

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, fostering inclusive environments, and acting ethically to discover and apply new knowledge and engineering practices
- Our graduates will continue to grow professionally and will strive to acquire new skills and new knowledge throughout their careers.
- Our graduates will be entrepreneurially minded innovators who have a positive economic, social, and environmental impact on their communities, the nation, and society as a whole.

Code	Title	Credit Hours
Wellness		
APPH 1040	Scientific Foundations of Health	2
	or APPH 10 The Science of Physical Activity and Health	
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	6
Core D - Science, Math, & Technology		
PHYS 2211	Introductory Physics I ²	4
PHYS 2212	Introductory Physics II	4
MATH 1551	Differential Calculus ²	2

MATH 1553	Introduction to Linear Algebra ²	2
	or MATH 1554 Linear Algebra	
	or MATH 1555 Linear Algebra with Abstract Vector Spaces	

Core E - Social Sciences

Select one of the following: 3

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

Select one of the following: 3

ECON 2100	Economic Analysis and Policy Problems	
ECON 2101	The Global Economy	
ECON 2105	Principles of Macroeconomics	
ECON 2106	Principles of Microeconomics	

Any SS 6

Core F - Courses Related to Major

CHEM 1310	General Chemistry ⁷	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 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	3
ME 3340	Fluid Mechanics	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
ISYE 3025	Essentials of Engineering Economy	1
MATH 3670	Probability and Statistics with Applications	3

Nuclear Energy Concentration

NRE 3301	Radiation Physics	3
NRE 3208	Nuclear Reactor Phys I	3
ME 3180	Machine Design	3
	or ME 4315 Energy Systems Analysis and Design	

Select two of the following: ⁵ 6

ECE 3025	Electromagnetics	
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ECE 3072	Electrical Energy Systems	
ME 4214	Mechanical Behavior of Materials	
ME 4340	Applied Fluid Mechanics	
MSE 4010	Environmental Degradation	
NRE 4214	Reactor Engineering	
NRE 4610	Introduction to Plasma Physics and Fusion Engineering	
Free Electives		
Free Electives ^{3,4,6}		6
Total Credit Hours		129

No pass-fail courses allowed.

Student must earn a 2.0 GPA within Major Requirements and the following:

Code	Title	Credit Hours
MSE 2001	Principles and Applications of Engineering Materials	3
ECE 3710	Circuits and Electronics	2
ECE 3741	Instrumentation and Electronics Lab	1
ISYE 3025	Essentials of Engineering Economy	1

If a course is repeated, only the latest grade is included in the calculation of the Major Requirements GPA.

- Students must complete one Ethics course during their program.
- Minimum grade of C required.
- 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.
- Excludes CEE 2040, PHYS 2802, PHYS 2XXX (AP Credit) and MGT 2250.
- ME 4803/NRE 4803 must have the title 'Nuclear Reactor Materials'
- 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.
- 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:

- a minimum of 26 weeks abroad in educational, research, or work internships,
- a language requirement,
- courses specifically designated for global economics, international affairs, and global competency, and

- 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.

For more information about all of the programs in the Center for Career Discovery and Development, visit www.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.

BS/MS Information