

MECHANICAL ENGINEERING MAJOR (B.S.)

<https://ceps.unh.edu/mechanical-engineering/program/bs/mechanical-engineering-major>

Description

The B.S.M.E. curriculum provides students with a solid engineering core and prepares students for professional engineering careers or for graduate study. The department has a four-course mechanics sequence, a four-course thermal/fluid sciences sequence, and a two-course systems and controls sequence. Modern experimental methods are taught in a two-course sequence starting in the junior year. The two-semester senior design project requires students to utilize the skills they have learned in their courses and function in an engineering team. The five technical electives required in the program give the students the opportunity to focus on advanced technical areas of their choice.

With their advisers' assistance, students should plan a program based on the following distribution of courses that totals not less than 128 credits. Note: mechanical engineering graduates typically exceed this requirement depending on what elective courses they select in the curriculum. The degree plan outlined below is typical only in format. Within the constraints of satisfying all the requirements and having all the necessary prerequisites, schedules may vary because of scheduling needs or student preference. Curriculum flexibility allows students to pursue a co-op experience or a minor, if interested which will potentially delay graduation. Some mechanical engineering elective courses may not be offered every year.

Requirements

Technical Elective Requirements:

Of the five technical elective courses, at least three of these courses must be taken in mechanical or ocean engineering, and these must be at least three credits and at the 600 or 700 level. At most, two may be selected from other 600- or 700-level courses in the College of Engineering and Physical Sciences (CEPS), which can include CS 410C Introduction to Scientific Programming/C, CS 410P Introduction to Scientific Programming/Python (equivalent to a 600 level technical elective), ESCI 501 Introduction to Oceanography, ECE 543 Introduction to Digital Systems, or a course approved by the department. Only one technical elective is allowed at the 400 or 500 level. Courses that cover nearly identical material to core mechanical and ocean engineering courses, but in another CEPS department, will not be accepted as technical electives, e.g.,

Code	Title	Credits
CHE 601	Fluid Mechanics and Unit Operations	3
CHE 602	Heat Transfer and Unit Operations	3
CHE 604	Chemical Engineering Thermodynamics	3
CEE 635	Engineering Materials	4
CEE 650	Fluid Mechanics	4
ECE 633	Signals and Systems I	3

Students should consult with their academic advisor before selecting technical electives outside of mechanical/ocean engineering. With departmental approval, the two technical electives outside of

mechanical/ocean engineering can be used for studying a focused area/minor, with the restrictions that only one course can be at the 400 or 500 level and the focused area/minor must be in a bachelor's degree program.

Discovery Program Requirements:

Students must satisfy the University's Discovery Program requirements. The following features are unique to students in the Mechanical Engineering Program:

As is the case across the University, all students are required to take an Inquiry course or an Inquiry Attributes course during their first two years. This can be satisfied with ME 441 Introduction to Engineering Design and Solid Modeling. Students who are exempt from ME 441 Introduction to Engineering Design and Solid Modeling due to prior engineering design and computer-aided design (CAD) experience must select an Inquiry 444 course or a course with an Inquiry Attribute and enroll in ME 477 Introduction to Solid Modeling. The Discovery Environment, Technology, and Society category requirement is met upon receiving a B.S. degree in mechanical engineering. The Discovery Social Science category must be satisfied with either ECON 402 Principles of Economics (Micro) or EREC 411 Environmental and Resource Economics Perspectives. The Discovery senior capstone experience is satisfied with either ME 755 Senior Design Project I and ME 756 Senior Design Project II or TECH 797 Undergraduate Ocean Research Project.

Grade-Point Average Requirements:

In order to graduate with a mechanical engineering B.S. degree, students must have at least a 2.0 grade-point average in all engineering and science courses, including required technical electives, normally taken as department requirements after the start of the junior year as defined in the degree plan below.

Predictor courses: To enter the sophomore year, students must achieve a greater than (but not equal to) 2.00 GPA in PHYS 407 General Physics I and MATH 426 Calculus II with no grade below a C.

To enter the junior year, students must achieve a minimum GPA of 2.00 in ME 525 Statics, ME 526 Mechanics of Materials, and ME 503 Thermodynamics with only one C- grade allowed and no grades below C-.

Students are allowed two repeats of these predictor courses to achieve the predictor rule requirements before being removed from the Program. This can be a single class repeated twice or two classes repeated once. Students are also removed from the program if they obtain a semester GPA below 1.5 three times. Students may petition to be reinstated after one year out of the program.

Transfer Policy for UNH Students into the Department of Mechanical Engineering:

CEPS Students: To transfer into the freshman or sophomore year, students must earn a combined GPA greater than (but not equal to) 2.00 in PHYS 407 General Physics I and MATH 426 Calculus II with no grade below a C in these two courses.

If students are enrolled in ME 525 Statics (or CEE 500 Statics for Civil Engineers), ME 526 Mechanics of Materials (or CEE 501 Strength of Materials), or ME 503 Thermodynamics, they must earn a combined GPA of 2.00 with no grade below a C- in two of these courses with only one C- grade allowed to transfer into Mechanical Engineering. Note: A combined GPA greater than (but not equal to) 2.00 in PHYS 407 General Physics I and MATH 426 Calculus II with no grade below a C is also required.

Non-CEPS Students: To transfer into the Department of Mechanical Engineering from another college at UNH, students have to satisfy the CEPS college transfer policy as well as the Department of Mechanical Engineering transfer policies listed above according to their status.

List of Required Courses:

Code	Title	Credits
CHEM 405 or CHEM 403 & CHEM 404	Chemical Principles for Engineers General Chemistry I and General Chemistry II	0-8
ECON 402 or EREC 411	Principles of Economics (Micro) Environmental and Resource Economics Perspectives	4
ECE 537	Introduction to Electrical Engineering	4
ENGL 401	First-Year Writing	4
IAM 550	Introduction to Engineering Computing	4
MATH 425	Calculus I	4
MATH 426	Calculus II	4
MATH 527 or MATH 525	Differential Equations with Linear Algebra Linearity I	4
MATH 528 or MATH 526	Multidimensional Calculus Linearity II	4
ME 441 or ME 477	Introduction to Engineering Design and Solid Modeling Introduction to Solid Modeling	4
ME 503	Thermodynamics	3
ME 525	Statics	4
ME 526	Mechanics of Materials	3
ME 561	Introduction to Materials Science	4
ME 603	Heat Transfer	3
ME 608	Fluid Dynamics	3
ME 627	Dynamics	3
ME 643	Machine Design	3
ME 646	Experimental Measurement and Data Analysis	4
ME 670	Systems Modeling, Simulation, and Control	4
ME 705	Thermal System Analysis and Design	4
ME 747	Experimental Measurement and Modeling of Complex Systems	4
ME 755 or TECH 797	Senior Design Project I Undergraduate Ocean Research Project	2
ME 756 or TECH 797	Senior Design Project II Undergraduate Ocean Research Project	2
PHYS 407	General Physics I	4
PHYS 408	General Physics II	4

Degree Plan

Course	Title	Credits
First Year		
Fall		
ME 441 or ME 477	Introduction to Engineering Design and Solid Modeling ¹ or Introduction to Solid Modeling	4
CHEM 405	Chemical Principles for Engineers ²	4
OR		
CHEM 403 & CHEM 404	General Chemistry I and General Chemistry II ²	
MATH 425	Calculus I ³	4
Discovery Program Elective		4
Credits		16
Spring		
ENGL 401	First-Year Writing ⁴	4
MATH 426	Calculus II	4
PHYS 407	General Physics I ²	4

Discovery Program Elective		4
Credits		16
Second Year		
Fall		
ME 525	Statics	4
IAM 550	Introduction to Engineering Computing	4
MATH 528 or MATH 525	Multidimensional Calculus ⁵ or Linearity I	4
PHYS 408	General Physics II	4
Discovery Program Elective		4
Credits		20
Spring		
ME 503	Thermodynamics	3
ME 526	Mechanics of Materials	3
ME 561	Introduction to Materials Science	4
MATH 527 or MATH 526	Differential Equations with Linear Algebra ⁵ or Linearity II	4
Credits		14
Third Year		
Fall		
ME 608	Fluid Dynamics	3
ME 627	Dynamics	3
ME 705	Thermal System Analysis and Design	4
ECE 537	Introduction to Electrical Engineering	4
Discovery Program Elective		4
Credits		18
Spring		
ME 603	Heat Transfer	3
ME 643	Machine Design	3
ME 646	Experimental Measurement and Data Analysis	4
ME 670	Systems Modeling, Simulation, and Control	4
Credits		14
Fourth Year		
Fall		
ME 755 or TECH 797	Senior Design Project I ⁶ or Undergraduate Ocean Research Project	2
ME 747	Experimental Measurement and Modeling of Complex Systems	4
Technical Elective		3-4
Technical Elective		3-4
Discovery Program Elective		4
Credits		16-18
Spring		
ME 756 or TECH 797	Senior Design Project II ⁶ or Undergraduate Ocean Research Project	2
Technical Elective		3-4
Technical Elective		3-4
Technical Elective		3-4

Discovery Program Elective	4
Credits	15-18
Total Credits	129-134

- ¹ ME 441 Introduction to Engineering Design and Solid Modeling satisfies the Discovery Inquiry requirement. Note: ME 477 does not satisfy the Discovery Inquiry requirement. An alternative Discovery Program Inquiry course or Inquiry Attributes course is required. Permission is required to take ME 477 in place of ME 441.
- ² CHEM 405 Chemical Principles for Engineers or CHEM 403 General Chemistry I and CHEM 404 General Chemistry II, or PHYS 407 General Physics I satisfies the Discovery Physical Science (with lab) category.
- ³ MATH 425 Calculus I satisfies the Discovery Foundation Quantitative Reasoning category.
- ⁴ ENGL 401 First-Year Writing satisfies the Discovery Foundation Writing Skills category.
- ⁵ MATH 525 Linearity I and MATH 526 Linearity II also counts as a 600 level technical elective course typically completed in the senior year of the program. Permission is required to take Linearity I and II.
- ⁶ ME 755, ME 756 and TECH 797 satisfy the Discovery Senior Capstone Experience category.

Student Learning Outcomes

- A. the ability to apply knowledge of mathematics, science and engineering; (objective 1)
- A.1 knowledge of chemistry and calculus-based physics with depth in at least one; (objective 1)
- A.2 the ability to apply advanced mathematics through multivariate calculus and differential equations; (objective 1)
- A.3 a familiarity with statistics and linear algebra; (objective 1)
- B. the ability to design and conduct experiments, as well as to analyze and interpret data; (objective 2)
- C. the ability to design a system, component, or process to meet desired needs; (objective 2)
- C.1 the ability to work professionally in mechanical systems areas including the design and realization of such systems; (objective 2)
- C.2 the ability to work professionally in thermal systems areas including the design and realization of such systems, (objective 2)
- D. the ability to function in multidisciplinary teams; (objective 2 & 3)
- E. the ability to identify, formulate and solve engineering problems; (objective 2)
- F. the understanding of professional and ethical responsibility; (objectives 4 & 6)
- G. the ability to communicate effectively; (objective 2)
- H. the broad education necessary to understand the impact of engineering solutions in a global and societal context; (objective 5)
- I. recognition of the need for and an ability to engage in life-long learning; (objective 4)
- J. knowledge of contemporary issues; (objective 4)
- K. the ability to use the techniques, skills and modern engineering tools necessary for engineering practice; (objective 2)