng Psych Ctrl&Workspace. 1 Credit Hour.
This course covers the basic human factors principles involved in controls and workspace layout.

PSYC 6040. Topics in Cog & Brain Sc. 1 Credit Hour.
This course presents current research topics in cognition and brain science.

PSYC 6041. Topics in Cog Aging. 1 Credit Hour.
This course presents current research topics in cognitive aging.

PSYC 6042. Neuroimaging. 3 Credit Hours.
This course details the potential and limits of fMRI and critically evaluates the inferences that can be drawn from fMRI studies.

PSYC 6043. Engr Psych Res Seminar. 1 Credit Hour.
This course presents current research topics in engineering psychology.

PSYC 6060. Psych of Aging. 3 Credit Hours.
A survey covering psychological aspects of aging, mind, and behavior (perception, cognition, emotion, mental health) and topics relevant to adulthood (e.g. caregiving and retirement).

PSYC 6090. Cognitive Neuroscience. 3 Credit Hours.
Examines the foundations of Cognitive Neuroscience, including the biological mechanisms underlying cognition, the dominant theories, and the experimental techniques.

PSYC 6270. Psychological Testing. 3 Credit Hours.
Fundamentals of psychological testing. Topics include test construction and application issues.

PSYC 6750. Human-Computer Interact. 3 Credit Hours.
Describes the characteristics of interaction between humans and computers and demonstrates techniques for the evaluation of user-centered systems. Crosslisted with CS 6750.

PSYC 6753. HCI Prof Prep & Practice. 1 Credit Hour.
Preparation for a professional career in HCI. Speakers. Atlanta-area lab visits. Career trajectories. Project presentations. Technical, resume and interviewing skills, Atlanta-area HCI resources. Credit not allowed for both PSYC 6753 and CS 6753 or LCC 6753.

PSYC 6755. HCI Foundations. 3 Credit Hours.
Describes the theory and practice of designing effective and efficient interactions between people and technology.

PSYC 6795. Intro-Cognitive Science. 3 Credit Hours.
Multidisciplinary perspectives on cognitive science. Interdisciplinary approaches to issues in cognition, including memory, language, problem solving, learning, perception, and action. Crosslisted with CS and ISYE 6795.

PSYC 6998. HCI Master’s Project. 1-9 Credit Hours.
Final project for students completing a Human-Computer Interaction master’s degree. Repeatable for multi-semester projects.

PSYC 6XXX. Psychology Elective. 1-21 Credit Hours.

PSYC 7000. Master’s Thesis. 1-21 Credit Hours.

PSYC 7020. Cognitive Aging. 3 Credit Hours.
Introduction to theory and research on adult cognitive development, including intelligence, attention, memory, and problem solving.

PSYC 7101. Engineering Psy I. 3 Credit Hours.
Basic methods used to study human-machine systems including both system analysis and human performance evaluation techniques. These methods will be applied to specific systems.

PSYC 7102. Engineering Psy II. 3 Credit Hours.
Basic principles of human factors for the design, evaluation, and use of displays, controls, and workspace layout including new technologies and associated human factors problems.
PSYC 7103. Engineering Psy III. 3 Credit Hours.
Environmental stressors and their influences on human performance, physiological function, and emotional responses including work/rest cycles, jetlag, noise, vibration, glare, weightlessness, etc.

PSYC 7104. Psychomotor & Cog Skill. 3 Credit Hours.
Human capabilities and limitations for learning and performing psychomotor and cognitive skills are studied.

PSYC 7105. First Yr Research I. 3 Credit Hours.
First year graduate students will initiate a research project.

PSYC 7106. First Yr Research II. 3 Credit Hours.
First year graduate students will complete a research project.

PSYC 7201. Industrial/Organiz Psy. 3 Credit Hours.
This course introduces an overview of issues relevant to behavior in the workplace and psychology applied in industrial and organizational settings.

PSYC 7202. Employee Selection. 3 Credit Hours.
The course provides a conceptual framework for personnel selection guided by scientific principles, research, and theory as well as by professional, legal, and technical guidelines.

PSYC 7203. Motivation&Job Attitudes. 3 Credit Hours.
Examines theory and pragmatics in description, prediction, and measurement of work-related behavior and associated evaluations. Includes theoretical and methodological problems in field and laboratory contexts.

PSYC 7204. Training & Development. 3 Credit Hours.
This course will focus on theory, principles, techniques, and practices relevant to training and developing human resources. Research and professional literature will be examined.

PSYC 7301. Multivariate Statistics. 3 Credit Hours.
Foundations for multivariate analysis including properties of linear composite variables, multiple regression, multiple and partial correlation, MANOVA, factor analysis, multiple discriminant analysis, canonical correlation, etc.

PSYC 7302. Equation Modeling. 3 Credit Hours.
Methods of causal modeling to study causal relations including issues of causality, establishing causality, fundamentals of linear structural equation modeling with latent variables, fitting models.

PSYC 7303. Psychometric Theory. 3 Credit Hours.
Preparation of students in statistical theory and techniques relevant to becoming professionally involved in construction, analysis, and evaluation of psychology and personnel tests.

PSYC 7700. Professional Problems. 2 Credit Hours.
Discussion of issues faced by professional psychologists in the areas of teaching, research, and professional practice. Ethical issues in all of these areas are emphasized.

PSYC 7701. Teaching Practicum. 2 Credit Hours.
Supervised college teaching including techniques, course and curriculum design, evaluation. Students will prepare and present lectures with direct observations and video taping for discussion.

PSYC 7790. Cognitive Modeling. 4 Credit Hours.
A hands-on course covering a range of cognitive modeling methodologies. It explores the analysis, development, construction, and evaluation of models of cognitive processing. Crosslisted with CS and ISYE 7790.

PSYC 7999. Prep Doctoral Qual Exam. 1-21 Credit Hours.

PSYC 8000. Sem-Experimental Psy. 3 Credit Hours.
Critical examination of current problems in a selected area of general experimental psychology. Areas to be discussed may vary each time course is offered.

PSYC 8010. Seminar-Cognitive Psy. 3 Credit Hours.
Critical examination of current problems in a selected area of cognitive psychology. Areas to be discussed may vary each time course is offered.

PSYC 8020. Seminar-Cognitive Aging. 3 Credit Hours.
Critical examination of current problems in a selected area of cognitive aging. Areas to be discussed may vary each time course is offered.

PSYC 8030. Sem-Comparative Psy. 3 Credit Hours.
Critical examination of current problems in a selected area of comparative psychology. Areas to be discussed may vary each time course is offered.

PSYC 8040. Seminar-Engineering Psy. 3 Credit Hours.
Critical examination of current problems in a selected area of engineering psychology. Areas to be discussed may vary each time course is offered.

PSYC 8050. Sem-Indust/Organiz Psy. 3 Credit Hours.
Critical examination of current problems in a selected area of industrial/organizational psychology. Areas to be discussed may vary each time course is offered.

PSYC 8060. Sem-Quantitative Psy. 3 Credit Hours.
Presentation and discussion of quantitative approaches to psychology. Topics will vary, but might include neural networks, measurement theory, behavioral ecology, modeling, system dynamics, etc.

PSYC 8070. Seminar CogNeuro. 3 Credit Hours.
Critical examination of current problems in selected areas of cognitive neuroscience. Areas to be discussed vary each time.

PSYC 8080. Seminar Cog & Brain. 3 Credit Hours.
Critical examination of current problems in selected areas of cognition and brain sciences. Areas to be discussed may vary each time.

PSYC 8795. Colloquium-Cognitive Sci. 1 Credit Hour.
Reading of research papers by leading cognitive scientists, attendance at their colloquia, and meeting with them to discuss research. Crosslisted with CS and ISYE 8795.

PSYC 8802. Topics in CogNeuro. 2 Credit Hours.
Covers current issues and recent advances in cognitive neuroscience.

PSYC 8803. Spec Top-Applied Stat. 3 Credit Hours.
Covers current issues and recent advances in the application of statistical methods to research in psychology. Instructors select the specific focus for a given term.

PSYC 8804. Topics in Cog Aging. 3 Credit Hours.
Covers current issues and recent advances in cognitive aging.

PSYC 8805. Topics in CogNeuro. 3 Credit Hours.
Covers current issues and recent advances in cognitive neuroscience.

PSYC 8806. Topics in Cog Psyc. 3 Credit Hours.
Covers current issues and recent advances in cognitive psychology.

PSYC 8807. Special Topics Engr Psy. 3 Credit Hours.
Covers current issues and recent advances in Engineering Psychology.

PSYC 8811. Special Topics. 1 Credit Hour.
Special topics that cover current issues and recent advances in Psychology.
Public Policy (PUBP)

PUBP 1142. Teams and Collaboration. 3 Credit Hours.
Exposes students to essential theories and concepts for analyzing, understanding, and managing teams in the context of complex interdependent public problems. Credit not awarded for both PUBP 1142 and PUBP 2142.

PUBP 1XXX. Public Policy Elective. 1-21 Credit Hours.
Courses on special topics of current interest in Public Policy.

PUBP 2010. Political Processes. 3 Credit Hours.
Introduction to political models and theories of policy making. Agenda-setting, stakeholder involvement, policy adoption, policy design and implementation, evaluation, and advocacy.

PUBP 2012. Foundation-Public Policy. 3 Credit Hours.
An in-depth exploration of American public policy, with emphasis on the dynamics of policymaking in policy areas such as health care, research, energy and environment, income maintenance, and economic development.

PUBP 2030. Organizations and Policy. 3 Credit Hours.
An exploration of the roles and activities of bureaucracies in the implementation of policies and programs, with emphasis on practical issues of public management. Credit not allowed for both PUBP 2030 and PUBP 3010.

PUBP 2142. Teams and Collab Context. 3 Credit Hours.
Exposes students to essential theories and concepts for analyzing, understanding, and managing teams in the context of complex interdependent public problems. Credit not awarded for both PUBP 2142 and PUBP 1142.

PUBP 2651. Public Policy Internship. 1-3 Credit Hours.
Course projects related to professional internships. Topics, credit, and requirements to be arranged by student, instructor, and sponsor. Maybe taken only once.

PUBP 2698. Research Assistantship. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

PUBP 2699. Undergraduate Research. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

PUBP 2803. Special Topics. 3 Credit Hours.
Courses on special topics of current interest in Public Policy.

PUBP 2XXX. Public Policy Elective. 1-21 Credit Hours.

PUBP 3000. US Constitutional Issues. 3 Credit Hours.
Examines the American social and political system through the prism of Constitutional issues decided by the U.S. Supreme Court.

PUBP 3016. Judicial Process. 3 Credit Hours.
The functions, structures, and procedures of state and federal court systems, including selection and appointment of judges, judicial activism, influences on court decisions, and enforcement of court decisions.

PUBP 3020. Applied Political Econ. 3 Credit Hours.
Roles of markets and government in allocating resources. Rational choice approaches to understanding policy. Institutional design. Growth and sustainability.

PUBP 3030. Policy Analysis. 3 Credit Hours.
The science and craft of professional problem-solving, analysis, and advice. Economic and political approaches and techniques for analysis of costs, benefits, and risks.

PUBP 3120. Stat Analysis-Pub Policy. 3 Credit Hours.
Introduction to probability, descriptive statistics, inferential statistics and analysis, and spreadsheets. Emphasis application of basic statistical concepts to public policy and administration problems. Credit not allowed for both PUBP 3120 and PUBP 4113.

PUBP 3130. Research Methods. 3 Credit Hours.
Conceptual and methodological issues in policy studies, including causality, explanation, models, threats to research, data collection, and assessment of applicability to policy issues. Design of research. Credit not allowed for both PUBP 3130 and PUBP 3110.

PUBP 3141. Leading Social Orgs. 3 Credit Hours.
This course is designed to give the student a sound understanding of how to lead and manage change in social organizations.

PUBP 3201. Intro To Social Policy. 3 Credit Hours.
A survey of public policies directed toward social problems in America and their evolution and reform. Development of role of government in addressing issues related to poverty and social welfare.
PUBP 3214. African-Amer Politics. 3 Credit Hours.
An exploration of the organizations, strategies, and issues that have defined African American political life in the post-civil rights era in the United States.

PUBP 3244. Stem Cell Policy Ethics. 3 Credit Hours.
Examination of current state of scientific knowledge regarding stem cells and historical development, relevant ethical issues, and policy considerations.

PUBP 3315. Environ Policy& Politics. 3 Credit Hours.
Overview of the major institutions, organizations, official and unofficial actors in environmental policy and politics, and what influences their environmental decisions and actions. Credit not allowed for both PUBP 3315 and PUBP 4314.

PUBP 3320. Climate Policy. 3 Credit Hours.
Examines relevant scientific theory and evidence, political history, policy options, alternative policy analysis frameworks, and the influence of science and scientific uncertainty on climate policy.

PUBP 3350. Energy Policy. 3 Credit Hours.
Examines policies impacting the production and utilization of energy in the U.S. and abroad. Addresses resource constraints, physical principles, and policy analysis tools and concepts.

PUBP 3502. IT/Comm/Telecom Policy. 3 Credit Hours.
Examination of the convergence of information technology, communications and telecommunications, policymaking within the executive/regulatory branches, special interest group role, and key domestic and international issues. Credit not allowed for both PUBP 3502 and PUBP 4512.

PUBP 3600. Sustain, Tech & Policy. 3 Credit Hours.
Ethical, scientific, technological, economic, and political dimensions of sustainable human practices, applying multidisciplinary perspectives to challenges facing public and private-sector approaches to sustainability.

PUBP 3610. Pre-Law Seminar. 3 Credit Hours.
Examination of the legal profession and areas of legal specialization (e.g., contract, property, intellectual property, international). Emphasizes skills and values that are essential to success in law school and competent lawyering.

PUBP 3XXX. Public Policy Elective. 1-21 Credit Hours.
PUBP 4010. Policy Task Force I. 3 Credit Hours.
Capstone project in which teams of students formulate, analyze, and recommend policy options.

PUBP 4020. Policy Task Force II. 3 Credit Hours.
Capstone project in which teams of students formulate, analyze, and recommend policy options.

PUBP 4111. Internet & Public Policy. 3 Credit Hours.
Analyzes policy implications of Internet architecture (Internet protocols, domain name system, packet switching, peer-to-peer) and surveys policy issues about content, privacy, intellectual property, and governance.

PUBP 4120. Survey Research Methods. 3 Credit Hours.
Methods for producing and reporting valid surveys, including composition of questions, design and implementation of survey strategies, and analysis and communication of results.

PUBP 4130. Pol Analy & Program Eval. 3 Credit Hours.
Analytical methods for rational planning and policy analysis, emphasizing "learning by doing" as students examine alternative types of policy analysis, establish evaluation criteria, and evaluate policy implementation.

PUBP 4140. Foundations Leadership. 3 Credit Hours.
This course offers a comprehensive review of contemporary issues and perspectives on leadership, including multi-disciplinary and systems-oriented approaches as well as classic theory, moving to the examination of evolving contemporary beliefs.

PUBP 4200. Social Policy Issues. 3 Credit Hours.
A review of conceptual and analytical perspectives in social policy and coverage of major areas of persistent social problems, including health care, welfare reform, housing, education, reproductive issues, and gerontology.

PUBP 4211. Urban Policy. 3 Credit Hours.
Urban policy and urban economic development examined historically, nationally, and locally. Approaches to urban development and redevelopment.

PUBP 4212. Women and Public Policy. 3 Credit Hours.
The status of women in American society as a function of rights and opportunities conferred upon women by governmental actions and as influenced by forces of social change.

PUBP 4214. Gender, Sci, Tech & Pub Plicy. 3 Credit Hours.
The course focuses on the connections between gender, science, and technology, and issues of public policy.

PUBP 4226. Business and Government. 3 Credit Hours.
How government regulates business and markets, and how business exercises power and influence on government in areas such as antitrust, financial markets, safety and health, and environmental quality.

PUBP 4260. Econ Dev Policy & PLan. 3 Credit Hours.
Introduction to the context, theory, processes, and practice of regional and local economic development policy and planning in the U.S. and internationally.

PUBP 4338. Environ Impact Assesment. 3 Credit Hours.
Examines policy, planning, and methodological issues in the environmental impact assessment of engineering systems. Emphasizes regulatory aspects of environmental analysis and key analytical techniques, and the incorporation of environmental considerations into engineering design processes.

PUBP 4410. Science, Tech & Pub Policy. 3 Credit Hours.
Examination of relationships between science, technology, and government, and their mutual influence on public and private decisions.

PUBP 4414. Tech, Innovation & Policy. 3 Credit Hours.
Theories and concepts of technological innovation and diffusion, economic development, and the role of public and private institutions in technological development at the firm, industry, regional, national, and international levels.

PUBP 4416. Critical Issues-Sci&Tech. 3 Credit Hours.
Exploration of technology and technological society, going beyond utility and functionality to consider justice, meaningfulness, and self-realization. Perspectives include political economy, aesthetics, and social change.

PUBP 4440. Sci Tech & Regulation. 3 Credit Hours.
Examines historical, legal, economic, and political rationales for regulation. Survey of administrative law and processes, risk analysis/management, expertise and public, and current topical issues. Credit not allowed for both PUBP 4440 and PUBP 6440.

PUBP 4501. Info Policy & Management. 3 Credit Hours.
Examination of the information dimensions of public and private organizations in response to the multiple types of uncertainty they face in their strategic pursuits. Credit not allowed for both PUBP 4501 and PUBP 6501.
PUBP 4514. Mass Communications Pol. 3 Credit Hours.
Examines mass media influences, activities, characteristics, and behavior with respect to the political process and government. Structure of media markets, characteristics of news and advertising, and impacts of changing technologies on political processes.

PUBP 4530. Geographic Info Systems. 3 Credit Hours.
Overview of GIS concepts, methods, and terminology, Introduction to PC-based GIS software. Applications to marketing, natural resource management, and public information systems. Students use case studies to design and implement actual projects.

PUBP 4532. Advanced GIS Topics. 3 Credit Hours.
Introduction to raster-based GIS software, Avenue script language, and map Internet server. Applications to marketing, natural resource management, and public information systems.

PUBP 4600. Senior Thesis. 3 Credit Hours.
A capstone course usually taken in the student’s last term before graduation, the senior seminar and thesis involves writing an original paper entailing policy analysis relevant to a public or nonprofit agency.

PUBP 4609. Legal Practice. 3 Credit Hours.
This course develops skills in reading and comprehension of legal materials, analysis of legal writing, and document drafting in selected areas of law.

PUBP 4620. Environmental Law. 3 Credit Hours.
Investigation of the principal environmental laws and regulations. The class will also consider philosophical and ethical underpinnings of environmental law.

PUBP 4640. Tech Law, Policy, Mgmt. 3 Credit Hours.
An in-depth analysis of patent law and survey of other forms of intellectual property protection, including trademark, copyright, and trade secrets.

PUBP 4650. Internet Law. 3 Credit Hours.
Covers issues including copyright (including music/video file sharing), privacy; freedom of speech (including defamation and obscenity), jurisdiction, regulation, and crimes as applied to the Internet.

PUBP 4651. Public Policy Internship. 1-6 Credit Hours.
Course projects related to professional internships. Topics, credit, and requirements to be arranged by student, instructor, and sponsor.

PUBP 4652. OLA Legal Internship. 1-3 Credit Hours.
Supervised professional internship with the Georgia Tech Office of Legal Affairs.

PUBP 4698. Research Assistantship. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

PUBP 4699. Undergraduate Research. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

PUBP 4725. Info Security Policies. 3 Credit Hours.
Information security vulnerabilities and risks; legal, cost, privacy, and technology constraints; derivation of strategies; technical and procedural means of achieving desired ends.

PUBP 4726. Privacy, Tech, Policy, Law. 3 Credit Hours.
This course takes a multi-disciplinary approach to privacy, a topic of great interest in the technology, policy, ethics and law business realms. Credit will not be awarded for more than one of PUBP 4726, MGT 4726, MGT 6726, CS 4726 OR CS 6726.

PUBP 4756. Technology Forecasting. 3 Credit Hours.
Develops skills in methods for technology monitoring, forecasting, and assessment; draws on examples in various emerging technologies. Collection and analysis of quantitative and qualitative data on emerging technologies and their implications. Crosslisted with ISYE 4756.

PUBP 4803. Special Topics. 3 Credit Hours.

PUBP 4811. Special Topics. 1 Credit Hour.
Topics of interest not covered in the regular course offerings.

PUBP 4812. Special Topics. 2 Credit Hours.
Topics of interest not covered in the regular course offerings.

PUBP 4813. Special Topics. 3 Credit Hours.
Topics of interest not covered in the regular course offerings.

PUBP 4814. Special Topics. 4 Credit Hours.
Topics of interest not covered in the regular course offerings.

PUBP 4815. Special Topics. 5 Credit Hours.
Topics of interest not covered in the regular course offerings.

PUBP 4823. Special Topics. 3 Credit Hours.
Topics of interest not covered in the regular offerings.

PUBP 4833. Special Topics. 3 Credit Hours.
Topics of interest not covered in the regular offerings.

PUBP 4843. Special Topics. 3 Credit Hours.
Topics of interest not covered in the regular offerings.

PUBP 4848. Special Topics. 5 Credit Hours.
Themes of interest not covered in the regular course offerings.

PUBP 4825. Legislative Intern Prog. 3 Credit Hours.
Work-study program assigning students to a project in state or local government. Students prepare research papers analyzing their work experiences relative to theory from the social science or policy studies.

PUBP 4952. Legislative Intern Prog. 3 Credit Hours.
Topics of interest not covered in the regular offerings.

PUBP 4951. Georgia Internship Prog. 3 Credit Hours.
Topics of interest not covered in the regular offerings.

PUBP 4952. Legislative Intern Prog. 3 Credit Hours.
Students work fulltime for the Georgia General Assembly for elected officials or committees. Students prepare research papers analyzing their work experiences relative to theory from the social science or policy studies. Spring semester only.

PUBP 4XXX. Public Policy Elective. 1-21 Credit Hours.

PUBP 6001. Intro to Public Policy. 1 Credit Hour.
An introduction to the field of public policy, including an overview of the scope of the field and examples of public policy analysis.

PUBP 6010. Ethic,Epistem&Public Pol. 3 Credit Hours.
Examination of the role of ethics and epistemology in public decision making including the effects of values of professionals on public institutions and private sector organizations.

PUBP 6012. Fund of Policy Processes. 3 Credit Hours.
The political and governmental context of policy is presented, from agenda setting to evaluation. Examines constitutional and federal contexts of policy, the role of various input mechanisms in shaping policy decisions, the processes by which government institutions make decisions (and the interactions among these institutions), and approaches for understanding and anticipating policy decision making.
PUBP 6014. Organization Theory. 3 Credit Hours.
A broad overview of the theoretical issues pertaining to the management of organizations. The course explores both "macro" (i.e. external relations, strategies, and structures) organizational issues. While this is a survey course, we will be concentrating much of our attention on current challenges to bureaucracy as a form of organization. In particular, we will be using theories to examine trends toward re-engineering corporations or re-inventing government agencies. Satisfies policy implementation, management, and organization theory requirement.

PUBP 6017. Public Management. 3 Credit Hours.
Using case studies and a field exercise, students will examine how public policies are executed and managed. Underlying the course is the assumption that public management, is the management of political authority and that strategic thinking can make for effective public management. Satisfies policy implementation, management and organization theory requirement.

PUBP 6018. Policy Implement & Admin. 3 Credit Hours.
This course gives special attention to institutional processes in efforts to coordinate policy implementation at the federal level and within the intergovernmental context; the analysis of implementation and enforcement of policy by regulatory agencies with the support of state governments and private sector agents; challenges to implementation by policy type; and the analysis of policy tools and administrative discretion in implementation. Satisfies policy implementation, management, and organization theory requirement.

PUBP 6111. Internet & Public Policy. 3 Credit Hours.
Analyzes policy implications of Internet architecture (Internet protocols, domain name system, packet switching, peer-to-peer) and surveys policy issues about content, privacy, intellectual property, and governance.

PUBP 6112. Research Dsgn-Policy Sci. 3 Credit Hours.
The objectives for this course include: (1) providing a broad overview of research methods and research criteria; (2) giving students the opportunity to conduct data-based research and analysis; (3) providing more specialized knowledge of one set of research techniques (e.g. survey research, case studies, experimentation - varies by term); (4) providing experience in presenting and defending research.

PUBP 6114. Applied Policy Methods. 3 Credit Hours.
This course will focus on how to design, carry out, present, and interpret quantitative analyses, of policy problems. Topics include probability, inferential statistics, regression analysis, general linear models, nonparametric analyses and graphical analysis, as time permits. Classes will focus on (1) the course project, (2) discussions of assigned readings and problems, and (3) data analysis using spreadsheets and a standard statistical package. Note: Students without preparation in basic statistical concepts and computer methods will be required to take appropriate courses at the 4000 level prior to admission.

PUBP 6116. Microecon-Policy Analy. 3 Credit Hours.
Microeconomic theory is studied with applications to public problems. Students will be introduced to price-generating processes in an economy, demand and supply theory, market equilibrium, welfare economics, categories of market failure, and the public sector's role.

PUBP 6118. Public Finance & Policy. 3 Credit Hours.
Examines the theory, practice and policy implementations of federal, state, and local government budgeting and finance. Topics include government spending decisions with a focus on aggregate demand and supply, fiscal policy, budgeting practice, introduction to cost/benefit analysis.

PUBP 6201. Public Policy Analysis. 3 Credit Hours.
This course provides a capstone experience for public policy students. The course addresses real-world policy issues and various approaches to analyzing them. The course relies heavily on cases and exercises.

PUBP 6218. Quantitative Models-Pubp. 3 Credit Hours.
This course lays a foundation for model building, and through the introduction of a variety of software packages will provide some hands-on experience with elementary model-building. Decision models will be emphasized. Some familiarity with data analysis, probability, and statistical models is assumed. The goal of the course is to equip students with basic model building tools, familiarize them with common problems in modeling, and improve their ability to create and evaluate simple models of policy problems.

PUBP 6221. Pol & Program Evaluation. 3 Credit Hours.
Approaches to evaluation policies and programs are presented using examples and case studies to contrast evaluation methods as well as the organizational and political context for evaluation.

PUBP 6226. Business & Government'. 3 Credit Hours.
Examines government regulation of business operations and the economy from a broad perspective.

PUBP 6300. Earth Systems. 3 Credit Hours.
Describes the scientific principles and interactions that make up the Earth's environmental system. The course examines the interaction of natural and human influences that shape the development and operation of the Earth system and how public and private decision-making impacts this system.

PUBP 6310. Environmental Issues. 3 Credit Hours.
Provides an overview of basic concepts and methods of environmental policy analysis and implementation through a case study approach. Cases will range from local to global environmental policy issues. The goal of the course will be to expose students to the broad range of social and physical problems referred to as "environmental" problems, and to orient the student for future work in the field.

PUBP 6312. Economics-Environ Polcy. 3 Credit Hours.
This course addresses key concepts in environmental economics, including externalities, efficiency, social welfare and environmental quality as a public good. Addresses environmental problems (i.e. water resources, air quality, urbanization) and vehicles of collective environmental action.

PUBP 6314. Policy Tools-Environ Mgt. 3 Credit Hours.
Explores the various regulatory, managerial, and legal mechanisms available to policy analysts and decision makers for protecting environmental quality.

PUBP 6326. Environ Values&Pol Goals. 3 Credit Hours.
Examines the goals and objectives of environmentalists, with special attention to the literature of environmental ethics.

PUBP 6327. Sustainability & Env Pol. 3 Credit Hours.
This course explores the theory and practice of sustainable development, surveying areas of consensus and controversy in emerging thought on sustainability. Credit not allowed for both PUBP 6327 and PUBP 6320.

PUBP 6330. Environmental Law. 3 Credit Hours.
Presents the legal and institutional framework within which environmental law is developed and implemented in the the United States and internationally. Also examines the major pollution control statutes, and reviews international law and conventions to address trans-boundary environmental issues.
PUBP 6350. Energy Policy & Markets. 3 Credit Hours.
Examines theory and policy impacting production and utilization of energy in the U.S. and abroad. Addresses resource constraints, environmental impacts, and policy analysis tools.

PUBP 6401. Sci, Tech & Public Policy. 3 Credit Hours.
Examination of the relationships between science, technology, and government, including policies for support, control, and application of science and technology.

PUBP 6402. Research Policy & Mgt. 3 Credit Hours.
Examines challenges in researching policy and management. The research activities of public, private, and not-for-profit organizations are contrasted in examining strategic planning, allocation of resources, technology transfer, and research evaluation practices.

PUBP 6403. Sci Careers/Workplaces. 3 Credit Hours.
Focuses on key social and organizational dimensions of scientific careers and workplace sectors (academia, industry, and government).

PUBP 6414. Tech Innovation&Gov Plcy. 3 Credit Hours.
Federal and state policies to stimulate innovation; sources and stimuli for innovation; role of universities and industry consortia; comparative innovation policy; evaluation of technology policy.

PUBP 6415. Tech Regions & Policy. 3 Credit Hours.
Explores concepts, issues, and policies related to regional development, economic development, industrial change, and technology policy.

PUBP 6417. Critic Perspect-Sci&Tech. 3 Credit Hours.
This course seeks to stimulate students’ critical thinking about science and technology and their relationships to markets, politics and societies. Discussions include topics such as the social organization of scientific and technical communities, the roles of economic and political forces in science and technology, the shaping of the technical workforce, and the implications of science and technology for concepts that go beyond utility and competitiveness to include justice and self-realization.

PUBP 6421. Large-Scale Soc-Tech Sys. 3 Credit Hours.
Analyzes development of large systems such as smart highways, computer networks, electrical power, weapons, and space. Teaches practical skills including negotiation, coalition-building, strategy, and innovation politics.

PUBP 6440. Sci Tech & Regulation. 3 Credit Hours.
Examines historical, legal, economic, and political rationales for regulation. Survey of administrative law and processes, risk analysis/management, expertise and public, and current topical issues. Credit not allowed for both PUBP 6440 and PUBP 4440.

PUBP 6501. Information Policy & Mgt. 3 Credit Hours.
Examination of the information age from policy and management perspectives. The course will explore concepts and issues related to the formation and implementation of information policies. Credit not allowed for both PUBP 6501 and PUBP 4501.

PUBP 6502. IT/Comm/Telecom Policy. 3 Credit Hours.
Examination of the convergence of information technology, communications and telecommunication, policymaking within the executive/regulatory branches, special interest group role, and key domestic and international issues.

PUBP 6514. Mass Communications Plcy. 3 Credit Hours.
Traces the evolution of broadcasting, cable, and other mass media policies. Examines the functioning/impact of mass communications in a changing technological environment.

PUBP 6530. Intro to GIS. 3 Credit Hours.
Introduction to the application of geographic information systems (GIS) to public policy issues. Students develop an understanding of GIS software and hardware components, develop facility with a desktop GIS software package, explore digital data availability on the Internet, learn data transfer procedures, learn cartographic projection methods, apply GIS and environmental management data to analyze a selected program.

PUBP 6600. Local Econ Dev Plan&Plyc. 3 Credit Hours.
Introduction to the context, theory, process, and practice of local economic development planning and policy. Topics covered include: differing theoretical and conceptual explanations of the economic development process; international, national, and regional factors affecting local economic development; federal, state, and local roles; key elements in the economic development process; and contrasting economic development approaches.

PUBP 6602. Econ Dev Analy&Practice. 3 Credit Hours.
Strategy development, methods of analysis, and approaches to practice for urban and regional economic development policy and planning.

PUBP 6604. Urban Policy Analy& Plan. 3 Credit Hours.
Applies analytical techniques and practices of public policy and planning to urban issues, synthesizing varied public policy techniques and practices in a case study context.

PUBP 6606. Urban Development Policy. 3 Credit Hours.
Introduces elements of urban policy and urban economic development by examining them historically, nationally, and locally. Approaches to urban development and redevelopment are analyzed.

PUBP 6710. Energy Technol & Policy. 3 Credit Hours.
Examines energy production, use, and policy using quantitative engineering and policy analysis. Addresses resource constraints, physical principles, and policy analysis methods.

PUBP 6725. Info Security Policies. 3 Credit Hours.
Information security vulnerabilities and risks; legal, cost, privacy and technology constraints; derivation of strategies; technical and procedural means of achieving desired ends.

PUBP 6726. Privacy, Tech, Policy & Law. 3 Credit Hours.
This course takes a multi-disciplinary approach to privacy, a topic of great interest in the technology, policy, ethics, law, and business realms. Credit will not be awarded for more than one of PUB 6726, MGT 6726 or CS 6726.

PUBP 6740. Innovation and the State. 3 Credit Hours.
Research seminar exploring the role of the state in industrial development, innovation and business-government relations. Special attention given to science and technology policies and their influence in different international and industrial contexts. Crosslisted with INTA 6740.

PUBP 6741. Geography of Innovation. 3 Credit Hours.
Examination of the growing discussion on the knowledge economy, learning regions, innovation capacity, and place management and what those strategies mean for regional economies.

PUBP 6743. STS Core Seminar. 3 Credit Hours.
This survey course covers key works in Science, Technology & Society, and guest lectures introduce students to faculty doing STS-related research across the Ivan Allen College. Credit not allowed for both PUBP 6743 and HTS 6743 or LCC 6743.
PUBP 6748. Social Justice & Design. 3 Credit Hours.
Focuses on social justice from a Science, Technology, and Society (STS) point of view that is informed by critical theory and philosophy of design. Credit not allowed for both PUBP 6748 and LCC 6748.

PUBP 6749. Feminist Theory STS. 3 Credit Hours.
This course is an advanced science, technology and society (STS) seminar in feminist theory. Credit not allowed for both PUBP 6749 and LCC 6749.

PUBP 6753. Comp Science & Tech Policy. 3 Credit Hours.
Examination of the social, political, and cultural contexts of science and technology, and how they affect the research, development, and regulatory policies of nations. Crosslisted with INTA 6753.

PUBP 6760. Negotiation & Conflict Mgt. 3 Credit Hours.
Practical and theoretical instruction on techniques of negotiation and consensus building using training exercises and case studies. Emphasizes environmental, policy, planning, and development disputes. Crosslisted with CP 6760.

PUBP 6777. Analysis-Emerging Tech. 3 Credit Hours.
This course develops skills in the use of selected methods for technology monitoring, forecasting, and assessment. Also examines current status and prospects in selected emerging technology domains. Crosslisted with ISYE 6777.

PUBP 6801. Research Paper. 3 Credit Hours.
Either a professional policy research paper or a team research project including a co-authored policy research monograph prepared for a government or public affairs client.

PUBP 6XXX. Public Policy Elective. 1-21 Credit Hours.

PUBP 7000. Master's Thesis. 1-21 Credit Hours.

PUBP 8101. Workshop Pol Res I. 1 Credit Hour.
Course provides an overview of research and professional socialization. It presents topics partially satisfying GT RCR policy for in-person training. Student will brainstorm dissertation topics.

PUBP 8102. Workshop Pol Res II. 1 Credit Hour.
Course provides an overview of public policy research and professional socialization. It completes the sequence of topics satisfying GT RCR policy for in-person training.

PUBP 8200. Adv Research Methods I. 3 Credit Hours.
The course will cover advanced policy analysis and modeling methods, including regression models, and other topics as time permits.

PUBP 8205. Adv Research Methods II. 3 Credit Hours.
Building on Advanced Research Methods I, the course will cover advanced policy analysis and modeling methods, for example, panel data and nonparametric regression. Other policy research methods may be explored as time permits.

PUBP 8211. Microeconomic Theory. 3 Credit Hours.
Extensions of microeconomic theory-consumer theory, firm theory, and markets-to situations involving many periods and uncertainty. Introduces students to general equilibrium, externality, and welfare economics.

PUBP 8500. Research Seminar. 3 Credit Hours.
Exploration of the purpose of and approaches used in public policy research. Requires development of original empirical research.

PUBP 8510. Logic of Policy Inquiry. 3 Credit Hours.
This course presents the conceptual foundations of models of policy inquiry. Topics include the scientific, rational-actor, and ethical models. The ethical values underlying cost benefit analysis, pareto-optimal models, and market models are also examined.

PUBP 8520. Scope & Theory-Public Plcy. 3 Credit Hours.
Overview of core literature of public policy including theories of public policy, the history of public policy studies, the institutional structure of policy analysis, the profession of policy research, and the intellectual bases of public policy studies.

PUBP 8530. Adv Science & Tech Policy. 3 Credit Hours.
Overview of core literature of technology and science policy, theories of innovation, intellectual foundations of technology and science policy.

PUBP 8540. Adv Environmental Policy. 3 Credit Hours.
Overview of core literature of environmental policy, theories of environmental policy, intellectual foundations of environmental policy.

PUBP 8550. Adv Urb & Region Econ Dev. 3 Credit Hours.
Overview of core literature of economic development policy, theories of economic development in urban and regional settings, intellectual foundations of economic development policy.

PUBP 8590. Dissertation Colloquium. 3 Credit Hours.
Seminar focusing on dissertation research preparation, culminates in public colloquium in which students present preliminary dissertation proposal.

PUBP 8801. Special Topics. 1 Credit Hour.
PUBP 8802. Special Topics. 2 Credit Hours.
PUBP 8803. Special Topics. 3 Credit Hours.
PUBP 8811. Special Topics. 1 Credit Hour.
PUBP 8812. Special Topics. 2 Credit Hours.
PUBP 8813. Special Topics. 3 Credit Hours.
PUBP 8821. Special Topics. 1 Credit Hour.
PUBP 8822. Special Topics. 2 Credit Hours.
PUBP 8823. Special Topics. 3 Credit Hours.
PUBP 8831. Special Topics. 1 Credit Hour.
PUBP 8832. Special Topics. 2 Credit Hours.
PUBP 8833. Special Topics. 3 Credit Hours.
PUBP 8900. Special Problems. 1-21 Credit Hours.
PUBP 8910. Special Problems. 1-21 Credit Hours.
PUBP 8920. Special Problems. 1-21 Credit Hours.
PUBP 8930. Special Problems. 1-21 Credit Hours.
PUBP 8940. Special Problems. 1-21 Credit Hours.
PUBP 8950. Special Problems. 1-21 Credit Hours.
PUBP 8997. Teaching Assistantship. 1-9 Credit Hours.
For graduate students holding a teaching assistantship.

PUBP 8998. Research Assistantship. 1-9 Credit Hours.
For graduate students holding a research assistantship.

PUBP 8999. Prep-Doctoral Qual Exam. 1-21 Credit Hours.
PUBP 9000. Doctoral Thesis. 1-21 Credit Hours.

Public Policy/Joint GSU PhD (PUBJ)
PUBJ 8000. Joint GT/GSU PhD Program. 1-21 Credit Hours.
Placeholder course for students in the joint Doctoral program in Public Policy with Georgia State University as their home institution. Used to maintain Georgia Tech student status.
RUSS 1001. Elementary Russian I. 4 Credit Hours.
An introduction to Russian language and culture. First half of a survey of basic Russian grammar and the development of the four language skills of listening, speaking, reading, and writing. The course includes an orientation to aspects of everyday life in Russia. Humanities credit awarded upon successful completion of RUSS 1002 or RUSS 2001.

RUSS 1002. Elementary Russian II. 4 Credit Hours.
Second half of an introduction to Russian language and culture. Second half of a survey of basic Russian grammar and the development of the four basic language skills of listening, speaking, reading, and writing. The course includes an orientation to aspects of everyday life in Russia. Credit not allowed for both RUSS 1002 and RUSS 1692.

RUSS 1XX1. Trans Elementary Russian I. 3 Credit Hours.
RUSS 1XX2. Trans Elementary Russian II. 3 Credit Hours.

RUSS 1250. Vampires International. 3 Credit Hours.

RUSS 1692. Intens Element Russ II. 3 Credit Hours.
Continues introduction to fundamental Russian grammar and development of four modalities — speaking, reading, listening, and writing — in intensive immersion environment in Russia. Credit not allowed for both RUSS 1692 and RUSS 1002.

RUSS 1811. Special Topics. 1 Credit Hour.
Topics of current interest in Russian.

RUSS 1813. Special Topics. 3 Credit Hours.
Topics of current interest in Russian.

RUSS 1814. Special Topics. 4 Credit Hours.
Topics of current interest in Russian.

RUSS 1821. Special Topics. 1 Credit Hour.
Topics of current interest in Russian.

RUSS 1XXX. Russian Elective. 1-21 Credit Hours.

RUSS 2001. Intermediate Russian I. 3 Credit Hours.
A review and extension of basic grammar with intensive vocabulary-building and focus on development of idiom on the basis of conversation, reading, and writing activities. Includes reading and discussion of stories and magazine articles of general cultural interest with follow-up composition assignments. Credit not allowed for both RUSS 2001 and RUSS 2691.

RUSS 2002. Intermediate Russian II. 3 Credit Hours.
A review and extension of basic grammar with intensive vocabulary-building and focus on development of idiom on the basics of conversation, reading, and writing activities. Includes reading and discussion of stories and magazine articles of general cultural interest with follow-up composition assignments. Credit not allowed for both RUSS 2002 and RUSS 2692.

RUSS 2691. Intens Interm Russian I. 3 Credit Hours.
Review and extension of basic grammar, intensive vocabulary-building, and development of idiom on the basis of conversation, reading, and writing activities (in Russia). Credit not allowed for both RUSS 2691 and RUSS 2001.

RUSS 2692. Intens Interm Russian II. 3 Credit Hours.
Review and extension of basic grammar, intensive vocabulary-building, and development of idiom on the basis of conversation, reading, and writing activities (in Russia). Credit not allowed for both RUSS 2692 and RUSS 2002.

RUSS 2698. Research Assistantship. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

RUSS 2699. Undergraduate Research. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

RUSS 2811. Special Topics. 1 Credit Hour.
Topics of current interest in Russian.

RUSS 2813. Special Topics. 3 Credit Hours.
Topics of current interest in Russian.

RUSS 2821. Special Topics. 1 Credit Hour.
Topics of current interest in Russian.

RUSS 2XXX. Russian Elective. 1-21 Credit Hours.

RUSS 3001. Advanced Russian I. 3 Credit Hours.
First half of advanced courses in Russian conversation and composition. Discussion of controversial issues with the goal of self expression in coherent paragraphs. Advanced grammar topics.

RUSS 3002. Advanced Russian II. 3 Credit Hours.
Second half of advanced courses in Russian conversation and composition. Discussion of controversial issues with the goal of self expression in coherent paragraphs. Advanced grammar topics.

RUSS 3005. Russian for Herit Spkrs. 3 Credit Hours.
Russian-language communication skills for heritage speakers. Focus on grammar and orthography, stylistics of adult/professional communication. Reading, discussion and writing on contemporary topics. Taught in Russian. Credit will not be awarded for both RUSS 3005 and RUSS 3001.

RUSS 3222. Russ 20th Cent Lit&Film. 3 Credit Hours.
Russian twentieth-century literature and film. Discussion of historical and cultural context, aesthetics, structure and meaning. Reading and discussion in English.

RUSS 3242. Urban Myth in Russ Lit. 3 Credit Hours.
Students analyze iconic texts that have been shaped by both Russian and non-Russian urban environments across generations. Conducted in English.

RUSS 3350. Russian-US Mass Cultures. 3 Credit Hours.
Trends, genres and youth movements existing in contemporary American and Russian mass culture area compared to distinguish important cultural differences and similarities. Conducted in English.
**RUSS 3691. Intensive Adv Russian. 3 Credit Hours.**
Intensive development of aural/oral communication skills, capitalizing on a rich linguistic environment. Review and expansion of grammar, practiced in context. Focus on description, narration and comparison.

**RUSS 3692. Read&Comp:Bus,Sci & Tech. 3 Credit Hours.**
Advanced reading and writing skills. Study of syntax enables more sophisticated paragraph structure. Readings include newspaper texts on current affairs, business, science and technology.

**RUSS 3695. Contemporary Russia. 3 Credit Hours.**
General introduction to political, cultural, social, and historical background of Russian domestic and foreign politics. Lectures in English. Discussion section and research project in Russian.

**RUSS 3698. Russia Yesterday & Today. 1 Credit Hour.**
Lecture and discussion of a range of problems confronting Russian society today and the depth of their connection to Russia's historical heritage. Taught in English.

**RUSS 3803. Special Topics. 3 Credit Hours.**
Permits a group of students and a professor to pursue areas of the Russian language not extensively treated in other courses in the department.

**RUSS 3811. Special Topics. 1 Credit Hour.**

**RUSS 3812. Special Topics. 2 Credit Hours.**
Topics of current interest in Russian.

**RUSS 3813. Special Topics. 3 Credit Hours.**
Permits a group of students and a professor to pursue areas of the Russian language not extensively treated in other courses in the department.

**RUSS 3823. Special Topics. 3 Credit Hours.**
Permits a group of students and a professor to pursue areas of the Russian language not extensively treated in other courses in the department.

**RUSS 3833. Special Topics. 3 Credit Hours.**
Topics of current interest in Russian.

**RUSS 3XXX. Russian Elective. 1-21 Credit Hours.**
Permits a group of students and a professor to pursue areas of the Russian language not extensively treated in other courses in the department.

**RUSS 4320. 19th Cent Russ Writers. 3 Credit Hours.**
Trends and paradigms in Russian literature from Pushkin to Chekhov. Conducted in Russian.

**RUSS 4335. Tech, Soc&Cult-USSR&RUSS. 3 Credit Hours.**
Problems of sustainability, ecology, medicine, industrial development, and technological progress as manifested in Soviet and Russian society and reflected in culture. Conducted in Russian.

**RUSS 4340. Business Discourse 1990-. 3 Credit Hours.**

**RUSS 4360. RUSS Culture Thru Song. 3 Credit Hours.**
Russian songs as object of study and focal points for broader exploration of key issues in Russian and Soviet culture and history. Conducted in Russian.

**RUSS 4380. Russian Culture in Exile. 3 Credit Hours.**
A journey through almost a century of Russian culture in exile across genres, periods and artistic forms (prose, poetry, songs, films, photography). Conducted in Russian.

**RUSS 4400. Intercultural Seminar. 3 Credit Hours.**
Russia and the West: cultural models and political fault lines. Historical debates that continue to divide and engage Russians. Conducted in Russian.

**RUSS 4692. Intens Adv Russian II. 3 Credit Hours.**
Russian LBAT summer program. Reading on and discussion of contemporary Russian and global issues. Advanced grammar and syntax. Stylistics of written discourses. Taught in Russian.

**RUSS 4693. Intens Adv Russian III. 3 Credit Hours.**
Russian LBAT summer program. Reading on and discussion of contemporary Russian and global issues. Advanced grammar and syntax. Stylistics of written discourses. Taught in Russian.

**RUSS 4695. Russian Internship. 1-3 Credit Hours.**
Professional experience with a business/organization in which students enhance their language skills and cultural knowledge in Russian in relation to the practical goals/objectives of the entity.

**RUSS 4698. Research Assistantship. 1-12 Credit Hours.**
Independent research conducted under the guidance of a faculty member.

**RUSS 4699. Undergraduate Research. 1-12 Credit Hours.**
Independent research conducted under the guidance of a faculty member.

**RUSS 4813. Special Topics. 3 Credit Hours.**
Topics of interest not covered in the regular course offerings.

**RUSS 4823. Special Topics. 3 Credit Hours.**
Topics of current interest in Russian.

**RUSS 4833. Special Topics. 3 Credit Hours.**
Topics of current interest in Russian.

**RUSS 4901. Special Prob - Russian. 1-21 Credit Hours.**
Provides the special instruction required under special programs.

**RUSS 4902. Special Prob - Russian. 1-21 Credit Hours.**
Provides the special instruction required under special programs.

**RUSS 4XXX. Russian Elective. 1-21 Credit Hours.**

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**Science (SCI)**

**SCI 1XXX. Science Elective. 1-21 Credit Hours.**

**SCI 2XXX. Science Elective. 1-21 Credit Hours.**

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**Serve Learn Sustain (SLS)**

**SLS 2803. Special Topics. 3 Credit Hours.**
Special Topics for Serve-Learn-Sustain.

**SLS 3110. Tech and Sustain Community. 3 Credit Hours.**
This course will explore the role of technology in the development of sustainable communities, locally and internationally.

**SLS 3120. Sustainable Systems. 3 Credit Hours.**
This course teaches decision-making where a systems focus on the environmental and social dimensions of a design, project, innovation or business model are explicitly considered.

**SLS 3803. Special Topics. 3 Credit Hours.**
Special Topics for Serve-Learn-Sustain.
Social Science Elective (SS)

SS 1XXX. Social Science Elective. 1-21 Credit Hours.
SS 2XXX. Social Science Elective. 1-21 Credit Hours.
SS 3XXX. Social Science Elective. 1-21 Credit Hours.
SS 4XXX. Social Science Elective. 1-21 Credit Hours.

Sociology (SOC)

SOC 1101. Intro to Sociology. 3 Credit Hours.
A study of basic social relations, including social structure and functions, analysis of social processes, the foundations of personality, and analysis of social organization.

Spanish (SPAN)

SPAN 1001. Elementary Spanish I. 3 Credit Hours.
An introduction to the Spanish language and the cultures of the Spanish-speaking world. Beginning of a survey of basic Spanish grammar and the development of the four language skills of listening, speaking, reading, and writing. Some aspects of everyday life in the Spanish-speaking world will also be introduced. Conducted in Spanish. No native speakers allowed. Credit not allowed for both Span 1001 and 1101.

SPAN 1002. Elementary Spanish II. 3 Credit Hours.
The second part of an introduction to the Spanish language and cultures of the Spanish-speaking world. Completion of the survey of basic Spanish grammar and the development of the four language skills of listening, speaking, reading, and writing. Aspects of everyday life in the Spanish-speaking world will also be introduced. Conducted in Spanish. No native speakers allowed. Credit not allowed for both SPAN 1002 and SPAN 1102.

SPAN 1101. Patterns of Spanish I. 3 Credit Hours.
Focuses on the development of communication and cultural skills, building upon previous elementary Spanish experience. Conducted in Spanish. Credit not allowed for both SPAN 1001 and 1101. Humanities credit is awarded for SPAN 1101 only upon the successful completion of SPAN 1102 or SPAN 2001.

SPAN 1102. Patterns of Spanish II. 3 Credit Hours.
Focuses on the development of communication and cultural skills, building upon previous elementary Spanish experience. Conducted in Spanish. Credit not allowed for both SPAN 1002 and SPAN 1102.

SPAN 1813. Special Topics. 3 Credit Hours.
Topics of current interest in Spanish.

SPAN 1XXX. Spanish Elective. 1-21 Credit Hours.

SPAN 2001. Intermediate Spanish I. 3 Credit Hours.
Review of basic grammatical concepts: conversational, reading, and writing activities; cultural aspects of the Hispanic world. Conducted in Spanish. No native speakers allowed.

SPAN 2002. Intermediate Spanish II. 3 Credit Hours.
Review of basic grammatical concepts; conversational, reading, and writing activities; cultural aspects of the Hispanic world. Conducted in Spanish. No native speakers allowed.

SPAN 2690. Intermed Span Abroad. 3 Credit Hours.
Intensive intermediate Spanish conducted abroad with focus on issues and perspectives of the target region.

SPAN 2698. Research Assistantship. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

SPAN 2699. Undergraduate Research. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

SPAN 2813. Special Topics. 3 Credit Hours.
Topics of current interest in Spanish.

SPAN 2XXX. Spanish Elective. 1-21 Credit Hours.

SPAN 3040. Pract. App. Span Grammar. 3 Credit Hours.
A review of important structures of Spanish, presented in communicative contexts vital to the academic careers of students. Taught in Spanish.

SPAN 3050. Intro-Read Hispanic Lit. 3 Credit Hours.
This course bridges language study and the study of literature by helping students read, understand, and interpret literature as a system of communication in Spanish.

SPAN 3061. Business Spanish I. 3 Credit Hours.
Introduction to business language in the Hispanic world. Development of linguistic abilities to this end, with emphasis on those cultural factors that lead to commercial success. Conducted in Spanish.

SPAN 3062. Business Spanish II. 3 Credit Hours.
Focus on the oral and written language and cultural context of Hispanic business protocols; themes and situations include banking and finance, marketing and advertising structures and practices. Conducted in Spanish.

SPAN 3064. Medical Spanish. 3 Credit Hours.
This course facilitates acquisition of a broad vocabulary and awareness of cultural customs and trends pertaining to the healthcare field. Taught in Spanish. Prerequisites: SPAN 2002 or any SPAN 3000-level course.

SPAN 3101. Conversation I. 3 Credit Hours.
Development of communicative ability and cross-cultural awareness through discussion of contemporary issues in the Hispanic world. No native speakers allowed.

SPAN 3102. Conversation II. 3 Credit Hours.
Development of communicative ability and cross-cultural awareness through discussion of contemporary issues in the Hispanic world. No native speakers allowed.

SPAN 3111. Composition I. 3 Credit Hours.
Writings from the Hispanic world used as a springboard for analysis and enrichment of self-expression and development of precision in written communication. Incorporates grammar review. No native speakers allowed.

SPAN 3112. Composition II. 3 Credit Hours.
Writings from the Hispanic world used as a springboard for analysis and enrichment of self-expression and development of precision in written communication. Incorporates grammar review. No native speakers allowed.

SPAN 3122. Cultural Hist-Spain II. 3 Credit Hours.
History of Spanish culture from 1800 to the present. Conducted in Spanish.

SPAN 3151. Conversation Practicum. 3 Credit Hours.
This course combines current event discussion with ongoing conversation practice. Students participate in in-class discussions plus weekly language exchanges with native Spaniards. Taught in Spanish.

SPAN 3170. Spanish Phonetics. 3 Credit Hours.
Study of the phonological system of the Spanish language, including dialectal variations in the Hispanic world.
SPAN 3211. Spain Today. 3 Credit Hours.
This course introduces students to current issues in the culture and history of contemporary Spain. Articles, videos, and news clips are used as springboard for discussion.

SPAN 3235. Latin America Today. 3 Credit Hours.
Selected journalistic and literary writings used as a springboard for discussion of social, economic, and political issues of contemporary Latin America. Conducted in Spanish.

SPAN 3241. Indiv&Family in Hisp Lit. 3 Credit Hours.
Analysis and discussion of the portrayal of the individual and the family in selected readings from Hispanic literature. Conducted in Spanish.

SPAN 3242. Society in Hispanic Lit. 3 Credit Hours.
Study of Hispanic society and political thought in selected literary works. Conducted in Spanish.

SPAN 3254. Hispanic Film. 3 Credit Hours.
Contemporary Latin American and Spanish films serve as gateway to discussion of social, political, economic and cross-cultural perspectives. Conducted in Spanish. Credit not allowed for both SPAN 3254 and SPAN 4254.

SPAN 3260. Identity In Hisp. Lit.. 3 Credit Hours.
This course examines the construction of personal, cultural, national, political, and regional identity in Hispanic American literature over the past two centuries. Taught in Spanish.

SPAN 3500. Sci-Fi in Latin America. 3 Credit Hours.
This course is a survey of Latin America science-fiction. Taught in Spanish.

SPAN 3590. Issues in Andean Devmt. 3 Credit Hours.
Historical and social context of contemporary issues of cultural, economic and environmental sustainability in the Andean region. Taught in Spanish.

SPAN 3591. Peru Cultural Patrimony. 3 Credit Hours.
Using literature, film and art, this course examines cultural patrimony in Peru and its impact on society, economy, environment and threats to its preservation. Conducted in Spanish.

SPAN 3592. Andean Culture Commerce. 3 Credit Hours.
Examines the 'business of nature' in the extractive economies of the Andes and culture clashes of Western and indigenous perspectives of development. Taught in Spanish.

SPAN 3690. Commerce Sustain Commun. 3 Credit Hours.
Study of the connectedness and community impact of contemporary issues of economic, sociocultural, and environmental sustainability in Mexico. Conducted in Spanish. Part of the Spanish intensive summer LBAT program. Admission by application only.

SPAN 3691. Bus Comm& Correspondence. 3 Credit Hours.
Refinement of accuracy/flexibility in oral/written expression. Focus on appropriate use of strategies, business negotiation protocols, lexical precision in business transactions. Incorporates grammar review. Part of the Spanish intensive summer language program. Admission by application only.

SPAN 3692. Business And Culture. 3 Credit Hours.
Study of cultural issues, tendencies, and traditional patterns of behavior in Spanish-speaking people as they relate to business practices. Value systems and formal manifestations. Regional variations, including the U.S. Hispanic culture. Part of the Spanish intensive summer language program. Admission by application only.

SPAN 3693. Science And Technology. 3 Credit Hours.
Study of business organizations and use of technology in the Spanish-speaking world. Specialized vocabularies of business, economics, statistics, and computer science. Geographical and anthropological background. Part of the Spanish intensive summer language program. Admission by application only.

SPAN 3694. Seminar Abroad. 3 Credit Hours.
Field study of technology, economic trends, business firms, financial institutions, and cultural protocols in the Spanish-speaking area. Part of the Spanish intensive summer language program. Admission by application only.

SPAN 3697. Span Health Professionals. 3 Credit Hours.
Culture-specific conceptions of health, medical vocabulary, professional-patient protocols, professional-professional protocols, symptoms, treatments. Part of the Spanish summer program in Cadiz.

SPAN 3698. Spain Health Industry. 3 Credit Hours.
Study of culture-specific values in health systems in Spain/ Europe. Visits to local sites. Part of the Spanish intensive summer program in Cadiz.

SPAN 3813. Special Topics. 3 Credit Hours.
Topics of current interest in Spanish.

SPAN 3821. Special Topics. 1 Credit Hour.
Topics of current interest in Spanish.

SPAN 3822. Special Topics. 2 Credit Hours.
Topics of current interest in Spanish.

SPAN 3823. Special Topics. 3 Credit Hours.
Topics of current interest in Spanish.

SPAN 3833. Special Topics. 3 Credit Hours.
Topics of current interest in Spanish.

SPAN 3XXX. Spanish Elective. 1-21 Credit Hours.

SPAN 4061. Science & Technology I. 3 Credit Hours.

SPAN 4062. Science & Technology II. 3 Credit Hours.
Advanced analysis of scientific and technological discourse in Spanish. Focus on reading strategies and oral discussion of topics such as use and transfer of technology and the acculturation issues that follow. Further development of comprehension, production, and translation strategies, with emphasis on professional communications and on writing feature descriptions, summaries, and abstracts. Conducted in Spanish.

SPAN 4065. Spanish Linguistics. 3 Credit Hours.
This course is designed to develop the students' understanding of the linguistic structure of the Spanish language. The topics covered in this course include: phonetics, phonology, morphology, syntax, language change, and language variation.

SPAN 4070. Intro-Span/Engl Translat. 3 Credit Hours.
Introductory course in Spanish/English translation that covers a variety of registers, such as general, business, and technical translation.

SPAN 4071. Translation & Interpret. 3 Credit Hours.
This course explores translation and interpreting in legal, medical, and media contexts. Conducted in Spanish.
SPAN 4101. Adv Communication Wkshop. 3 Credit Hours.
Advancement of oral and written proficiency using a workshop and project-development format to focus on communicative precision, style and register. Includes some treatment of grammar. No native speakers allowed.

SPAN 4150. Spanish Service Learning. 3 Credit Hours.
This class combines classroom discussion with Hispanic community service projects to allow students to study Hispanic cultures and practice Spanish with native speakers. Conducted in Spanish.

SPAN 4156. Span Service Abroad I. 3 Credit Hours.
Students complete service projects in a Spanish-speaking country abroad and attend weekly class meetings that combine student presentations and documentaries with a guest-speaker series.

SPAN 4157. Span Service Abroad II. 3 Credit Hours.
Students complete service projects in a Spanish-speaking country abroad and gain an in-country immersion opportunity that hones oral and aural skills and increases cultural competence through real-life interactions with the host community abroad.

SPAN 4158. Diversity in Spain. 3 Credit Hours.
This course examines the social, cultural, and linguistic dimensions of sustainability and the concepts of diversity and equity in the Spanish context. Taught in Spanish.

SPAN 4160. US Spanish-Lang& Cultures. 3 Credit Hours.
Linguistic groups, changes, bilingualism, customs, traditions of US Hispanics. Course project on current migration, legal, financial, educational, health, media or political issues/advances.

SPAN 4165. Bilingualism-Span World. 3 Credit Hours.
This course introduces students to bilingualism at both individual and societal levels within the Hispanic communities in the US, Spain, and Latin America.

SPAN 4170. Span Applied Linguistics. 3 Credit Hours.
Advanced linguistic analysis of the Spanish language, particularly as it contrasts with English.

SPAN 4220. Nation/Narration In LA. 3 Credit Hours.
This course examines the connection between nation and narration in Latin American literature and film and explores the narrative construction of national identities. Taught in Spanish.

SPAN 4235. Food Culture & Society. 3 Credit Hours.
Food as a gateway to in-depth exploration of Hispanic cultures, including issues of identity, community, cosmology, sustainability and effects of globalization. Conducted in Spanish.

SPAN 4236. Media,Market & Advertising. 3 Credit Hours.
Use of print, broadcast, and web-based media to explore the social structures and cultural values reflected in product consumption, marketing, and advertising. Conducted in Spanish.

SPAN 4242. LatinAm Art: Vision & Voice. 3 Credit Hours.
Historical and Cultural analysis of the role of plastic arts in Latin America, from preonquest to contemporary times. Conducted in Spanish.

SPAN 4251. Hispanic Internship. 3 Credit Hours.
Students complete internships with agencies, organizations, and businesses serving Atlanta Hispanics, using their Spanish language skills in a professional work environment. Conducted in Spanish.

SPAN 4255. Hispanic Drama Workshop. 3 Credit Hours.
Literary and theatrical aspects of Hispanic drama are explored through class discussion and performance of a collection of contemporary one-act plays.

SPAN 4350. Iberoamerican Cities. 3 Credit Hours.
This course examines the representation and development of cities in the Hispanic World. Students develop three urban projects based on their study. Taught in Spanish.

SPAN 4360. Covering LatinX Culture. 3 Credit Hours.
This course explores contemporary media reporting on the LatinX culture in the US and Latin America. Taught in Spanish and English.

SPAN 4400. Immigration Through Film. 3 Credit Hours.
Hispanic film as lens for in-depth exploration of immigration issues throughout the Spanish-speaking world. Conducted in Spanish. Credit not allowed for both SPAN 4400 and SPAN 3400.

SPAN 4410. Media and Power in Lat America. 3 Credit Hours.
This course explores the tensions between media and power in relation to the struggle for freedom of expression in Latin American countries. Taught in Spanish.

SPAN 4500. Intercultural Seminar. 3 Credit Hours.
Integrates cross-cultural research and reflection into discussion of current issues in the Hispanic world. Intended for students who have had some study abroad experience in a Spanish-speaking country. Conducted in Spanish.

SPAN 4693. Sustainability in Spain. 3 Credit Hours.
This course examines issues of economic and environmental sustainability as well as the relationship between the economy and the environment during the Spain LBAT Program.

SPAN 4695. Spanish Internship. 1-3 Credit Hours.
Professional experience with a business/organization in which students enhance their language skills and cultural knowledge in Spanish in relation to the practical goals/objectives of the entity.

SPAN 4698. Research Assistantship. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

SPAN 4699. Undergraduate Research. 1-12 Credit Hours.
Independent research conducted under the guidance of a faculty member.

SPAN 4813. Special Topics. 3 Credit Hours.
Topics of interest not covered in the regular course offerings.

SPAN 4823. Special Topics. 3 Credit Hours.
Topics of current interest in Spanish.

SPAN 4833. Special Topics. 3 Credit Hours.

SPAN 4901. Special Problems. 1-21 Credit Hours.
Provides the special instruction required under special programs.

SPAN 4902. Special Problems. 1-21 Credit Hours.
Provides the special instruction required under special programs.

SPAN 4XXX. Spanish Elective. 1-21 Credit Hours.

SPAN 6101. Adv Communication Wkshop. 3 Credit Hours.
Advancement of oral and written proficiency using workshop and project-development formats to focus on communicative precision, style, register and grammar. Taught in Spanish.

SPAN 6170. Applied Linguistics. 3 Credit Hours.
This course introduces students to theoretical and practical aspects of Spanish as a foreign language and fundamental concepts in second language acquisition and teaching.
SPAN 6236. Media, Market & Advertising. 3 Credit Hours.
This course uses print, broadcast and web-based media to explore the social structures and cultural values reflected in product consumption, marketing and advertising in Latin America. Conducted in Spanish.

SPAN 6237. Food, Power and Sustainability. 3 Credit Hours.
Food as gateway to region-by-region study of issues of sustainable development in Latin America. Taught in Spanish.

SPAN 6244. Visual Culture Lat Amer. 3 Credit Hours.
Historical and cultural analysis of the role of art, visual image and iconography as social commentator and public platform in Latin America. Taught in Spanish.

SPAN 6251. Hispanic Internship. 3 Credit Hours.
Students complete internships with agencies, organizations, and businesses serving Atlanta Hispanics, using their Spanish language skills in a professional work environment. Conducted in Spanish.

SPAN 6270. Span Sociolinguistics. 3 Credit Hours.

SPAN 6360. Covering LatinX Culture. 3 Credit Hours.
This course explores contemporary media reporting on the LatinX culture in the US and Latin America. Taught in Spanish and English.

SPAN 6401. Globalization & Migration. 3 Credit Hours.
Print and filmic texts serve as gateway to context-specific issues of migration in the Spanish-speaking world from both sender- and receiver-country perspectives. Taught in Spanish.

SPAN 6405. Latin American Documentaries. 3 Credit Hours.
This course explores the documentary traditions of Chile, Argentina and Cuba to learn about the history of Latin American societies. Taught in Spanish.

SPAN 6410. Media & Power Lat America. 3 Credit Hours.
This course explores the tension between media and power in relation to the struggle for freedom of expression in Latin American countries. Taught in Spanish.

SPAN 6454. Latin America Thru Film. 3 Credit Hours.
Contemporary Latin American film serves as gateway to in-depth discussion of social, political, economic and cross-cultural perspectives. Conducted in Spanish.

SPAN 6460. Hisp Digital Cultures. 3 Credit Hours.
Students explore recent developments in new Media and Digital Culture within the context of Latin American and Spanish cultures and societies. Taught in Spanish.

SPAN 6500. Intercultural Seminar. 3 Credit Hours.
Integrates cross-cultural research and reflection into discussion of current issues in the Spanish-speaking world. Taught in Spanish.

SPAN 6501. Theory & Foundations Sem. 3 Credit Hours.
This course seeks to increase theoretical knowledge and practical applications in key areas of culture, literature/media, and linguistics studies. Taught in Spanish.

SPAN 6503. Professional Portfolio. 3 Credit Hours.
Preparation of a professional portfolio connecting experiences and coursework in the MS program towards career preparation. Conducted in Spanish.

SPAN 6510. Language Practicum. 3 Credit Hours.
Students will serve as researchers, student aides and apprentice instructors for any 3/4000-level undergraduate course approved by their adviser.

SPAN 6511. Lang Practicum Abroad. 3 Credit Hours.
Students serve as researchers and apprentice instructors in LBAT or other faculty-led overseas language immersion program of the School of Modern Languages.

SPAN 6690. Intercultural Dialogue. 3 Credit Hours.
Explores cultural identity in Latin America through live interviews, print, and film. Topics vary. Taught in Spanish overseas as part of LBAT study abroad program.

SPAN 6693. Sustainable Development. 3 Credit Hours.
This course examines issues of economic and environmental sustainability as well as the relationship between the economy and the environment. Taught in Spanish.

SPAN 6695. Internship Abroad Span A. 3 Credit Hours.
Students complete internships abroad in a Spanish-speaking country. Conducted in Spanish. Online course.

SPAN 6696. Internship Abroad Span B. 6 Credit Hours.
Students complete internships abroad in a Spanish-speaking country. Conducted in Spanish. Online course. 6 credits.

SPAN 7000. Master's Thesis. 1-6 Credit Hours.
Master's Thesis.

SPAN 8803. Special Topics. 3 Credit Hours.
Special topics in Spanish Language and Literature.
STUDENT SERVICES

Programs & Services
- Academic Advising (http://www.advising.gatech.edu)
- Academic Resources (http://www.undergradstudies.gatech.edu)
- Career Services (http://www.career.gatech.edu)
- Counseling (http://www.counseling.gatech.edu)
- Dean of Students (http://www.deanofstudents.gatech.edu)
- Dining Services (http://www.gatechdining.com)
- Diversity Programs (http://www.diversityprograms.gatech.edu)
- Fellowships (http://fellowships.gatech.edu)
- Freshman Experience Program (http://www.housing.gatech.edu/freshmanexperience)
- Health Services (http://www.health.gatech.edu)
- International Student Services (http://www.oie.gatech.edu)
- LGBTQIA Resource Center (http://lgbtqia.gatech.edu)
- Office of Minority Educational Development (http://omed.gatech.edu)
- Orientation (new students) (http://www.faset.gatech.edu)
- Tutoring & Workshops (http://www.success.gatech.edu/?id=6)
- Women's Resource Center (http://www.womenscenter.gatech.edu)
- Veteran's Resource Center (http://veterans.gatech.edu)

Student Life
- Leadership & Civic Engagement (http://engage.gatech.edu)
- Greek Affairs (http://greek.gatech.edu)
- Student Government (http://www.sga.gatech.edu)
- DramaTech (http://dramatech.org)

Departments
- Admissions (undergraduate) (http://www.admission.gatech.edu)
- Admissions (graduate) (http://www.grad.gatech.edu)
- Alumni Association (http://gtalumni.org)
- Athletic Association (http://www.ramblinwreck.com)
- Bursar's Office (http://www.bursar.gatech.edu)
- Office of the Vice President for Student Life and Dean of Students (http://studentlife.gatech.edu)
- Center for Career Discovery and Development (http://www.careerdiscovery.gatech.edu)
- Financial Aid (http://www.finaid.gatech.edu)
- Housing (http://www.housing.gatech.edu)
- Parking and Transportation (http://www.parking.gatech.edu)
- Police (campus) (http://www.police.gatech.edu)
- Registrar's Office (http://www.registrar.gatech.edu)

Facilities
- Campus Recreation Center (http://www.crc.gatech.edu)
- Information Technology (http://www.oit.gatech.edu)
- Library & Information Center (http://www.gatech.edu/libraries)
- Interdisciplinary Research Centers (http://www.gtri.gatech.edu)
- Ferst Center (http://www.ferstcenter.gatech.edu)
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