

ELECTRICAL ENGINEERING GENERAL ELECTIVE REQUIREMENTS

Complete four 4-SH-equivalent, nonremedial, nonrepetitive courses from the following departments:

ACC, AFR, ARC, ART, ASL, BIO, CHE, CHM, CIN, CIV, CJ, CMN, CS, ECE, ECN, ED, ENG, ENT, ENV, FIN, GEO, HRM, HS, HST, IAF, INB, INT, IS, JRN, LIN, LNA, LNC, LNF, LNG, LNH, LNI, LNJ, LNL, LNM, LNR, LNS, MGT, MIM, MIS, MKT, MMS, MSC, MTH, MUS, PHL, PHY, POL, PSY, SCM, SOA, SOC, or THE.

GPA REQUIREMENT

2.000 GPA required in the major

GENERAL ELECTIVES

Additional courses taken beyond college and major course requirements to satisfy graduation credit requirements.

COOPERATIVE EDUCATION

UNIVERSITY-WIDE REQUIREMENTS

138 total semester hours required

Minimum 2.000 GPA required

MECHANICAL AND INDUSTRIAL ENGINEERING

www.coe.neu.edu/Depts/MIE

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Richard J. Murphy, PhD

The Department of Mechanical and Industrial Engineering offers two accredited programs leading to a Bachelor of Science in industrial engineering or a Bachelor of Science in mechanical engineering.

The overarching mission of the department is to organize the faculty, staff, curricula, facilities, and research programs to provide the highest-quality education for our students. At the undergraduate level, our goal is to provide rigorous, theoretically based but practice-oriented programs that effectively integrate classroom and laboratory instruction with the cooperative work experience. The educational objectives for both of our undergraduate degree programs are to: (1) educate students through a broad, theoretically based mechanical or industrial engineering curriculum; (2) support students in developing practical work skills involving current technology and technical tools, as well as an awareness of manufacturing, management and economic issues, and commonly accepted norms for professional conduct; (3) integrate academic learning with practice-oriented experience to promote professional development and career planning; (4) provide students with learning experiences that instill a passion for lifelong learning; (5) involve students in leadership and contributing roles in interactive team environments; (6) instruct students to be effective communicators with good interpersonal skills; and (7) integrate students' engineering course work with industrial, ethical, cultural, historical, and societal perspectives, leading to an appreciation of the broad educational objectives (as specified in the University's Academic Common Experience [ACE] goals).

Mechanical engineers will achieve the ability to work professionally in both thermal and mechanical systems areas, including the design and realization of such systems. Industrial engineers will demonstrate the ability to design, analyze, improve, and optimize integrated systems that include people, materials, information, equipment, and energy.

Industrial Engineering

Industrial engineering involves the design and analysis of systems that include people, equipment, and materials and their interactions and performance in the workplace. The industrial engineer collects this information and evaluates alternatives to make decisions that best advance the goals of the enterprise.

The program in industrial engineering offers students a base of traditional engineering courses such as production systems, work design, probability, statistics, and engineering economy, while emphasizing such contemporary areas as simulation, material handling, computer software, quality control, and operations research.

To gain the skills they need to make informed managerial and professional decisions, students take courses in management, economics, and technical subjects, as well as in the humanities and social sciences.

Industrial engineers work in manufacturing firms, hospitals, banks, public utilities, government agencies, insurance companies, and construction firms. Among the projects they undertake are design and implementation of a computer-integrated manufacturing system, design of a robotics system in a manufacturing environment, long-range corporate planning, development and implementation of a quality-control system, design of workstations to enhance worker safety and productivity, and development of computer systems for information control.

Co-op jobs generally increase in level of responsibility as students gain theoretical and technical knowledge through their academic work. A sophomore might begin as a computer analyst evaluating the performance of a manufacturing system and progress to designing manufacturing engineering workstations by the senior year. See pages 389–395 for course descriptions.

BSIE—Bachelor of Science in Industrial Engineering

ENGLISH REQUIREMENT

Complete the following course:

ENG U111 College Writing 4 SH
and one approved Advanced Writing in the Disciplines course for the major. A grade of C or higher is required in both courses.

ENGINEERING CATEGORICAL REQUIREMENT

Students must complete a minimum of semester hours in the categories of math/science and engineering topics. Completing all courses in the prescribed curriculum satisfies these requirements without any additional consideration. However, any student with transfer credit or course substitutions must meet with an academic adviser to plan appropriate course work to assure that these requirements are fully satisfied.

INDUSTRIAL ENGINEERING GENERAL EDUCATION

Mathematics and Science

CALCULUS 1 AND 2 FOR SCIENCE AND ENGINEERING

Complete the following two courses:

MTH U241 Calculus 1 for Science and Engineering 4 SH
MTH U242 Calculus 2 for Science and Engineering 4 SH

PHYSICS 1 AND 2

Complete the following two courses with corresponding labs:

PHY U151 Physics for Engineering 1 4 SH
with PHY U152 Lab for PHY U151 1 SH
or PHY U161 Physics 1 4 SH
with PHY U162 Lab for PHY U161 1 SH
PHY U155 Physics for Engineering 2 4 SH
with PHY U156 Lab for PHY U155 1 SH
or PHY U165 Physics 2 4 SH
with PHY U166 Lab for PHY U165 1 SH

CHEMISTRY

Complete the following course:

CHM U151 General Chemistry for Engineers 4 SH

DIFFERENTIAL EQUATIONS AND LINEAR ALGEBRA

Complete the following course:

MTH U343 Differential Equations and Linear Algebra 4 SH
for Engineering

CALCULUS 3 FOR SCIENCE AND ENGINEERING

Complete the following course:

MTH U341 Calculus 3 for Science and Engineering 4 SH

Arts and Humanities

Complete two courses from the “College of Engineering Arts and Humanities Requirements” on page 213.

INDUSTRIAL ENGINEERING MAJOR REQUIREMENTS

First-Year Engineering

Complete the following two courses:

GE U110 Engineering Design 4 SH
GE U111 Engineering Problem Solving 4 SH
and Computation

General Engineering

Complete the following three courses:

GE U100 Introduction to the Study of Engineering 1 SH
MIM U300 Introduction to Engineering Co-op 1 SH
Education
or GE U300 Introduction to Engineering Co-op 1 SH
Education
MIM U500 Professional Issues in Engineering 1 SH
or GE U500 Professional Issues in Engineering 1 SH

Industrial Engineering Fundamentals

Complete the following two courses:

MIM U310	Introduction to Industrial Engineering	4 SH
MIM U412	Engineering Probability and Statistics	4 SH

Information and Technology

Complete the following two courses:

MIM U420	Computers and Information Systems	4 SH
MIM U425	Engineering Database Systems	4 SH

Advanced Industrial Engineering

Complete the following eight courses with corresponding labs:

MIM U510	Digital Simulation Techniques	4 SH
MIM U512	Engineering Economy	4 SH
MIM U515	Operations Research	4 SH
MIM U516	Quality Assurance	4 SH
MIM U520	Stochastic Modeling	4 SH
MIM U522	Human Machine Systems	4 SH
with MIM U523	Lab for MIM U522	1 SH
MIM U525	Logistics and Supply Chain Management	4 SH
MIM U530	Manufacturing Systems and Techniques	4 SH
with MIM U531	Lab for MIM U530	1 SH

Engineering Science/Design Electives

Complete two science/design engineering courses. See adviser for an approved list.

Capstone

Complete the following two courses:

MIM U701	Capstone Design 1	1 SH
MIM U702	Capstone Design 2	5 SH

INDUSTRIAL ENGINEERING GENERAL ELECTIVE REQUIREMENTS

Complete four 4-SH-equivalent, nonremedial, nonrepetitive courses from the following departments:

ACC, AFR, ARC, ART, ASL, BIO, CHE, CHM, CIN, CIV, CJ, CMN, CS, ECE, ECN, ED, ENG, ENT, ENV, FIN, GEO, HRM, HS, HST, IAF, INB, INT, IS, JRN, LIN, LNA, LNC, LNF, LNG, LNH, LNI, LNJ, LNL, LNM, LNR, LNS, MGT, MIM, MIS, MKT, MMS, MSC, MTH, MUS, PHL, PHY, POL, PSY, SCM, SOA, SOC, or THE.

GPA REQUIREMENT

2.000 GPA required in the major

GENERAL ELECTIVES

Additional courses taken beyond college and major course requirements to satisfy graduation credit requirements.

COOPERATIVE EDUCATION**UNIVERSITY-WIDE REQUIREMENTS**

138 total semester hours required
Minimum 2.000 GPA required

Minor in Industrial Engineering**REQUIRED COURSES**

Complete the following three courses:

MIM U310	Introduction to Industrial Engineering	4 SH
MIM U412	Engineering Probability and Statistics	4 SH
or MIM U522	Human Machine Systems	4 SH
MIM U515	Operations Research	4 SH

TECHNICAL ELECTIVE

Complete one course from the following list:

MIM U412	Engineering Probability and Statistics	4 SH
MIM U420	Computers and Information Systems	4 SH
MIM U425	Engineering Database Systems	4 SH
MIM U510	Digital Simulation Techniques	4 SH
MIM U512	Engineering Economy	4 SH
MIM U516	Quality Assurance	4 SH
MIM U520	Stochastic Modeling	4 SH
MIM U522	Human Machine Systems	4 SH
MIM U525	Logistics and Supply Chain Management	4 SH
MIM U530	Manufacturing Systems and Techniques	4 SH

GPA REQUIREMENT

2.000 GPA required in the minor

Mechanical Engineering

Mechanical engineering involves the design, development, and manufacture of machinery and devices to transmit power or to convert energy from thermal to mechanical form in order to power the modern world and its machines. Its current practice has been heavily influenced by recent advances in computer hardware and software.

Mechanical engineers use computers to formulate preliminary and final designs of systems or devices, to perform calculations that predict the behavior of the design, and to collect and analyze performance data from system testing or operation.

Traditionally, mechanical engineers have designed and tested such devices as heating and air-conditioning systems, machine tools, internal-combustion engines, and steam power plants. Today they also play primary roles in the development of new technologies in a variety of fields—energy conversion, solar energy utilization, environmental control, prosthetics, transportation, manufacturing, and new-materials development.

The curriculum in mechanical engineering focuses on three areas: applied mechanics, thermofluids engineering, and materials science. Applied mechanics is the study of the motion and deformation of structural elements acted on by forces in devices that range from rotating industrial dynamos to dentists' drills. Thermofluids engineering deals with the motion of fluids and the transfer of energy, as in the cooling of electronic components or the design of gas turbine engines. Materials science is concerned with the relationship between the structure and properties of materials and with the control of structure, through processing, to achieve the desired properties. Practical applications are in the development of composite materials and in metallurgical process industries.

Courses in each area form the foundation for advanced analytical and creative design courses that culminate in a two-semester capstone design project. Faculty encourage students throughout the curriculum to use computer-aided design tools and high-performance computer workstations.

Cooperative education assignments increase in responsibility and technical challenge as students progress through the program. Initial positions may involve computer-intensive CAD/CAM assignments or programming tasks, while more advanced jobs will place students in charge of quality-control systems and performance testing of equipment. See pages 389–395 for course descriptions.

BSME—Bachelor of Science in Mechanical Engineering

ENGLISH REQUIREMENT

Complete the following course:

ENG U111	College Writing	4 SH
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and one approved Advanced Writing in the Disciplines course for the major. A grade of C or higher is required in both courses.

ENGINEERING CATEGORICAL REQUIREMENT

Students must complete a minimum of semester hours in the categories of math/science and engineering topics. Completing all courses in the prescribed curriculum satisfies these requirements without any additional consideration. However, any student with transfer credit or course substitutions must meet with an academic adviser to plan appropriate course work to assure that these requirements are fully satisfied.

MECHANICAL ENGINEERING GENERAL EDUCATION

Mathematics and Science

CALCULUS 1 AND 2 FOR SCIENCE AND ENGINEERING

Complete the following two courses:

MTH U241	Calculus 1 for Science and Engineering	4 SH
MTH U242	Calculus 2 for Science and Engineering	4 SH

PHYSICS 1 AND 2

Complete the following two courses with corresponding labs:

PHY U151	Physics for Engineering 1	4 SH
with PHY U152	Lab for PHY U151	1 SH
or PHY U161	Physics 1	4 SH
with PHY U162	Lab for PHY U161	1 SH
PHY U155	Physics for Engineering 2	4 SH
with PHY U156	Lab for PHY U155	1 SH
or PHY U165	Physics 2	4 SH
with PHY U166	Lab for PHY U165	1 SH

CHEMISTRY

Complete the following course:

CHM U151	General Chemistry for Engineers	4 SH
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DIFFERENTIAL EQUATIONS AND LINEAR ALGEBRA

Complete the following course:

MTH U343	Differential Equations and Linear Algebra for Engineering	4 SH
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CALCULUS 3 FOR SCIENCE AND ENGINEERING

Complete the following course:

MTH U341	Calculus 3 for Science and Engineering	4 SH
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Arts and Humanities

Complete two courses from the “College of Engineering Arts and Humanities Requirements” on page 213.

MECHANICAL ENGINEERING MAJOR REQUIREMENTS

First-Year Engineering

Complete the following two courses:

GE U110	Engineering Design	4 SH
GE U111	Engineering Problem Solving and Computation	4 SH

General Engineering

Complete the following three courses:

GE U100	Introduction to the Study of Engineering	1 SH
MIM U300	Introduction to Engineering Co-op Education	1 SH
or GE U300	Introduction to Engineering Co-op Education	1 SH
MIM U500	Professional Issues in Engineering	1 SH
or GE U500	Professional Issues in Engineering	1 SH

Electrical Engineering

Complete the following course with corresponding lab:

ECE U210	Electrical Engineering	4 SH
with ECE U211	Lab for ECE U210	1 SH

Mechanical Engineering Fundamentals

Complete the following five courses with corresponding labs:

MIM U315	Statistical and Economical Analyses in Engineering	4 SH
MIM U340	Introduction to Materials Science	4 SH
with MIM U341	Lab for MIM U340	1 SH
MIM U350	Engineering Mechanics and Design	4 SH
MIM U355	Mechanics of Materials	4 SH
with MIM U356	Lab for MIM U355	1 SH
MIM U380	Thermodynamics	4 SH

Advanced Mechanical Engineering

Complete the following seven courses with corresponding labs:

MIM U455	Dynamics and Vibrations	4 SH
with MIM U456	Lab for MIM U455	1 SH
MIM U475	Fluid Mechanics	4 SH
MIM U505	Measurement and Analysis with Thermal Science Application	4 SH
with MIM U506	Lab for MIM U505	1 SH
MIM U508	Mechanical Engineering Computation and Design	4 SH
MIM U550	Mechanical Engineering Design	4 SH
MIM U555	System Analysis and Control	4 SH
MIM U570	Thermal Systems Analysis and Design	4 SH

Information Technology

Complete one course from the following list:

MIM U420	Computers and Information Systems	4 SH
MIM U425	Engineering Database Systems	4 SH
MIM U430	Object-Oriented Engineering Applications	4 SH
MIM U660	Computer-Aided Design	4 SH

Capstone

Complete the following two courses:

MIM U701	Capstone Design 1	1 SH
MIM U702	Capstone Design 2	5 SH

MECHANICAL ENGINEERING GENERAL ELECTIVE REQUIREMENTS

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ACC, AFR, ARC, ART, ASL, BIO, CHE, CHM, CIN, CIV, CJ, CMN, CS, ECE, ECN, ED, ENG, ENT, ENV, FIN, GEO, HRM, HS, HST, IAF, INB, INT, IS, JRN, LIN, LNA, LNC, LNF, LNG, LNH, LNI, LNJ, LNL, LNM, LNR, LNS, MGT, MIM, MIS, MKT, MMS, MSC, MTH, MUS, PHL, PHY, POL, PSY, SCM, SOA, SOC, or THE.

GPA REQUIREMENT

2.000 GPA required in the major

GENERAL ELECTIVES

Additional courses taken beyond college and major course requirements to satisfy graduation credit requirements.

COOPERATIVE EDUCATION**UNIVERSITY-WIDE REQUIREMENTS**

140 total semester hours required

Minimum 2.000 GPA required