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

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Hours</th>
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<tbody>
<tr>
<td>M E 130L</td>
<td>Experimental Fluid Mechanics</td>
<td>1</td>
</tr>
<tr>
<td>M E 134L</td>
<td>Materials Engineering Laboratory</td>
<td>1</td>
</tr>
<tr>
<td>M E 139L</td>
<td>Experimental Heat Transfer</td>
<td>1</td>
</tr>
<tr>
<td>M E 140L</td>
<td>Mechatronics Laboratory</td>
<td>1</td>
</tr>
<tr>
<td>M E 144L</td>
<td>Dynamic Systems and Controls Laboratory</td>
<td>1</td>
</tr>
<tr>
<td>M E 266K</td>
<td>Mechanical Engineering Design Project (independent inquiry flag and writing flag)</td>
<td>2</td>
</tr>
<tr>
<td>M E 266P</td>
<td>Design Project Laboratory</td>
<td>2</td>
</tr>
</tbody>
</table>
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

Chemistry
CH 301  Principles of Chemistry I (part II science and technology)  3

Engineering Mechanics
E M 306  Statics  3
E M 319  Mechanics of Solids  3

Mathematics
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

Physics
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

Rhetoric and Writing
RHE 306  Rhetoric and Writing (English composition)  3

Other Required Courses
Approved career gateway electives  12
Approved natural science/mathematics elective  3

Remaining Core Curriculum Requirements
E 316L  or E 316M  or E 316N  or E 316P  British Literature  3
American Literature  3
World Literature  3
Masterworks of Literature  3
American and Texas government  2
American history  6

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.