

DEPARTMENT OF MECHANICAL ENGINEERING

Undergraduate Study

The Department of Mechanical Engineering (MechE) offers three programs of undergraduate study. The first of these, the traditional program that leads to the bachelor's degree in mechanical engineering, is a more structured program that prepares students for a broad range of career choices in the field of mechanical engineering. The second program leads to a bachelor's degree in engineering and is intended for students whose career objectives require greater flexibility. It allows them to combine the essential elements of the traditional mechanical engineering program with study in another, complementary field. The third program, in mechanical and ocean engineering, is also a structured program for students interested in mechanical engineering as it applies to the engineering aspects of ocean science, exploration, and utilization, and of marine transportation.

All of the educational programs in the department prepare students for professional practice in an era of rapidly advancing technology. They combine a strong base in the engineering sciences (mechanics, materials, fluid and thermal sciences, systems and control) with project-based laboratory and design experiences. All strive to develop independence, creative talent, and leadership, as well as the capability for continuing professional growth.

Bachelor of Science in Mechanical Engineering (Course 2)

The program in mechanical engineering provides a broad intellectual foundation in the field of mechanical engineering. The program develops the relevant engineering fundamentals, includes various experiences in their application, and introduces the important methods and techniques of engineering practice.

The educational objectives of the program leading to the degree Bachelor of Science in Mechanical Engineering (<https://catalog.mit.edu/degree-charts/mechanical-engineering-course-2>) are that:

Within a few years of graduation, a majority of our graduates will have completed or be progressing through top graduate programs; advancing in leadership tracks in industry, non-profit organizations, or the public sector; or pursuing entrepreneurial ventures. In these roles they will: (1) apply a deep working knowledge or technical fundamentals in areas related to mechanical, electromechanical, and thermal systems to address needs of the customer and society; (2) develop innovative technologies and find solutions to engineering problems; (3) communicate effectively as members of multidisciplinary teams; (4) be sensitive to professional and societal contexts and committed to ethical action; (5) lead in the conception, design, and implementation of new products, processes, services, and systems.

Students are urged to contact the MechE Undergraduate Office as soon as they have decided to enter mechanical engineering so that a faculty advisor may be assigned. Students, together with their faculty advisors, plan a program that best utilizes the departmental electives and the 48 units of unrestricted electives available in the Course 2 degree program.

This program is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET) (<http://www.abet.org>) as a mechanical engineering degree.

Bachelor of Science in Engineering (Course 2-A)

Course 2-A is designed for students whose academic and career goals demand greater breadth and flexibility than are allowed under the mechanical engineering program, Course 2. To a large extent, the 2-A program allows students an opportunity to tailor a curriculum to their own needs, starting from a solid mechanical engineering base. The program combines a rigorous grounding in core mechanical engineering topics with an individualized course of study focused on a second area that the student designs with the help and approval of the 2-A faculty advisor. The program leads to the degree Bachelor of Science in Engineering.

This program is accredited by the Engineering Accreditation Commission of ABET as an engineering degree.

The educational objectives of the program leading to the degree of Bachelor of Science in Engineering (<https://catalog.mit.edu/degree-charts/mechanical-engineering-course-2-a>) are that:

Within a few years of graduation, a majority of our graduates will have completed or be progressing through top graduate programs; advancing in leadership tracks in industry, non-profit organizations, or the public sector; or pursuing entrepreneurial ventures. In these roles they will: (1) apply a deep working knowledge or technical fundamentals in areas related to mechanical, electromechanical, and thermal systems to address needs of the customer and society; (2) develop innovative technologies and find solutions to engineering problems; (3) communicate effectively as members of multidisciplinary teams; (4) be sensitive to professional and societal contexts and committed to ethical action; (5) lead in the conception, design, and implementation of new products, processes, services, and systems.

A significant part of the 2-A curriculum consists of electives chosen by the student to provide in-depth study of a field of the student's choosing. A wide variety of popular concentrations are possible in which well-selected academic subjects complement a foundation in mechanical engineering and general Institute requirements. Some examples of potential concentrations include robotics, engineering management, product development, biomedical engineering and pre-medicine, energy conversion engineering, sustainable development, architecture and building technology, and any of the seven departmental focus areas mentioned above. The MechE faculty

have developed specific recommendations in some of these areas; details are available from the MechE Undergraduate Office and on the departmental website.

Concentrations are not limited to those listed above. Students are encouraged to design and propose technically oriented concentrations that reflect their own needs and those of society.

The student's overall program must contain a total of at least one and one-half years of engineering content (150 units) appropriate to the student's field of study. The required core and second-level subjects include approximately 78 units of engineering topics. The self-designed concentration must include at least 72 more units of engineering topics. While engineering topics are usually covered through engineering subjects, subjects outside the School of Engineering may provide material essential to the engineering program of some concentrations. For example, management subjects usually form an essential part of an engineering management concentration. In all cases, the relationship of concentration subjects to the particular theme of the concentration must be obvious.

To pursue the 2-A degree, students must submit the online 2-A enrollment form no later than Add Date of their second term in the program.

Bachelor of Science in Mechanical and Ocean Engineering (Course 2-OE)

This program is intended for students who are interested in combining a firm foundation in mechanical engineering with a specialization in ocean engineering. The program includes engineering aspects of the ocean sciences, ocean exploration, and utilization of the oceans for transportation, defense, and extracting resources. Theory, experiment, and computation of ocean systems and flows are covered in a number of subjects, complementing a rigorous mechanical engineering program; a hands-on capstone design class allows students to master the design of advanced marine systems, including autonomous underwater vehicles and smart sensors.

This program is accredited by the Engineering Accreditation Commission of ABET in both mechanical engineering and ocean engineering.

The educational objectives of the program leading to the degree Bachelor of Science in Mechanical and Ocean Engineering (<https://catalog.mit.edu/degree-charts/mechanical-ocean-engineering-course-2-oe>) are that within a few years of graduation, a majority of our graduates will have completed or be progressing through top graduate programs; advancing in leadership tracks in industry, non-profit organizations, or the public sector; or pursuing entrepreneurial ventures. In these roles they will: (1) apply a deep working knowledge or technical fundamentals in areas related to mechanical, electromechanical, and thermal systems to address needs of the customer and society; (2) develop innovative technologies and find solutions to engineering problems; (3) communicate effectively as

members of multidisciplinary teams; (4) be sensitive to professional and societal contexts and committed to ethical action; (5) lead in the conception, design, and implementation of new products, processes, services, and systems.

Graduates have exciting opportunities in offshore industries, naval architecture, the oceanographic industry, the Navy or government, or for further study in graduate school.

Minor in Mechanical Engineering

Students pursuing a minor in the department must complete a total of six 12-unit subjects in the Mechanical Engineering Department program. At least three of the subjects must be selected from among the required subjects for the Course 2 and Course 2-OE degree programs, which are listed below. In addition, two subjects may be selected from restricted electives in those programs.

| | | |
|---|--|-----------|
| 18.03 | Differential Equations ¹ | 12 |
| Select three of the following: | | 36 |
| 2.001 | Mechanics and Materials I | |
| 2.002 | Mechanics and Materials II | |
| 2.003[[]] | Dynamics and Control I | |
| 2.004 | Dynamics and Control II | |
| 2.005 | Thermal-Fluids Engineering I | |
| 2.006 | Thermal-Fluids Engineering II | |
| 2.007 | Design and Manufacturing I | |
| 2.008 | Design and Manufacturing II | |
| 2.009 | The Product Engineering Process | |
| 2.017[[]] | Design of Electromechanical Robotic Systems | |
| 2.019 | Design of Ocean Systems | |
| 2.612 | Marine Power and Propulsion | |
| 2.086 | Numerical Computation for Mechanical Engineers | |
| 2.671 | Measurement and Instrumentation | |
| Select two additional subjects from the required subjects or restricted electives for either Course 2 or Course 2-OE ² | | 24 |
| Total Units | | 72 |

¹ 18.032 Differential Equations is also an acceptable option. Consult department for other alternatives.

² For information about restricted electives in these programs, please refer to the department's website (<http://meche.mit.edu/academic/undergraduate/mecheminor>).

Inquiries

Further information on undergraduate programs may be obtained from the MechE Undergraduate Office (me-undergradoffice@mit.edu), Room 1-110, 617-253-230.