

# Bachelor of Science in Mechanical Engineering

Mechanical engineering is one of the largest and broadest fields of technical study. Mechanical engineers are concerned with the engineering systems used to control and transform energy to meet the needs of humanity. In mechanical engineering, students develop an understanding of basic topics and fundamental principles upon which engineered systems are conceived and developed in a modern society. It is an excellent foundation for a rewarding career in engineering, as well as for further study in business, law, medicine, and other professions that require a solid foundation in science and technology, and the ability to solve problems.

The mechanical engineering department is dedicated to graduating mechanical engineers who practice mechanical engineering in the general stems of thermal/fluid systems, mechanical systems and design, and materials and manufacturing in industry and government settings; pursue advanced education, research and development, and other creative efforts in science and technology; conduct themselves in a responsible, professional, and ethical manner; and participate as leaders in activities that support service to and economic development of the region, state, and nation.

The mechanical engineering faculty has defined seven educational outcomes that students in the program are expected to achieve by the time of graduation. These outcomes are

- Ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
- Ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
- Ability to communicate effectively with a range of audiences
- Ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
- Ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
- Ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
- Ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

The mechanical engineering curriculum meets these outcomes by providing breadth and depth across a range of topics.

- A combination of college-level mathematics and basic science courses (some with experimental work) that includes mathematics, probability and statistics, physics, and chemistry
- Engineering courses that develop a working knowledge of graphics and computer-aided design, engineering mechanics, thermodynamics, kinematics, dynamics and control of mechanical systems, computational methods, fluid mechanics, heat transfer, materials science and engineering, mechatronics, technical communication, and engineering economics

- Mechanical engineering project and laboratory experiences that develop competence in measurements and instrumentation, interpretation of data, reverse engineering analysis of mechanical systems, use of computational tools for engineering analysis, integration of multidisciplinary topics in design of complex systems, teamwork and project planning, and written and oral communication
- A sequence of engineering design courses, culminating in a major capstone design experience in collaboration with an industrial sponsor, that draws on the knowledge and skills students have acquired in earlier coursework and incorporates modern engineering standards and realistic constraints
- Core curriculum courses, including social and behavioral sciences, humanities, and visual and performing arts electives, that complement the technical content of the curriculum
- A broad range of senior elective options that provide a career gateway to further study and lifelong learning in the practice of engineering and other professions
- Many courses throughout the curriculum are structured to motivate the study of engineering science by challenging students with in-depth analysis of real mechanical components and systems. In these courses, students address real-world projects based on current industrial methods and practices to connect theory with practice.

## Portable Computing Devices

Students entering Mechanical Engineering are expected to have a laptop computer at their disposal. The use of laptop computers will be necessary in many required courses, and individual instructors may require that a laptop be brought to class or lab sessions. For a list of minimum system requirements see: <http://www.me.utexas.edu/laptopreq>.

## Curriculum

Course requirements include courses within the Cockrell School of Engineering, and other required courses. In addition, each student must complete the University's Core Curriculum. In some cases, a course required as part of the major may also be counted toward the core curriculum; these courses are identified below.

In the process of fulfilling engineering degree requirements, students must also complete coursework to satisfy the University's flag requirements: one independent inquiry flag, one course with a quantitative reasoning flag, one ethics flag, one global cultures flag, one cultural diversity in the United States flag, and three writing flags. The independent inquiry flag, the quantitative reasoning flag, the ethics flag, and three writing flags are carried by courses specifically required for the degree; these courses are identified below. Courses that may be used to fulfill flag requirements are identified in the Course Schedule.

Requirements		Hours
<b>Mechanical Engineering Courses</b>		
M E 130L	Experimental Fluid Mechanics	1
M E 134L	Materials Engineering Laboratory	1
M E 139L	Experimental Heat Transfer	1
M E 140L	Mechatronics Laboratory	1
M E 144L	Dynamic Systems and Controls Laboratory	1
M E 266K	Mechanical Engineering Design Project (independent inquiry flag and writing flag)	2
M E 266P	Design Project Laboratory	2

M E 302	Introduction to Engineering Design and Graphics	3
M E 314D	Dynamics	3
M E 316T	Thermodynamics	3
M E 318M	Programming and Engineering Computational Methods	3
M E 330	Fluid Mechanics	3
M E 333T	Engineering Communication (writing flag and ethics flag)	3
M E 334	Materials Engineering	3
M E 335	Engineering Statistics	3
M E 338	Machine Elements	3
M E 339	Heat Transfer	3
M E 340	Mechatronics	3
M E 344	Dynamic Systems and Controls	3
M E 353	Engineering Finance	3
M E 366J	Mechanical Engineering Design Methodology (writing flag)	3
<b>Chemistry</b>		
CH 301	Principles of Chemistry I (part II science and technology)	3
<b>Engineering Mechanics</b>		
E M 306	Statics	3
E M 319	Mechanics of Solids	3
<b>Mathematics</b>		
M 408C	Differential and Integral Calculus (mathematics; quantitative reasoning flag)	4
M 408D	Sequences, Series, and Multivariable Calculus	4
M 427J	Differential Equations with Linear Algebra	4
M 427L	Advanced Calculus for Applications II	4
<b>Physics</b>		
PHY 303K	Engineering Physics I (part I science and technology; quantitative reasoning flag)	3
PHY 303L	Engineering Physics II (part I science and technology; quantitative reasoning flag)	3
PHY 105M	Laboratory For Physics 302K, 303K, and 317K	1
PHY 105N	Laboratory For Physics 302L, 303L, and 317L	1
<b>Rhetoric and Writing</b>		
RHE 306	Rhetoric and Writing (English composition)	3
<b>Other Required Courses</b>		
Approved career gateway electives		12
Approved natural science/mathematics elective		3
<b>Remaining Core Curriculum Requirements</b>		
E 316L	British Literature <sup>1</sup>	3
or E 316M	American Literature	
or E 316N	World Literature	
or E 316P	Masterworks of Literature	
American and Texas government <sup>2</sup>		6
American history <sup>2</sup>		6

Social and behavioral sciences <sup>3</sup>		3
Visual and performing arts <sup>3</sup>		3
UGS 302	First-Year Signature Course <sup>4</sup>	3
or UGS 303	First-Year Signature Course	

1. Some sections of the English humanities courses (E 316L, 316M, 316N, 316P) carry a global cultures or cultural diversity flag.

2. Some sections carry a cultural diversity flag.

3. Some sections carry a global cultures and/or cultural diversity flag.

4. In UGS 302, all sections carry a writing flag. In UGS 303, some sections carry a writing flag.

**Total Hours** **126**

## Career Gateway Elective Options

The ME curriculum includes 12 credit hours of Career Gateway Electives (CGEs) which give students the flexibility to tailor their upper-division academic program to meet a variety of career goals, while ensuring that they graduate with a robust grounding in one or more selected technical or specialty areas. The CGEs are arranged into tracks, each of which has designated courses. Technical tracks are designed to provide more focus in a selected technical area than is provided in the core curriculum alone. Specialty tracks are designed for those students whose career interests extend beyond mechanical engineering. Detailed guidelines for choosing CGEs and for approval of CGE choices are published on the mechanical engineering website and may be subject to periodic change as needs arise. Exceptions can be considered on a case-by-case basis by petition to the undergraduate advisor.

## Minors and Transcript-Recognized Certificate Programs

Minors and transcript-recognized certificate programs offer interdisciplinary curricula that support and extend a student's major. Minors that may be of particular interest to mechanical engineering students include the minor in Materials Science and Engineering and certificates in Computational Science and Engineering, the National Academy of Engineering Grand Challenges Scholars Program, Humanitarian Engineering, Applied Statistical Modeling, and Pre-Health Professions. Additional information about minors and transcript recognized certificates is available [online](#).

## Integrated Bachelor of Science in Mechanical Engineering/Master of Science in Engineering Program

The integrated degree program results in simultaneously awarding a Bachelor of Science in Mechanical Engineering (BSME) and a Master of Science in Engineering (MSE) degree offered by the J. Mike Walker Department of Mechanical Engineering. The objective of the Integrated BSME/MSE Program is to enable prepared undergraduates in Mechanical Engineering to earn two degrees in a shortened time period. By applying for AP and Credit by Exam courses, having students take recommended summer courses, and allowing seniors to enroll in graduate-level engineering courses reserved for graduate credit, the program enables graduates to complete both degree requirements in five years.

**Admissions.** Current undergraduate mechanical engineering (ME) students may begin the application process to the Integrated BSME/MSE Program option in the second term of their third year. Admission

includes the two steps outlined below. Undergraduate students not in the mechanical engineering major are not eligible to apply. It is expected that all students selected for the program in Step 1 and who have been successful in their first graduate-level coursework will be selected for admission in Step 2. Successful completion will be evaluated and determined by the department's Domestic Graduate Admission Committee and the graduate advisor.

*Step 1.* Students complete the first step in the application for admission to the Integrated BSME/MSE Program in the second term of the third year. The Step 1 application is internal through the department and includes a resume, statement of purpose, and letter of recommendation. Qualified applicants will be selected based on the applicant's progress to degree completion, grade point average, and other qualifications included in the application materials. Selected students will be notified before the first term of the fourth year of their admission status for the integrated program, allowing them to meet with an academic advisor to plan graduate coursework in the first term of their fourth year.

*Step 2.* Students complete the second step in the application in the first term of their fourth year. The Step 2 application is formal through the Graduate and International Admission Center (GIAC). Admission to the integrated program will be based on a review of the applicant's undergraduate record and GPA, GRE scores, performance in graduate coursework, letters of recommendation, personal statement, TOEFL score (if required), and research experience.

If a student in their fourth year is taking graduate courses and would be on track to complete the integrated program but did not apply in their third year through Step 1, they may apply by completing Step 1 and Step 2 together. These students will be evaluated for admission on the same criteria.

**Degree Requirements.** In order for integrated program students to complete both the BSME and MSE degrees in five years, the department waives six semester credit hours (SCH) of technical area electives in lieu of six SCH of graduate engineering coursework reserved for graduate credit taken in the fourth year. This reduces the total BSME degree requirements for integrated program students from 126 to 120 SCH.

Students in the integrated program complete 12 SCH of graduate coursework in their fourth year and 18-24 SCH of graduate coursework in their fifth year to complete a total of 30-36 SCH of graduate coursework for the MSE degree as described in the Graduate Catalog. Students have the option of choosing the coursework, report, or thesis option for the MSE degree as described in the Graduate Catalog. The selected degree option determines the number of hours required to graduate with the MSE degree. Courses the student takes will be determined with the graduate advisor and academic advisor to ensure compliance with degree requirements and to meet the students' career goals.

Students unable to successfully complete the integrated program, or who wish to terminate pursuit of the MSE for any reason, may obtain a BSME degree by applying for a change of major back to the standalone BSME program and satisfying all of the requirements for the standalone degree. Six SCH of the graduate courses taken in the fourth year may count toward the 12 SCH of CGEs required to complete the entire 126 SCH requirements. An undergraduate student leaving the integrated program will be on a trajectory to graduate with the regular BSME degree in the same timeframe prior to admission to the integrated program.

Graduates of the integrated program will receive the BSME and MSE degrees simultaneously after successfully completing the 120 SCH for the BSME and 30-36 SCH for the MSE, a total of 150-156 SCH. Ideally students in this program will graduate with both degrees in a total of five years to completion.

**Advising.** Once admitted, students will be advised each semester by the graduate advisor and an academic advisor to complete coursework required for the BSME degree in their fourth year, and completion of the coursework required for the MSE degree in their fourth and fifth years. Information regarding the integrated program requirements and policies may be obtained from the ME Academic Advising Office in ETC 2.146.