

Mechanical Engineering, BSE

Requirements

The Bachelor of Science in Engineering (BSE) with a major in mechanical engineering requires a minimum of 129 s.h. of credit, including two 0 s.h. department seminars. At the time of graduation, students must have a cumulative grade-point average of at least 2.00 in all college work used to complete degree requirements and in all UI coursework in order to be awarded the BSE.

All BSE students are required to take the same collegiate curriculum. For information about these collegiate requirements, see the Bachelor of Science in Engineering, BSE in the catalog. 6 s.h. of a student's major courses fulfill the basic science or college-level math collegiate requirement. Students completing the major in mechanical engineering also fulfill the collegiate statistics requirement by completing STAT:2020 Probability and Statistics for the Engineering and Physical Sciences.

The BSE with a major in mechanical engineering requires the following coursework.

Requirements	Hours
Collegiate Curriculum	49
Basic Science and College-Level Math, from Major Requirements or Focus Area	6
Major Requirements (includes two 0 s.h. seminars)	53
Focus Area	21

Major Requirements

Major requirements include a set of common courses (56 s.h.), two departmental seminars (0 s.h.), and one capstone design course (3 s.h.).

Course #	Title	Hours
All of these:		
ME:2200	Introduction to Mechanical Engineering Design	2
ME:2300	Manufacturing Processes	3
ME:3045	Heat Transfer	3
ME:3052	Mechanical Systems	4
ME:3351	Engineering Instrumentation	2
ME:3600	Control of Mechanical Engineering Systems	3
ME:4048	Energy Systems Design	4
ME:4055	Mechanical Systems Design	3
ME:4080	Experimental Engineering	4
ENGR:2110	Statics	2
ENGR:2120	Electrical Circuits	3
ENGR:2130	Thermodynamics	3
ENGR:2510	Fluid Mechanics	4
ENGR:2710	Dynamics	3
ENGR:2720	Materials Science	3
ENGR:2750	Mechanics of Deformable Bodies	3
MATH:3550	Engineering Vector Calculus	3

PHYS:1612	Introductory Physics II (with lab)	4
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Departmental Seminars

Course #	Title	Hours
Both of these:		
ME:2020	Mechanical Engineering Program Seminar	0
ME:3091	Professional Seminar: Mechanical Engineering	0

Capstone Design Course

Course #	Title	Hours
This course:		
ME:4086	Mechanical Engineering Design Project	3

Focus Area

Students must select focus area courses according to guidelines established by the Department of Mechanical Engineering. The mechanical engineering program offers a variety of focus area options, including standard focus areas developed and maintained by the program and flexible focus areas tailored to individual student interests. The focus area is a set of 21 s.h. of elective courses taken during the second through fourth years that provide mechanical engineering undergraduate students with a unique opportunity to acquire advanced education in an area of their choice.

Standard focus areas are offered in energy and environment [p. 1], manufacturing [p. 2], mechanical engineering design [p. 3], and robotics and autonomous systems [p. 3]. For guidelines regarding tailored focus areas, see ME Focus Areas on the Department of Mechanical Engineering website.

Focus areas in mechanical engineering consist of required courses, focus area electives, and additional electives; carefully selected elective courses may contribute to earning a minor and/or certificate.

Energy and Environment

Students in the energy and environment focus area complete one required course (3 s.h.), at least two focus area electives (6 s.h.), and up to four additional electives to total 21 s.h.

Required Energy and Environment Course

Course #	Title	Hours
At least one of these:		
ME:5145	Intermediate Heat Transfer	3
ME:5160/CEE:5369	Intermediate Mechanics of Fluids	3

Energy and Environment Electives

Course #	Title	Hours
At least two of these:		
ME:4111/CEE:4511	Scientific Computing and Machine Learning	3
ME:4160	Engines and Power Plants	3
ME:5145	Intermediate Heat Transfer (if not taken as a required course)	3
ME:5149	Propulsion Engineering	3

ME:5160/CEE:5369	Intermediate Mechanics of Fluids (if not taken as a required course)	3
CEE:4107/CBE:4410	Sustainable Systems	3

Additional Electives, Energy and Environment

The remainder of the 21 s.h. must be fulfilled by electives. In addition to the following courses, students may also select courses not already taken from the lists of required energy and environment courses and approved energy and environment electives. See "Flexible Electives" in this section of the catalog for more information.

Course #	Title	Hours
ME:4024	Product Design and Realization	3
ME:4125	Biomimetic Fluid Dynamics	3
ME:4175	Computational Naval Hydrodynamics	3
ME:4186	Enhanced Design Experience	3
ME:5143	Computational Fluid and Thermal Engineering	3
ME:5210/CBE:5110	Intermediate Thermodynamics	3
CBE:3405	Green Chemical and Energy Technologies	3
CBE:5415/IGPI:5415	Satellite Image Processing and Remote Sensing of Atmosphere	3
CBE:5417/ CEE:5417/IGPI:5417	Physical Meteorology and Atmospheric Radiative Transfer	3
CEE:3371	Principles of Hydraulics and Hydrology	3
CEE:4102	Groundwater	3
CEE:4159/ CBE:4459/IGPI:4159	Air Pollution Control Technology	3
CEE:5380	Fluid Flows in Environmental Systems	3
ECE:5620	Electric Power Systems and Renewable Energy	3
ISE:2500	Engineering Economy	3
May include one of these:		
SEES:1080	Introduction to Environmental Science	3-4
SEES:1290	Energy and the Environment	3

Manufacturing

Students in the manufacturing focus area complete two required courses (6 s.h.), at least two focus area electives (6 s.h.), and up to three additional electives (9 s.h.) to total 21 s.h.

Required Manufacturing Courses

Course #	Title	Hours
This course:		
ME:4111/CEE:4511	Scientific Computing and Machine Learning	3
And at least one of these:		
ME:4116/ISE:4116	Manufacturing Processes Simulations and Automation	3

ME:4140	Modern Robotics and Automation	3
ME:5146	Modeling of Materials Processing	3

Manufacturing Electives

Course #	Title	Hours
At least two of these:		
ME:4024	Product Design and Realization	3
ME:4116/ISE:4116	Manufacturing Processes Simulations and Automation (if not taken as a required course)	3
ME:4140	Modern Robotics and Automation (if not taken as a required course)	3
ME:4145	Industrial Internet of Things (IIoT)	3
ME:4200	Modern Engineering Materials for Mechanical Design	3
ME:5146	Modeling of Materials Processing (if not taken as a required course)	3
ME:5167/CEE:5137	Composite Materials	3
ME:5170	Data-Driven Analysis in Engineering Mechanics	3

Additional Electives, Manufacturing

The remainder of the 21 s.h. must be fulfilled by electives. In addition to the following courses, students may also select courses not already taken from the lists of required manufacturing courses and approved manufacturing electives. See "Flexible Electives" in this section of the catalog for more information.

Course #	Title	Hours
ME:4110/CEE:4515	Computer-Aided Engineering	3
ME:4112/CEE:4512	Engineering Design Optimization	3
ME:4117	Finite Element Analysis	3
ME:4150	Artificial Intelligence in Engineering	3
ME:4153/CEE:4532	Fundamentals of Vibrations	3
ME:4186	Enhanced Design Experience	3
ME:5114	Nonlinear Control in Robotic Systems	3
ME:5143	Computational Fluid and Thermal Engineering	3
ME:5145	Intermediate Heat Transfer	3
ME:5159/CEE:5549	Fracture Mechanics	3
ME:5300	Uncertainty Quantification and Design Optimization	3
BME:5620	Introduction to Applied Biomedical Finite Element Modeling	3
ECE:5550	Internet of Things	3
ISE:3300	Manufacturing Systems	3
ISE:3600/CEE:3142/ STAT:3620	Quality Control	3
ISE:3700	Operations Research	3

ISE:4620	Design of Experiments for Quality Improvement	3
ISE:4900	Introduction to Six Sigma	3

Mechanical Engineering Design

Students in the mechanical engineering design focus area complete two required courses (6 s.h.), at least two focus area electives (6 s.h.), and up to three additional electives (9 s.h.) to total 21 s.h.

Required Design Courses

Course #	Title	Hours
Both of these:		
ME:4111/CEE:4511	Scientific Computing and Machine Learning	3
ME:4186	Enhanced Design Experience	3

Students in the mechanical engineering design focus area are required to apply for a yearlong design experience comprised of ME:4086 Mechanical Engineering Design Project (see "Capstone Design Course") in the fall and ME:4186 Enhanced Design Experience in the spring (see Policy on Participation in PEDE or VIPT Programs). Students who are not accepted or who are unable to take the yearlong set of courses are required to replace ME:4186 with a course from the section titled "Design Electives" or "Additional Electives-Mechanical Engineering Design."

Design Electives

Course #	Title	Hours
At least two of these:		
ME:4024	Product Design and Realization	3
ME:4110/CEE:4515	Computer-Aided Engineering	3
ME:4112/CEE:4512	Engineering Design Optimization	3
ME:4117	Finite Element Analysis	3
ME:5143	Computational Fluid and Thermal Engineering	3
ME:5170	Data-Driven Analysis in Engineering Mechanics	3
ME:5300	Uncertainty Quantification and Design Optimization	3

Additional Electives, Mechanical Engineering Design

The remainder of the 21 s.h. must be fulfilled by electives. In addition to the following courses, students may also select courses not already taken from the list of approved design electives. See "Flexible Electives" in this section of the catalog for more information.

Course #	Title	Hours
ME:4116/ISE:4116	Manufacturing Processes Simulations and Automation	3
ME:4120	Advanced Linear Control Systems	3
ME:4125	Biomimetic Fluid Dynamics	3
ME:4140	Modern Robotics and Automation	3
ME:4145	Industrial Internet of Things (IIoT)	3

ME:4150	Artificial Intelligence in Engineering	3
ME:4153/CEE:4532	Fundamentals of Vibrations	3
ME:4175	Computational Naval Hydrodynamics	3
ME:4200	Modern Engineering Materials for Mechanical Design	3
ME:5114	Nonlinear Control in Robotic Systems	3
ME:5120	Vehicle System Dynamics	3
ME:5145	Intermediate Heat Transfer	3
ME:5149	Propulsion Engineering	3
ME:5150/CEE:5540	Intermediate Mechanics of Deformable Bodies	3
ME:5154	Intermediate Kinematics and Dynamics	3
ME:5159/CEE:5549	Fracture Mechanics	3
ME:5160/CEE:5369	Intermediate Mechanics of Fluids	3
ME:5167/CEE:5137	Composite Materials	3
ME:5179/CEE:5179	Continuum Mechanics	3

Robotics and Autonomous Systems

Students in the robotics and autonomous systems focus area complete two required courses (6 s.h.), at least two focus area electives (6 s.h.), and up to three additional electives (9 s.h.) to total 21 s.h.

Required Robotics and Autonomous Systems Courses

Course #	Title	Hours
Both of these:		
ME:4111/CEE:4511	Scientific Computing and Machine Learning	3
ME:4120	Advanced Linear Control Systems	3

Robotics and Autonomous Systems Electives

Course #	Title	Hours
At least two of these:		
ME:4116/ISE:4116	Manufacturing Processes Simulations and Automation	3
ME:4140	Modern Robotics and Automation	3
ME:4145	Industrial Internet of Things (IIoT)	3
ME:4150	Artificial Intelligence in Engineering	3
ME:4175	Computational Naval Hydrodynamics	3
ME:4176	Experimental Naval Hydrodynamics	3
ME:5114	Nonlinear Control in Robotic Systems	3
ME:5120	Vehicle System Dynamics	3
ME:5170	Data-Driven Analysis in Engineering Mechanics	3
ME:6115	Cooperative Autonomous Systems	3

Additional Electives, Robotics and Autonomous Systems

The remainder of the 21 s.h. must be fulfilled by electives. In addition to the following courses, students may also select courses not already taken from the list of approved robotics and autonomous systems electives. See "Flexible Electives" in this section of the catalog for more information.

Course #	Title	Hours
ME:4024	Product Design and Realization	3
ME:4110/CEE:4515	Computer-Aided Engineering	3
ME:4125	Biomimetic Fluid Dynamics	3
ME:4153/CEE:4532	Fundamentals of Vibrations	3
ME:4186	Enhanced Design Experience	3
ME:5150/CEE:5540	Intermediate Mechanics of Deformable Bodies	3
ME:5154	Intermediate Kinematics and Dynamics	3
ME:5300	Uncertainty Quantification and Design Optimization	3
ECE:5550	Internet of Things	3
ENGR:2730	Computers in Engineering	3

Flexible Electives

Students in all mechanical engineering focus areas may apply up to 3 s.h. of flexible elective courses to the additional elective requirement. Flexible elective courses include the following.

- A College of Engineering course that is required for another BSE major, excluding department seminars.
- A mechanical engineering course (prefix ME) numbered 4100 or above.
- A chemistry course (prefix CHEM) numbered above 1110, a mathematics course (prefix MATH) numbered above 3350, or a physics course (prefix PHYS) numbered above 1612. Students who have completed ME:4111 Scientific Computing and Machine Learning cannot use MATH:3800 Introduction to Numerical Methods as a flexible elective.
- An independent study (ME:4098) in a mechanical engineering subject area.