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 thermoluminscent 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
- Minor in Engineering and Business
- Minor in Global Development
- Minor in Nuclear and Radiological Engineering

Bachelor's Degrees

- Bachelor of Science in Mechanical Engineering
- Bachelor of Science in Nuclear and Radiological Engineering

Master's Degrees

- Master of Science in Bioengineering
- Master of Science in Mechanical Engineering
- Master of Science in Mechanical Engineering (undesignated)
- Master of Science in Medical Physics
- Master of Science in Nuclear Engineering
- Master of Science in Robotics
- Master of Science - Undesignated

Doctoral Degrees

- Doctor of Philosophy with a Major in Bioengineering
- Doctor of Philosophy with a Major in Mechanical Engineering
- Doctor of Philosophy with a Major in Nuclear Engineering
- Doctor of Philosophy with a Major in Robotics

ME 1670. Introduction to Engineering Graphics and Design. 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.

ME 1801. Special Topics. 1 Credit Hour.
Special Topics.

ME 1XXX. Mechanical Engineering Elective. 1-21 Credit Hours.

ME 2016. Computer Applications. 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 and Design. 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 2202R. ME 2202 Recitation. 0 Credit Hours.
Recitation for ME 2022.

ME 2205. Three-dimensional rigid body dynamics. 1 Credit Hour.
Three-dimensional rigid body dynamics; Newton-Euler methods, inertia properties and principal axes; Euler equations, gyroscopic effects.

ME 2698. Undergraduate 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 Engineering Elective. 1-21 Credit Hours.

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 3017R. ME 3017 Recitation. 0 Credit Hours.
Recitation for ME 3017.

ME 3057. Experimental Methodology and Technical Writing. 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, Materials, 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 3322R. ME 3322 Recitation. 0 Credit Hours.
Recitation for ME 3322.

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 3340R. ME 3340 Recitation. 0 Credit Hours.
Recitation for ME 3340.

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 3345R. ME 3345 Recitation. 0 Credit Hours.
Recitation for ME 3345.

ME 3700. Introduction to Energy Systems Engineering. 3 Credit Hours.
Renewable, fossil, and nulcear energy and its conversion into various forms. Electrical grid, energy storage, energy conservation, and mitigation of adverse conversion.

ME 3720. Introduction to Fluid and Thermal Engineering. 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 3743. Analysis of 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. Managing Product, Service & Technology Development. 3 Credit Hours.
Analysis of the managerial challenges of the product development process. Credit not allowed for both ME 3744 and MGT 3744.

ME 3801. Special Topics. 1 Credit Hour.
Special Topics.

ME 3XXX. Mechanical Engineering Elective. 1-21 Credit Hours.

ME 4011. Internal Combustion 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 applicatons.

ME 4012. Modeling and Control of 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 4014. Introduction to Automotive Engineering. 3 Credit Hours.
Introduction to automotive engineering from a systems perspective. Major automotive systems and subsystems are described together with appropriate engineering models necessary for analysis and design.

ME 4042. Interactive Computer-Aided Design and Computer-Aided Engineering. 3 Credit Hours.
Principles of geometric modeling and finite-element method; interactive CAD and CAE software tools. CAD and CAE applications in thermal and mechanical design problems. Design projects.

ME 4056. Mechanical Engineering Systems Laboratory. 3 Credit Hours.
Measurement and analysis of mechanical, acoustic, manufacturing, thermodynamic, fluid, and heat transfer phenomena. Emphasis on data acquisition, reduction, analysis, and report preparation.

ME 4171. Environmentally Conscious Design and Manufacturing. 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. Designing Sustainable Engineering Systems. 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. Mechanical Design Engineering. 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. Mechanical 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. Design and Materials Selection for Tribological Applications. 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. Mechanical Behavior of 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. Manufacturing Process Analysis. 3 Credit Hours.
First principles based modeling and analysis of manufacturing processes. Process design and optimization.

ME 4315. Energy Systems Analysis and Design. 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 and Air Conditioning. 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 Technology. 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. Introduction to 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 4332. Renewable Energy Systems. 3 Credit Hours.
Renewable and efficient energy systems are introduced. Various energy conversion and storage technologies are explained and analyzed, along with their respective advantages and limitations.

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 Dynamics. 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. Fundamentals 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 4451. Robotics. 3 Credit Hours.
Mathematical modeling, simulation, and control of robotic systems with mechanical and sensory elements.

ME 4452. Control of 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. Undergraduate 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 and 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 4723. Interdisciplinary Capstone Design. 3 Credit Hours.
Seniors will work in teams to apply a systematic design process to real multi-disciplinary problems. Problems selected from a broad spectrum of interest areas, including biomedical, environmental, mechanical, industrial design, electrical and thermal/fluids. Projects must be based on the knowledge and skills acquired in earlier course work, and incorporate appropriate engineering standards and multiple realistic constraints. Emphasis is placed on the design process, the technical aspects of the design, and on reducing the proposed design to practice. The course consists of faculty and guest lectures, prototyping in design studios, and a multi-disciplinary design project.

ME 4725. Probabilistic Risk Assessment. 3 Credit Hours.
Introduction to a wide range of probabilistic risk analysis and probabilistic design methods for mechanical systems. Topics covered are probabilistic description, sampling methods, risk assessment, and reliability-based design.

ME 4730. Emerging Technologies for Forest Bioproducts. 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. Biologically 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 (BIOL 4740, or ISYE 4740 or PTFE 4740 or MSE 4740).

ME 4741. Integrative Management Development - Project Preparation. 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. Integrated Technology and Management Capstone Project. 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 Development 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 Engineering Practice. 3 Credit Hours.
Topics of current inportance offered in collaboration with an approved partner of Georgia Tech's Distance Learning Program.

ME 4754. Electronics Packaging Assembly, Reliability, Thermal Management, and Test. 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.
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 AE and CHE 4757.

ME 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 AE and CHE 4758.

ME 4759. Electrochemical Energy Storage and Conversion. 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. Engineering Acoustics and 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 4766. Fabrication and Properties of 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 and Engineering I: Formation and Properties. 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 and Engineering II: Analysis, Processing, and Laboratory. 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 TFE 4776.

ME 4777. Introduction to Polymer Science and Engineering. 3 Credit Hours.
An introduction to the structure and formation of polymers, physical states and transitions, physical and mechanical properties of polymer fluids and solids, and processing of polymers. Crosslisted with MSE and PTFE 4777.

ME 4781. Biomedical 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 Selection and 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. Mechanical Behavior of 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 Materials and Processes. 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 4795. Fundamental Elements of 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 in Mechanical Engineering. 1 Credit Hour.
Special topic offerings of current interest not included in regular courses.

ME 4802. Special Topics in Mechanical Engineering. 2 Credit Hours.
Special topic offerings of current interest not included in regular courses.

ME 4803. Special Topics in Mechanical Engineering. 3 Credit Hours.
Special topic offerings of current interest not included in regular courses.

ME 4804. Special Topics in Mechanical Engineering. 4 Credit Hours.
Special topic offerings of current interest not included in regular courses.

ME 4805. Special Topics in Mechanical Engineering. 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 4863. Special Topics. 3 Credit Hours.
Special Topics in Mechanical Engineering.

ME 4873. Special Topics. 3 Credit Hours.

ME 4901. Special Problems in Mechanical Engineering. 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 Engineering Elective. 1-21 Credit Hours.

ME 6007. Interfacial Fluid Mechanics. 3 Credit Hours.
The mechanics of fluid interfaces. Mathematical techniques of scaling and calculus of curved surfaces towards analysis of menisci, bubbles, jets, films, foams, and coatings.

ME 6101. Engineering Design. 3 Credit Hours.
Design concepts, processes, and methodologies, including quality and robustness. Group project.

ME 6102. Designing Open Engineering Systems. 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 in Engineering 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 and Simulation in Design. 3 Credit Hours.
Modeling and simutaltion 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: Theory and Practice. 3 Credit Hours.
Line, plane, solid, plate, and shell elements-theory: practical aspects of modeling; applications in mechanical engineering; final project.

ME 6201. Principles of Continuum Mechanics. 3 Credit Hours.
Introductory treatment of the fundamental, unifying concepts of the mechanics of continua.

ME 6203. Inelastic Deformation of Solids. 3 Credit Hours.
Phenomenological aspects of nonlinear material behavior and deformation with emphasis on model development.

ME 6204. Micromechanics of Materials. 3 Credit Hours.
Fundamental concepts of micromechanics of solids with emphasis on application to composite materials.

ME 6222. Manufacturing Processes and Systems. 3 Credit Hours.
Materials processing analysis and selection. Manufacturing systems design. Economic analysis.

ME 6223. Automated Manufacturing Process Planning. 3 Credit Hours.
Fundamentals of process planning. Automated process planning approaches and algorithms. Geometric modeling for process planning. Modeling and analysis of flexible fixturing systems. Mechanical assembly planning.

ME 6224. Machine Tool Analysis and Control. 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 and Measurement Systems. 3 Credit Hours.
Metrology techniques and procedures. Precision manufacturing system design and analysis.

ME 6229. Introduction to Micro-Electro-Mechanical Systems. 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. Rotordynamics. 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. Mechanics of Paper Forming and Coating. 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 Transfer. 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. Thermal 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. Principles of Thermodynamics. 3 Credit Hours.
Fundamentals of thermodynamics including energy, entropy, and energy analysis, property relations, equilibrium conditions, and evaluation of properties.

ME 6305. Applications 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 Transfer. 3 Credit Hours.
Microscopic concepts and methodology in thermal science, including equilibrium statistics. Boltzmann transport equation, and nano-microscale heat conduction and radiation, with applications in contemporary technologies.

ME 6335. NUMERICAL HEAT TRANSFER. 3 Credit Hours.
This course will provide foundation to develop numerical solutions for steady state and transient thermal transport problems in complex geometries.

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 Systems. 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. Advanced Control System Design and Implementation. 3 Credit Hours.
Analysis, synthesis, and implementation techniques of continuous-time and real-time control systems using classical and state-space methods.

ME 6405. Introduction 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 6409. Biomechatronics of Wearable Robotic Devices. 3 Credit Hours.
An introduction to the emerging science of human-machine interaction with particular focus on wearable robotic devices for restoration or augmentation of human movement.

ME 6441. Dynamics of Mechanical Systems. 3 Credit Hours.
Motion analysis and dynamics modeling of systems of particles and rigid bodies in three-dimensional motion.

ME 6442. Vibration of Mechanical Systems. 3 Credit Hours.
Introduction to modeling and oscillatory response analysis for discrete continuous mechanical and structural systems.

ME 6443. Variational Methods in Engineering. 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. Acoustic Transducers and Signal Analysis. 3 Credit Hours.
Acoustic instrumentation and methods of signal analysis.

ME 6452. Wave Propagation in Solids. 3 Credit Hours.
Wave motion in solids, wave equations, analytical and numerical solutions, ultrasonic NDE.

ME 6460. Microelectromechanical 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. Introduction 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 6607. Interfacial Fluid Mechanics. 3 Credit Hours.
The mechanics of fluid interfaces. Mathematical techniques of scaling and calculus of curved surfaces towards analysis of menisci,bubbles, jets, films, foams, and coatings.

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 6705. Introduction to Mechatronics. 4 Credit Hours.
Modeling and control of actuators and electro-mechanical systems. Performance and application of microprocessors and analog electronics to modern mechatronic systems.

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 and Paper Manufacture 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 6743. Biosolid 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 Engineering Practice. 3 Credit Hours.
Topics of current importance offered in collaboration with an approved partner of Georiga Tech's Distance Learning Program. Crosslisted with ECE 6744.

ME 6746. Rehabilitation 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. Principles of Management 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 6760. Acoustics I and II. 3 Credit Hours.
Fundamental principles governing the generation, propagation, reflection, and transmission of sound waves in fluids. Crosslisted with AE 6760.

ME 6761. Acoustics I and 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 and Thermodynamics of 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 I. 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 6768. Polymer Structure, Physical Properties, and Characterization. 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 and Variational Methods in Elasticity and Plasticity. 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 6776. Integrated Low-cost Microelectronics Systems 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. Thermal Engineering for Packaging of Micro and Nano Systems. 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. Computer Integrated Manufacturing Systems 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. Mathematical, Statistical, and Computational Techniques in Materials Science. 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. Structure-Property Relationships in Materials. 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. Thermodynamics and Kinetics of Microstructural Evolution. 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 in Technology Transfer. 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. Mechanical Engineering 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 7201. Computational Mechanics of Materials. 3 Credit Hours.
Computational treatments of material and geometric nonlinearity, with emphasis on rate-dependent elasto-plasticity and fracture.

ME 7203. Advanced Constitutive Relations for Solids. 3 Credit Hours.
Advanced treatment of constitutive laws for nonlinear behavior of solids. Coupled thermomechanical laws and underlying physical and thermodynamical bases. Behavior of media with underlying substructure.

ME 7205. Mechanics and Applications of Nanostructured Materials and 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 7227. Additive Manufacturing and Rapid Prototyping. 3 Credit Hours.
Rapid prototyping technologies in engineering design. Physical principles, materials, materials processing. Laboratory demonstrations and project.

ME 7301. Transport Phenomena in 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 of Continuous Systems. 3 Credit Hours.
Equations of motion and oscillatory response of dynamic systems modeled as continuous media.

ME 7602. Hydrodynamic Stability. 3 Credit Hours.
Hydrodynamic stability of fluid flows using linear, energy, and nonlinear stability theories. Taylor-Couette, buoyancy- driven, surface-tension-driven, shear, and thin-film flows.

ME 7741. Robotics Professional Preparation. 1 Credit Hour.
Preparation for a professional career in Robotics. Local & visiting speakers. Program introduction. Technical resume preparation. GT Robotics labs & resources.

ME 7742. Robotics Professional Preparation 2. 1 Credit Hour.
Preparation for a professional career in Robotics. Local & visiting speakers. Selecting and applying for Internship. Developing capstone project proposal. Public speaking practice and preparation.

ME 7743. Robotics Professional Preparation 3. 1 Credit Hour.
Preparation for a professional career in Robotics. Local & visiting speakers. Interview preparation & career search. Technical report writing and presentation.

ME 7751. Computational Fluid Mechanics. 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. Mechanics of Polymer Solids and Fluids. 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. Fundamentals of 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. Advanced 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 of Materials and Structures. 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. Topics in Fracture and Fatigue of Metallic and Composite Structures. 3 Credit Hours.
Brittle and ductile failure criteria. Failure prediction in composite structures. Free-edge and internal delamination. Anisotropic cracks. Fatigue behavior of composites and comparison with metal fatigue. Crosslisted with AE, CHE, and MSE 7775.

ME 7785. Introduction to 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 7793. Manufacturing of 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. Seminars in Mechanical Engineering. 1 Credit Hour.
Seminars involving current research projects presented by graduate students, faculty, and invited speakers.

ME 8011. Seminars in Mechanical Engineering. 1 Credit Hour.
Seminars involving current research projects presented by graduate students, faculty, and invited speakers.

ME 8012. Seminars in Mechanical Engineering. 1 Credit Hour.
Seminars involving current research projects presented by graduate students, faculty, and invited speakers.

ME 8014. Seminars in Mechanical Engineering. 2 Credit Hours.
Seminars involving current research projects presented by graduate students, faculty, and invited speakers.

ME 8740. Robotics Internship. 1-21 Credit Hours.
Graduate Internship at a partner company, GTRI or a GT Robotics lab.

ME 8741. Robotics Capstone Project. 3 Credit Hours.
Teams or individuals apply the knowledge and skills acquired throughout the MS program to a faculty supervised robotics project.

ME 8750. Robotics Research Foundation 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 Foundation II. 3 Credit Hours.
Continuation of ME 8751 (Robotics Research Foundation I).

ME 8801. Special Topics in Manufacturing. 1 Credit Hour.
Special topic offerings of current interest in manufacturing not included in regular courses.

ME 8802. Special Topics in Manufacturing. 2 Credit Hours.
Special topic offerings of current interest in manufacturing not included in regular courses.

ME 8803. Special Topics in Manufacturing. 3 Credit Hours.
Special topic offerings of current interest in manufacturing not included in regular courses.

ME 8804. Special Topics in Manufacturing. 4 Credit Hours.
Special topic offerings of current interest in manufacturing not included in regular courses.

ME 8805. Special Topics in Manufacturing. 5 Credit Hours.
Special topic offerings of current interest in manufacturing not included in regular courses.

ME 8806. Special Topics in Manufacturing. 6 Credit Hours.
Special topic offerings of current interest in manufacturing not included in regular courses.

ME 8811. Special Topics in Computer-aided Engineering and Design. 1 Credit Hour.
Special topic offerings of current interest in computer-aided engineering not included in regular courses.

ME 8812. Special Topics in Computer-aided Engineering and Design. 2 Credit Hours.
Special topic offerings of current interest in computer-aided engineering not included in regular courses.

ME 8813. Special Topics in Computer-aided Engineering and Design. 3 Credit Hours.
Special topic offerings of current interest in computer-aided engineering not included in regular courses.

ME 8814. Special Topics in Computer-aided Engineering and Design. 4 Credit Hours.
Special topics offerings of current interest in computer-aided engineering not included in regular courses.

ME 8815. Special Topics in Computer-aided Engineering and Design. 5 Credit Hours.
Special topics offerings of current interest in computer-aided engineering not included in regular courses.

ME 8816. Special Topics in Computer-aided Engineering and Design. 6 Credit Hours.
Special topics offerings of current interest in computer-aided engineering not included in regular courses.

ME 8821. Special Topics in Tribology. 1 Credit Hour.
Special topic offerings of current interest in tribology not included in regular courses.

ME 8822. Special Topics in Tribology. 2 Credit Hours.
Special topic offerings of current interest in tribology not included in regular courses.

ME 8823. Special Topics in Tribology. 3 Credit Hours.
Special topics offerings of current interest in tribology not included in regular courses.

ME 8824. Special Topics in Tribology. 4 Credit Hours.
Special topics offerings of current interest in tribology not included in regular courses.

ME 8825. Special Topics in Tribology. 5 Credit Hours.
Special topic offerings of current interest in tribology not included in regular courses.

ME 8826. Special Topics in Tribology. 6 Credit Hours.
Special topic offerings of current interest in tribology not included in regular courses.

ME 8831. Special Topics in Thermal Sciences. 1 Credit Hour.
Special topics offerings of current interest in thermal sciences not included in regular courses.

ME 8832. Special Topics in Thermal Sciences. 2 Credit Hours.
Special topics offerings of current interest in thermal sciences not included in regular courses.

ME 8833. Special Topics in Thermal Sciences. 3 Credit Hours.
Special topic offerings of current interest in thermal sciences not included in regular courses.

ME 8834. Special Topics in Thermal Sciences. 4 Credit Hours.
Special topic offerings of current interest in thermal sciences not included in regular courses.

ME 8835. Special Topics in Thermal Sciences. 5 Credit Hours.
Special topic offerings of current interest in thermal sciences not included in regular courses.

ME 8836. Special Topics in Thermal Sciences. 6 Credit Hours.
Special topics offerings of current interest in thermal sciences not included in regular courses,

ME 8841. Special Topics in Automation and Mechatronics. 1 Credit Hour.
Special topic offerings of current interest in automation and mechatronics not included in regular courses.

ME 8842. Special Topics in Automation and Mechatronics. 2 Credit Hours.
Special topic offerings of current interest in automation and mechatronics not included in regular courses.

ME 8843. Special Topics in Automation and Mechatronics. 3 Credit Hours.
Special topic offerings of current interest in automation and mechatronics not included in regular courses.

ME 8844. Special Topics in Automation and Mechatronics. 4 Credit Hours.
Special topic offerings of current interest in automation and mechatronics not included in regular courses.

ME 8845. Special Topics in Automation and Mechatronics. 5 Credit Hours.
Special topic offerings of current interest in automation and mechatronics not included in regular courses.

ME 8846. Special Topics in Automation and Mechatronics. 6 Credit Hours.
Special topic offerings of current interest in automation and mechatronics not included in regular courses.

ME 8851. Special Topics in Acoustics and Dynamics. 1 Credit Hour.
Special topic offerings of current interest in acoustics and dynamics not included in regular courses.

ME 8852. Special Topics in Acoustics and Dynamics. 2 Credit Hours.
Special topic offerings of current interest in acoustics and dynamics not included in regular courses.

ME 8853. Special Topics in Acoustics and Dynamics. 3 Credit Hours.
Special topic offerings of current interest in acoustics and dynamics not included in regular courses.

ME 8854. Special Topics in Acoustics and Dynamics. 4 Credit Hours.
Special topic offerings of current interest in acoustics and dynamics not included in regular courses.

ME 8855. Special Topics in Acoustics and Dynamics. 5 Credit Hours.
Special topic offerings of current interest in acoustics and dynamics not included in regular courses.

ME 8856. Special Topics in Acoustics and Dynamics. 6 Credit Hours.
Special topic offerings of current interest in acoustics and dynamics not included in regular courses.

ME 8861. Special Topics in Fluid Mechanics. 1 Credit Hour.
Special topic offerings of current interest in fluid mechanics not included in regular courses.

ME 8862. Special Topics in Fluid Mechanics. 2 Credit Hours.
Special topic offerings of current interest in fluid mechanics not included in regular courses.

ME 8863. Special Topics in Fluid Mechanics. 3 Credit Hours.
Special topic offerings of current interest in fluid mechanics not included in regular courses.

ME 8864. Special Topics in Fluid Mechanics. 4 Credit Hours.
Special topic offerings of current interest in fluid mechanics not included in regular courses.

ME 8865. Special Topics in Fluid Mechanics. 5 Credit Hours.
Special topic offerings of current interest in fluid mechanics not included in regular courses.

ME 8866. Special Topics in Fluid Mechanics. 6 Credit Hours.
Special topic offerings of current interest in fluid mechanics not included in regular courses.

ME 8871. Special Topics in Bioengineering. 1 Credit Hour.
Special topic offerings of current interest in bioengineering not included in regular courses.

ME 8872. Special Topics in Bioengineering. 2 Credit Hours.
Special topic offerings of current interest in bioengineering not included in regular courses.

ME 8873. Special Topics in Bioengineering. 3 Credit Hours.
Special topic offerings of current interest in bioengineering not included in regular courses.

ME 8874. Special Topics in Bioengineering. 4 Credit Hours.
Special topic offerings of current interest in bioengineering not included in regular courses.

ME 8875. Special Topics in Bioengineering. 5 Credit Hours.
Special topic offerings of current interest in bioengineering not included in regular courses.

ME 8876. Special Topics in Bioengineering. 6 Credit Hours.
Special topic offerings of current interest in bioengineering not included in regular courses.

ME 8881. Special Topics in Mechanics of Materials. 1 Credit Hour.
Special topic offerings of current interest in mechanics of materials not included in regular courses.

ME 8882. Special Topics in Mechanics of Materials. 2 Credit Hours.
Special topic offerings of current interest in mechanics of materials not included in regular courses.

ME 8883. Special Topics in Mechanics of Materials. 3 Credit Hours.
Special topic offerings of current interest in mechanics of materials not included in regular courses.

ME 8884. Special Topics in Mechanics of Materials. 4 Credit Hours.
Special topic offerings of current interest in mechanics of materials not included in regular courses.

ME 8885. Special Topics in Mechanics of Materials. 5 Credit Hours.
Special topic offerings of current interest in mechanics of materials not included in regular courses.

ME 8886. Special Topics in Mechanics of Materials. 6 Credit Hours.
Special topic offerings of current interest in mechanics of materials not included in regular courses.

ME 8893. Special Topics. 3 Credit Hours.
Special Topics.

ME 8894. Special Topics. 4 Credit Hours.
Special Topics.

ME 8901. Special Problems in Manufacturing. 1-21 Credit Hours.
Individual studies and/or experimental investigation of problems of current interest in manufacturing.

ME 8902. Special Problem in Manufacturing. 1-21 Credit Hours.
Individual studies and/or experimental investigation of problems of current interest in manufacturing.

ME 8903. Special Problems in Manufacturing. 1-21 Credit Hours.
Individual studies and/or experimental investigation of problems of current interest in manufacturing.

ME 8904. Special Problems in Manufacturing. 1-21 Credit Hours.
Individual studies and/or experimental investigation of problems of current interest in manufacturing.

ME 8905. Special Problems in Manufacturing. 1-21 Credit Hours.
Individual studies and/or experimental investigation of problems of current interest in manufacturing.

ME 8906. Special Problems in Manufacturing. 1-21 Credit Hours.
Individual studies and/or experimental investigation of problems of current interest in manufacturing.

ME 8911. Special Problems in Computer-aided Engineering and Design. 1-21 Credit Hours.
Individual studies and/or experimental investigation of problems of current interest in computer-aided engineering and design.

ME 8912. Special Problems in Computer-aided Engineering and Design. 1-21 Credit Hours.
Individual studies and/or experimental investigations of problems of current interest in computer-aided engineering and design.

ME 8913. Special Problems in Computer-aided Engineering and Design. 1-21 Credit Hours.
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ME 8914. Special Problems in Computer-aided Engineering and Design. 1-21 Credit Hours.
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ME 8915. Special Problems in Computer-aided Engineering and Design. 1-21 Credit Hours.
Individual studies and/or experimental investigation of problems of current interest in computer-aided engineering and design.

ME 8916. Special Problems in Computer-aided Engineering and Design. 1-21 Credit Hours.
Individual studies and/or experimental investigations of problems of current interest in computer-aided engineering and design.

ME 8921. Special Problems in Tribology. 1-21 Credit Hours.
Individual studies and/or experimental investigations of problems of current interest in tribology.

ME 8922. Special Problems in Tribology. 1-21 Credit Hours.
Individual studies and/or experimental investigation of problems of current interest in tribology.

ME 8923. Special Problems in Tribology. 1-21 Credit Hours.
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ME 8924. Special Problems in Tribology. 1-21 Credit Hours.
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ME 8926. Special Problems in Tribology. 1-21 Credit Hours.
Individual studies and/or experimental investigations of problems of current interest in tribology.

ME 8931. Special Problems in Thermal Sciences. 1-21 Credit Hours.
Individual studies and/or experimental investigations of problems of current interest in thermal sciences.

ME 8932. Special Problems in Thermal Sciences. 1-21 Credit Hours.
Individual studies and/or experimental investigations of problems of current interest in thermal sciences.

ME 8933. Special Problems in Thermal Sciences. 1-21 Credit Hours.
Individual studies and/or experimental investigation of problems of current interest in thermal sciences.

ME 8934. Special Problems in Thermal Sciences. 1-21 Credit Hours.
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ME 8935. Special Problems in Thermal Sciences. 1-21 Credit Hours.
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ME 8936. Special Problems in Thermal Sciences. 1-21 Credit Hours.
Individual studies and/or experimental investigations of problems of current interest in thermal sciences.

ME 8941. Special Problems in Automation and Mechatronics. 1-21 Credit Hours.
Individual studies and/or experimental investigations of problems of current interest in automation and mechatronics.

ME 8942. Special Problems in Automation and Mechatronics. 1-21 Credit Hours.
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ME 8945. Special Problems in Automation and Mechatronics. 1-21 Credit Hours.
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ME 8946. Special Problems in Automation and Mechatronics. 1-21 Credit Hours.
Individual studies and/or experimental investigations of problems of current interest in automation and mechatronics.

ME 8951. Special Problems in Acoustics and Dynamics. 1-21 Credit Hours.
Individual studies and/or experimental investigations of problems of current interest in acoustics and dynamics.

ME 8952. Special Problems in Acoustics and Dynamics. 1-21 Credit Hours.
Individual studies and/or experimental investigations of problems of current interest in acoustics and dynamics.

ME 8953. Special Problems in Acoustic and Dynamics. 1-21 Credit Hours.
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ME 8954. Special Problems in Acoustics and Dynamics. 1-21 Credit Hours.
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ME 8955. Special Problems in Acoustics and Dynamics. 1-21 Credit Hours.
Individual studies and/or experimental investigations of problems of current interest in acoustics and dynamics.

ME 8956. Special Problems in Acoustics and Dynamics. 1-21 Credit Hours.
Individual studies and/or experimental investigations of problems of current interest in acoustics and dynamics.

ME 8961. Special Problems in Fluid Mechanics. 1-21 Credit Hours.
Individual studies and/or experimental investigations of problems of current interest in fluid mechanics.

ME 8962. Special Problems in Fluid Mechanics. 1-21 Credit Hours.
Individual studies and/or experimental investigations of problems of current interest in fluid mechanics.

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ME 8966. Special Problems in Fluid Mechanics. 1-21 Credit Hours.
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ME 8971. Special Problems in Bioengineering. 1-21 Credit Hours.
Individual studies and/or experimental investigations of problems of current interest in bioengineering.

ME 8972. Special Problems in Bioengineering. 1-21 Credit Hours.
Individual studies and/or experimental investigations of problems of current interest in bioengineering.

ME 8973. Special Problems in Bioengineering. 1-21 Credit Hours.
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ME 8974. Special Problems in Bioengineering. 1-21 Credit Hours.
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ME 8975. Special Problems in Bioengineering. 1-21 Credit Hours.
Individual studies and/or experimental investigations of problems of current interest in bioengineering.

ME 8976. Special Problems in Bioengineering. 1-21 Credit Hours.
Individual studies and/or experimental investigations of problems of current interest in bioengineering.

ME 8981. Special Problems in Mechanics of Materials. 1-21 Credit Hours.
Individual studies and/or experimental investigations of problems of current interest in the mechanics of materials.

ME 8982. Special Problems in Mechanics of Materials. 1-21 Credit Hours.
Individual studies and/or experimental investigations of problems of current interest in mechanics of materials.

ME 8983. Special Problems in Mechanics of Materials. 1-21 Credit Hours.
Individual studies and/or experimental investigations of problems of current interest in mechanics of materials.

ME 8984. Special Problems in Mechanics of Materials. 1-21 Credit Hours.
Individual studies and/or experimental investigations of problems of current interest in the mechanics of materials.

ME 8985. Special Problems in Mechanics of Materials. 1-21 Credit Hours.
Individual studies and/or experimental investigations of problems of current interest in the mechanics of materials.

ME 8986. Special Problems in Mechanics of Materials. 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.