

# 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 instruction in the fundamentals of ceramic, metallurgy, and polymer and fiber science and engineering with specialized knowledge and skills, 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 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 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 Program Educational Objectives of the Bachelor of Science in Materials Science and Engineering program are:

- Our graduates will rapidly rise to leadership roles in materials-related positions in industry, academia, government, and other career pursuits.
- Our graduates will be global leaders, collaborating with diverse, multi-disciplinary teams while incorporating emerging materials developments and engineering technologies that are positively changing society and the human condition.
- Our graduates will continue to grow their cumulative knowledge base by engaging in life-long learning via career-appropriate options, including post-graduate education and professional designations.
- Our graduates will be entrepreneurs, continually discovering, designing and creating new materials of all types, building on the

process-structure-properties-performance paradigm to exert positive economic and social impacts across the field and society.

## 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.

## 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
- Bachelor of Science in Materials Science and Engineering - Polymer and Fiber Materials
- Bachelor of Science in Materials Science and Engineering - Structural Materials
- Bachelor of Science in Materials Science and Engineering - Functional Materials

## 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 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: <http://career.gatech.edu/co-op>.

We highly recommend careful planning with your faculty research mentor and academic advisor to determine how to incorporate this option into your educational experience.

## 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: <http://career.gatech.edu/internships>.

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 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://www.careerdiscovery.gatech.edu).

We highly recommend careful planning with your faculty research mentor and academic advisor to determine how to incorporate this option into your educational experience.

## 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.

We highly recommend careful planning with your faculty research mentor and academic advisor to determine how to incorporate this option into your educational experience.

## 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.

Current undergraduate students may participate in the BS/MS Program offered by the School. Georgia Tech undergraduate students may be admitted into the program after completing a minimum of 30 semester credit hours (and no more than 75 hours) at Georgia Tech and have a GPA of 3.5 or higher at time of application. Both the application fee and the GRE test score are waived. Students need to maintain at least a 3.0 GPA when receiving the B.S. degree in order to be converted into graduate student status and must continue immediately into the M.S. program in order to qualify for the 6 semester-hour "Graduate Course Credit" option, <http://catalog.gatech.edu/academics/undergraduate/credit-tests-scores/undergraduate-students-taking-graduate-courses/>.