MECHANICAL AND INDUSTRIAL ENGINEERING

THE FIELD
Mechanical engineers design, analyze, develop, and test engineering systems and their myriad components, ranging from power plants to jet aircraft to prosthetic limbs to offshore wind platforms. Industrial engineers design, analyze, and improve integrated systems of people, material, and equipment. Mechanical and industrial engineers often collaborate in manufacturing operations to ensure that a system of people and manufacturing equipment produces products from a supply of materials and other resources.

Logistics coordination, quality control, simulation, human factors, and economics are all part of industrial engineering. Often industrial engineers focus on enhancing the effectiveness of technological and logistics systems by gathering, structuring, and managing information. Industrial engineers apply their knowledge not only in industry, but also in government, health care, transportation, and many service industries.

Mechanical engineers are engaged in many facets of product and system realization ranging from concept design to production. Along with industrial engineers, they usually determine what gets made and how. Their task is to integrate aspects of mechanical engineering, including design, energy, materials, and controls to deliver cost-effective, high-quality products. Like industrial engineers, mechanical engineers work in a wide variety of industries and in many types of organizations. Both are employed not only as engineering professionals, but also as technical and corporate managers.

There is no minor available in either mechanical or industrial engineering.

THE MAJOR
The department offers undergraduate degree programs that lead to the bachelor of science (BS) in mechanical engineering or in industrial engineering. The educational objectives of the curricula are to develop engineers who can practice their mechanical and industrial engineering profession in business, organizational, societal, and ethical contexts.

ADMISSION TO THE MAJORS
Admission to either major is contingent upon completing the engineering first year with a cumulative GPA of 2.0 or higher and a C or better in the following: CHEM 111 or PHYSICS 152, MATH 131, MATH 132, PHYSICS 151, ENGLWRIT 112, ENGIN 100, 110, 111, 112, 113, or 114, and MIE 124 or COMPSCI 121. Students must also have a term GPA above 2.0 for the most recent term (fall or spring).

CURRICULUM
The first-year curricula in mechanical engineering and industrial engineering are identical, and the sophomore-year curricula are nearly identical. During the junior and senior years, students select required and elective courses relevant to their chosen majors. To achieve department educational objectives, the curricula include elements related to engineering fundamentals, engineering problem solving, professional responsibility, experimentation, communication, and design. Students in both degree programs are required to complete a senior exit survey.

For mechanical engineering majors, required courses include Thermodynamics I; Mechanical Engineering Laboratory I; Dynamics; Design of Mechanical Components; Fluid Mechanics I; Heat Transfer; Fundamentals of Electrical Engineering; Dynamic Systems Modeling, Analysis, and Simulation; Mechanical Engineering Lab I & II; Design of Mechanical Assemblies; and ME technical electives. Industrial engineering requirements include Engineering Economic Decision-Making, Introduction to Simulation Methods, Deterministic Operations Research, Stochastic Operations Research, Fundamentals of Electrical Engineering, Statistical Quality Control, Human Factors Engineering I, Production Planning and Control, Capstone Design, and electives. In addition, students must satisfy the College of Engineering core requirements and the UMass Amherst graduation requirements.
COOPERATIVE EXPERIENCE
Internships in an industrial, hospital, or academic setting provide significant advantages to students in their education and in the opportunities available to them upon graduation. Students are encouraged to discuss opportunities with the college's Career Center as well as with their academic advisor.

HONORS
UMass Amherst honors (Commonwealth Honors College) and departmental honors programs provide engineering students with the opportunity to participate in an honors experience on campus, including honors courses, seminars, undergraduate research projects, and a senior research thesis. Students interested in participating in departmental honors and Commonwealth Honors College should contact the honors coordinator in their respective College of Engineering department.

STUDY ABROAD
Engineering students are encouraged to study abroad. These can be semester or yearlong experiences taking General Education courses, engineering courses, and other technical electives to fulfill engineering degree requirements. Prior departmental approval is required for engineering and technical elective courses. For more information, contact the International Programs Office (413-545-2710, umass.edu/ipo).

CAREER OPPORTUNITIES
Mechanical and industrial engineering graduates exhibit the characteristics associated with professional engineering practice and understand how a mechanical or industrial engineer fits into an organization and how that organization fits into the global and societal context. They are able to design and conduct effective and efficient engineering experiments and interpret the results; to recognize, solve, and manage mechanical or industrial engineering problems; to communicate effectively at all appropriate organizational levels (e.g., technical, financial, shop floor, in teams); and to recognize and deal with change. Graduates of the programs understand the implications of product/process/life cycle decisions and the relationships between mechanical and industrial design and realization.

THE COLLEGE OF ENGINEERING
Modern society is faced with highly complex technological problems for which engineers are asked to provide solutions. These challenges make engineering a fascinating field of study and give prospective engineering students a wonderful opportunity to make a difference in society. Along with theoretical and practical knowledge, engineering students also gain experience by working in labs, collaborating with professors, joining research projects, participating in internships, working in the field, and completing a culminating senior project. In today's high-tech world, the engineering degree is a great foundation for careers in traditional engineering fields as well as careers in management, sales, government, medicine, research, law, teaching, and more.

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