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.

Wellness

APPH 1040 Scientific Foundations of Health 2
or APPH 10 The Science of Physical Activity and Health 2

Core A - Essential Skills

ENGL 1101 English Composition I 3
ENGL 1102 English Composition II 3
MATH 1552 Integral Calculus 2 4

Core B - Institutional Options

CS 1371 Computing for Engineers 3

Core C - Humanities

Any HUM (http://www.catalog.gatech.edu/academics/undergraduate/core-curriculum/core-area-c) 6

Core D - Science, Math, & Technology

PHYS 2211 Introductory Physics I 2 4
PHYS 2212 Introductory Physics II 4

Core E - Social Sciences

Select one of the following:
- HIST 2111 The United States to 1877 3
- HIST 2112 The United States since 1877 3
- INTA 1200 American Government in Comparative Perspective 3
- POL 1101 Government of the United States 3
- PUBP 3000 American Constitutional Issues 3

Select one of the following:
- ECON 2100 Economic Analysis and Policy Problems 3
- ECON 2101 The Global Economy 3
- ECON 2105 Principles of Macroeconomics 3
- ECON 2106 Principles of Microeconomics 3

Any SS (http://www.catalog.gatech.edu/academics/undergraduate/core-curriculum/core-area-e) 6

Core F - Courses Related to Major

CHEM 1310 General Chemistry 4
ME 1770 Introduction to Engineering Graphics and Visualization 3
MATH 2551 Multivariable Calculus 2 4
MATH 2552 Differential Equations 2 4
MSE 2001 Principles and Applications of Engineering Materials 3

Ethics Requirement (http://www.catalog.gatech.edu/academics/undergraduate/core-curriculum/ethics) 1

Major Requirements

COE 2001 Statics 2 2
ME 2016 Computer Applications 3
ME 2110 Creative Decisions and Design 3
ME 2202 Dynamics of Rigid Bodies 3
ME 3017 System Dynamics 3
ME 3057 Experimental Methodology and Technical Writing 3
ME 3322 Thermodynamics, Thermodynamics I 3
ME 3340 Fluid Mechanics, Fluid Mechanics I 3
ME 3345 Conduction and Radiation Heat Transfer 3
COE 3001 Mechanics of Deformable Bodies 3
ME 3210 Design, Materials, and Manufacture 3
ME 4056 Mechanical Engineering Systems Laboratory 3
ME 4182 Mechanical Design Engineering 3

Other Engineering Requirements

ECE 3710 Circuits and Electronics 2
ECE 3741 Instrumentation and Electronics Lab 1
ISE 3025 Essentials of Engineering Economy 1
MATH 3670 Probability and Statistics with Applications 3

Thermal, Fluid, and Energy Systems Concentration

ME 4315 Energy Systems Analysis and Design 3
Select one of the following: 3
- ME 4011 Internal Combustion Engines 12
- ME 4013 Hybrid Vehicle Powertrains 12
- ME 4321 Principles of Air Conditioning 12
ME 4325 Introduction to Fuel Cell Systems
ME 4340 Applied Fluid Mechanics
ME 4342 Computational Fluid Dynamics
ME 4701 Wind Engineering
ME 4759 Electrochemical Energy Storage and Conversion
ME 4803 Multiscale Thermal Engineering

**Free Electives**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSE 2001</td>
<td>Principles and Applications of Engineering Materials</td>
</tr>
<tr>
<td>ECE 3710</td>
<td>Circuits and Electronics</td>
</tr>
<tr>
<td>ECE 3741</td>
<td>Instrumentation and Electronics Lab</td>
</tr>
<tr>
<td>ISYE 3025</td>
<td>Essentials of Engineering Economy</td>
</tr>
</tbody>
</table>

Free Electives 3,4,5
Free Electives 3,4,5
1. If a course is repeated, only the latest grade is included in the calculation of the Major Requirements GPA.
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 credits) 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.

**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 and classroom studies until they complete three semesters of work. Co-op students with mechanical engineering majors complete the same coursework and classroom studies until they complete three semesters of work. Co-op students with mechanical engineering majors complete the same coursework and classroom studies until they complete three semesters of work.

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 Program 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://careerdiscovey.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)