

College of Engineering

www.coe.neu.edu

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GENERAL ENGINEERING FACULTY

RESEARCH PROFESSOR

Christos Zahopoulos, PhD

ACADEMIC SPECIALIST

Khaled Bugarra, PhD

ASSOCIATE ACADEMIC SPECIALISTS

Susan Freeman, PhD

Beverly Jaeger, PhD

Bala Maheswaran, PhD

Richard Whalen, PhD

ASSISTANT ACADEMIC SPECIALIST

Donald Goldthwaite, MS

The mission of the College of Engineering is to provide a teaching, learning, and research environment that results in the highest-quality education for our students. Consistent with our goal of providing the highest-quality, practice-oriented program, the College of Engineering prepares students to contribute to the accumulation and application of technical knowledge. The college helps students master the fundamental mathematical and scientific principles underlying a particular branch of engineering; develop and demonstrate competence in analysis and design appropriate to an engineering specialization; reason clearly and communicate effectively; and recognize the need to continue professional development.

Through laboratory exercises, senior design projects, professional association activities, and cooperative work assignments, students put theory into practice and clarify their professional goals.

The college offers a Bachelor of Science degree with specializations in chemical, civil, computer, electrical, industrial, and mechanical engineering. The five-year Bachelor of Science degree program, which includes eighteen months of cooperative education work experience, is the standard and most popular program. Four-year programs with and without co-op experience are also available.

The college encourages students to study the arts, sciences, business, and other areas outside of engineering, for they provide an awareness of the social, economic, political, aesthetic, and philosophical influences that shape the world in which graduates will practice their professions. Students may complete a minor in areas such as business, computer science, biomedical engineering, math, or music. In many cases, the minor can be completed without course overloads.

In addition to a full array of University services, special advising and other support services (including tutoring) are provided. Students may qualify to participate in honors sections of many courses. Active student chapters of many national professional engineering organizations and honor societies are supported by the college as an enriching addition to academic studies and co-op experience.

The Bachelor of Science degree programs with specification in chemical, civil, electrical, industrial, and mechanical engineering are accredited by the Accreditation Commission of ABET (formerly, the Engineering Accreditation Board for Engineering and Technology).

Bachelor of Science/Master of Science Joint-Degree Program

The Departments of Electrical and Computer Engineering and Mechanical and Industrial Engineering offer programs leading to both the bachelor's and master's degrees in five years. All students begin with the common first-year engineering program. Upon successful completion, students may petition to enter the BS/MS Program. Degree candidates must maintain a 3.200 cumulative grade-point average, carry extra courses, and reduce the number of cooperative education semesters to complete the course requirements.

Academic Standards

The faculty of the College of Engineering has set the following minimum academic standards, which students must meet to continue their programs of study in good standing:

Academic Progression Standards

It is expected that full-time engineering students enroll in four courses with appropriate labs and successfully complete at least 12 semester hours each academic semester with an acceptable grade-point average as noted below. Part-time engineering students are expected to complete two courses per semester with appropriate labs. Any exceptions to the course load requirement must be approved by the student's academic adviser, in writing, prior to the start of each semester.

Grade-Point Average (GPA) Requirements for Graduation

A minimum cumulative GPA requirement of 2.000 in major (department) courses and a minimum cumulative GPA requirement of 2.000 overall is required for graduation.

Criteria for Academic Probation

Full-time students in the College of Engineering will be placed on academic probation effective for the following academic semester for any of the reasons noted below:

First-year Students:

- Not maintaining an overall cumulative GPA of at least 1.800 or not earning at least 24 semester hours at the end of the two semesters of the first-year curriculum, or
- Not earning at least 12 semester hours in the second academic semester.

Upperclass and Transfer Students:

- Not earning at least 12 semester hours in the semester just completed, or
- Not maintaining an overall cumulative GPA of at least 2.000 at the end of each academic semester, or
- Not maintaining a GPA of at least 2.000 in major at the end of the fourth academic semester of the curriculum and at the end of each academic semester thereafter, or
- Not maintaining satisfactory progress through the curriculum by:

- Accumulating three outstanding course deficiencies (grades of F, I, W, NE, U, * or missing grades), or
- Earning a current semester GPA of 1.600 or lower, or
- Not following a program of study approved by the student's academic adviser.

A notation of the academic probation action will appear on the internal record but not on the permanent transcript.

Criteria for Academic Dismissal

Students who remain on probation after two academic semesters may be dismissed from the University. Notation of this academic dismissal action will appear on the permanent transcript.

Graduation Requirements

The college reserves the right to amend programs, courses, and degree requirements to fulfill its educational responsibility to respond to relevant changes in the field.

Students must complete all of the requirements in the degree program in which they are candidates. Degree requirements are based upon the year of graduation, determined by the date of entry or reentry into the College of Engineering. Degree requirements and the year of graduation for a degree candidate who fails to make normal academic progress will be subject to review and possible change.

College of Engineering Arts, Humanities, and Social Sciences Electives

Each College of Engineering degree program references the following arts, humanities, and social sciences electives:

HISTORICAL PERSPECTIVE ELECTIVE

Complete any course from the HST department or any course from the following list:

AFR U312	Black History of Boston	4 SH
AFR U350	History of Blacks in the Media and the Press	4 SH
ASL U350	Deaf History and Culture	4 SH
ECN U293	European Economic History	4 SH
ECN U470	American Economic History	4 SH
INT U305	Maritime History of New England	4 SH

SOCIAL/CULTURAL PERSPECTIVE ELECTIVE

Complete any course from the AFR, ASL, LNA, LNC, LNE, LNF, LNG, LNH, LNI, LNJ, LNL, LNM, LNR, LNS, or SOA departments or any course from the following list:

ARC U223	American Architecture	4 SH
ART U310	Nineteenth-Century Art	4 SH
ART U320	American Art	4 SH
ECN U240	Economics of Crime	4 SH
ECN U270	Economic Status of Ethnic Minorities	4 SH
ENG U226	Backgrounds in English and American Literature	4 SH
ENG U409	The Modern Novel	4 SH
ENG U425	Literature and Law	4 SH
ENG U427	The Literature of Science	4 SH

ENG U454	History of English	4 SH	POL U425	U.S. Foreign Policy	4 SH
ENG U520	American Novels 2	4 SH	POL U435	Politics in Western Europe	4 SH
ENG U611	Shakespeare	4 SH	POL U440	Politics in Northern Ireland	4 SH
ENG U671	Multiethnic Literature of the U.S.	4 SH	POL U445	Politics in Central and Eastern Europe	4 SH
ENG U687	Modern Poetry	4 SH	POL U450	Government and Politics in Russia	4 SH
ENG U688	Contemporary Poetry	4 SH	POL U460	Government and Politics in Africa	4 SH
GEO U112	Environmental Geology	4 SH	POL U465	Government and Politics in the Middle East	4 SH
GEO U510	Environmental Planning	4 SH	POL U470	Arab-Israeli Conflict	4 SH
HRM U201	Organizational Behavior	4 SH	POL U475	Government and Politics in Latin America	4 SH
HST U110	Introduction to World History	4 SH	POL U480	Government and Politics in Japan	4 SH
HST U204	Third World Women	4 SH	POL U485	Government and Politics in China	4 SH
HST U242	Women in America	4 SH	POL U487	Politics of Developing Nations	4 SH
HST U261	The Modern Caribbean	4 SH	SOC U215	Society and Culture in Russia	4 SH
HST U270	Ancient Greece	4 SH	SOC U246	Environment and Sociology	4 SH
HST U272	The Invention of Europe	4 SH	SOC U280	Sociology of Work	4 SH
HST U286	History of the Soviet Union	4 SH	SOC U402	Feminist Perspectives on Society	4 SH
HST U290	Modern Middle East	4 SH	SOC U440	Sociology of Human Service Organizations	4 SH
HST U311	Colonialism/Imperialism	4 SH	SOC U485	Environment, Technology, and Society	4 SH
HST U322	Work and Leisure	4 SH	SOC U528	Computers and Society	4 SH
HST U330	Colonial and Revolutionary America	4 SH	THE U210	Theatre and Society	4 SH
HST U337	African-American History before 1900	4 SH			
HST U340	Cultural History of the U.S.	4 SH			
HST U342	Environmental History of North America	4 SH			
HST U344	U.S. Urban History	4 SH			
HST U370	Renaissance to Enlightenment	4 SH			
HST U376	The British Empire	4 SH			
HST U391	Modern African Civilization	4 SH			
HST U392	African Diaspora	4 SH			
HST U394	Islamic Nationalism	4 SH			
HST U432	Latin America in Boston	4 SH			
HST U475	The Culture of Europe	4 SH			
INT U240	War and Conflict in the Nuclear Age	4 SH			
INT U310	Water Resources Policy and Management	4 SH			
JRN U150	Interpreting the Day's News	4 SH			
MTH U201	History of Mathematics	4 SH			
MUS U103	Music as a Social Expression	4 SH			
MUS U121	Medieval and Renaissance Music	4 SH			
PHL U135	Philosophical Problems of Law and Justice	4 SH			
PHL U137	Philosophical Problems of War and Peace	4 SH			
PHL U145	Technology and Human Values	4 SH			
PHL U150	Understanding the Bible	4 SH			
PHL U160	Philosophical Problems of Economic Justice	4 SH			
PHL U165	Moral and Social Problems in Health Care	4 SH			
PHL U180	Environmental Ethics	4 SH			
PHL U265	Latin American Religions	4 SH			
PHL U275	Eastern Religions	4 SH			
PHL U280	Islam	4 SH			
PHL U325	Ancient Philosophy	4 SH			
PHL U330	Modern Philosophy	4 SH			
POL U307	Public Policy and Administration	4 SH			
POL U375	Gender and Politics	4 SH			
POL U380	Latino Politics in the United States	4 SH			
POL U390	Science, Technology, and Public Policy	4 SH			
POL U415	Ethnic Conflict in Comparative Politics	4 SH			
POL U420	War and Political Violence	4 SH			

SOCIAL SCIENCES/HUMANITIES ELECTIVE

Complete any course from the ARC, CJ, ECN, ENG, MUS, PHL, POL, PSY, SOC, or THE departments. *Note:* The following courses are not acceptable: CJ U382, ECN U350, ENG U101, ENG U110, ENG U111, ENG U112, ENG U302, POL U400, PSY U320, PSY U321, SOC U320, SOC U321.

INTERDISCIPLINARY MINOR

Materials Science and Engineering

The study of materials science and engineering has spurred breakthroughs in applications ranging from artificial limbs and organs, to space travel vehicles, to personal MP3 players. For example, the discovery of buckyballs and carbon nanotubes has led to the development of an unprecedented reduction in size of prototype electronic components and points the way to tomorrow's electronic technologies. Porous nanostructures of biocompatible materials are studied for targeted drug delivery within the body. The integration of polymers and semiconductors is used to create efficient, usable solar cells to reduce our dependence on fossil fuels. There are many more examples of both existing technologies and current research areas involving materials science and engineering that impact everyday life both today and in the future.

The minor in materials science and engineering is open to all students of the College of Engineering whose science and technical interests involve the design, processing, and optimization of engineering materials. Since the materials interests may vary across the engineering disciplines, the minor is composed of an interdisciplinary selection of courses that offer a high degree of flexibility to the student. The fundamental goals of the program are to offer the students a broad

interdisciplinary program that includes a basic background in the relevant aspects of materials science and the engineering applications of materials. The objectives are to serve the needs of the chemical, civil, electrical, and mechanical engineering departments in providing a vehicle to expose students to materials science and engineering. Particular focus areas include: electronic materials and processing for device applications; strength, wear, and corrosion-resistant coatings; molecular-level design of thin films and nanostructures; polymers and biomedical applications; and steels, concretes, and space-based structures.

Minor in Materials Science and Engineering

REQUIRED COURSES

Complete the following course:

MIM U340	Introduction to Material Science	4 SH
and complete one additional course with corresponding lab as indicated from the following list:		
CIV U260	Civil Engineering Materials	3 SH
with CIV U261	Materials and Measurements Lab	2 SH
ECE U392	Electronic Materials	4 SH

ELECTIVES AND CAPSTONE DESIGN

Complete two courses from the following disciplines and complete 4 semester hours of capstone design (or complete 4 semester hours of elective courses in place of the capstone design project):

Electrical and Computer Engineering

ECE U606	Integrated Circuit Fabrication	4 SH
ECE U608	Nanotechnology in Engineering	4 SH

Chemical Engineering

CHE U364	Biomaterials	4 SH
(pending approval)		
CHE U608	Nanotechnology in Engineering	4 SH
CHE U634	Nanomaterials: Thin Films and Structures	4 SH

Mechanical and Industrial Engineering

MIM U640	Mechanical Behavior and Processing of Materials	4 SH
MIM U645	Environmental Issues in Manufacturing and Product Use	4 SH

Chemistry and Chemical Biology

CHM U501	Inorganic Chemistry	4 SH
CHM U687	Principles of Solid State Chemistry	3 SH

Physics

PHY U614	Condensed Matter Physics	4 SH
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Capstone Design

CHE U703	Chemical Process Design 2	3 SH
with CHE U704	Lab for CHE U703	2 SH
CIV U769	Senior Design Project	5 SH
ECE U790	Electrical and Computer Engineering Capstone 1	4 SH
MIM U702	Capstone Design 2	5 SH

GPA REQUIREMENT

2.000 GPA required in the minor

CHEMICAL ENGINEERING

www.coe.neu.edu/Depts/CHE/chemical/chemeng.html

ALBERT SACCO JR., PhD

Acting Chair, George A. Snell Professor of Engineering, and College of Engineering Distinguished Professor

PROFESSORS

Gilda A. Barabino, PhD
Ronald J. Willey, PhD, PE

DIPIETRO ASSISTANT PROFESSORS

Carolyn W. T. Lee-Parsons, PhD
Katherine S. Ziemer, PhD

ASSISTANT PROFESSORS

Daniel D. Burkey, PhD
Rebecca L. Carrier, PhD
Shashi K. Murthy, PhD

LECTURER

Eric J. Thorgerson, PhD

ASSOCIATE PROFESSORS EMERITI

Ralph A. Buonopane, PhD
Bernard M. Goodwin, ScD
Richard R. Stewart, PhD

The chemical engineering program offers students a broad education built on fundamentals in science, mathematics, and engineering, which are then applied to a variety of contemporary problems using modern tools, such as computational software and computer-aided design. Chemical engineers have traditionally been employed in chemical, petrochemical, agricultural chemicals, pulp and paper, plastics, cosmetics, and textiles industries and in consulting and design firms. Today, chemical engineers also play an integral role in emerging biological and advanced material fields. For example, chemical engineers are creating new materials needed for space exploration, alternate energy sources, and faster, self-powered computer chips. In biotechnology and bioengineering, chemical engineers are working to understand human diseases, developing new therapies and drug delivery systems, and producing new medicines through cell culture systems. Chemical engineers are also using nanotechnology to revolutionize sensors, security systems, and medical diagnostics and treatments. In addition to creating important products, chemical engineers are also involved in protecting our environment by exploring ways to reduce acid rain and smog, to recycle and reduce wastes, to develop new sources of environmentally clean energy, and to design inherently safe, efficient, and "green" processes. The role of chemical engineers is to develop new products and to design the processes while reducing costs, increasing production, and improving the quality and safety of new products.

The faculty of the chemical engineering program is committed to providing a practice-oriented education through an academic environment that encourages active learning and that draws connections between co-op experiences and classroom theory. A professional component includes thorough ground-work in mathematics, physical sciences, and engineering science as well as real-world design and laboratory experiences. This component prepares students to apply rigorous chemical engineering principles to a variety of contemporary problems. A liberal arts component is included to provide students with the general education skills necessary to identify the impact of engineering decisions in a broad societal context. The cooperative education component provides an integrated educational experience that enables students to gain practical workplace knowledge, which is supported by an academic curriculum designed to integrate theoretical concepts and practical applications. This combination of academic and cooperative education opportunities enables students to gain more knowledge, with increasing challenges and responsibilities, while progressing toward fully professional careers in chemical engineering. As a result, the chemical engineering program also prepares students for graduate school, medical school, law school, or business school.

Through faculty expertise and scholarship, a rigorous set of academic courses, and real-world cooperative education experiences, the chemical engineering program enables students to identify and solve chemical engineering problems; understand, analyze, and design chemical processes; be proficient in the use of modern engineering tools; be proficient in oral and written communication of their work and ideas; become independent learners and workers; participate effectively in intradisciplinary and interdisciplinary groups; design and perform laboratory experiments to acquire data and evaluate theories; understand the environmental and safety impact of their work as chemical engineers; understand the global and societal impact of engineering problems and solutions; conduct themselves in accordance with the highest ethical and professional standards; and be prepared for lifelong learning and continuing education.

The chemical engineering curriculum shown below is periodically evaluated and revised to ensure that graduates of the program are given every opportunity for future success as professional chemical engineers and are prepared for graduate or professional school. See pages 294–296 for course descriptions.

BSCHE—Bachelor of Science in Chemical Engineering

MATHEMATICS/SCIENCE REQUIREMENT

Complete 49 semester hours in mathematics and science as indicated below.

Required Mathematics/Science

Complete each of the following courses:

CHM U151	General Chemistry for Engineers	4 SH
CHM U311	Organic Chemistry 1	4 SH
with CHM U312	Lab for CHM U311	1 SH

CHM U313	Organic Chemistry 2	4 SH
with CHM U314	Lab for CHM U313	1 SH
CHM U403	Physical Chemistry 2	4 SH
with CHM U404	Lab for CHM U403	1 SH
MTH U241	Calculus 1 for Science and Engineering	4 SH
MTH U242	Calculus 2 for Science and Engineering	4 SH
MTH U341	Calculus 3 for Science and Engineering	4 SH
MTH U343	Differential Equations and Linear Algebra for Engineering	4 SH
PHY U151	Physics for Engineering 1	4 SH
with PHY U152	Lab for PHY U151	1 SH
PHY U155	Physics for Engineering 2	4 SH
with PHY U156	Lab for PHY U155	1 SH

Advanced Chemistry Elective

Complete one advanced chemistry elective from the following list:

BIO U313	Plant Biology	4 SH
BIO U323	Biochemistry	4 SH
CHM U321	Analytical Chemistry	4 SH
CHM U331	Bioanalytical Chemistry	4 SH
CHM U501	Inorganic Chemistry	4 SH
GEO U310	Earth Materials	4 SH
GEO U410	Environmental Geochemistry	4 SH
GEO U582	Groundwater Geochemistry	4 SH
PSC U320	Biochemistry	4 SH
PSC U412	Pharmaceutics 2	4 SH
TOX U576	Experimental Toxicology	3 SH

Further Credit

1 semester hour from the following course counts toward the mathematics/science requirement:

GE U111	Engineering Problem Solving and Computation	4 SH
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ENGINEERING REQUIREMENT

Complete 53 semester hours in engineering as indicated below.

Required Engineering

Complete each of the following courses:

CHE U308	Chemical Engineering Calculations	4 SH
with CHE U309	Lab for CHE U308	1 SH
CHE U310	Transport Processes and Operations 1	4 SH
CHE U312	Transport Processes and Operations 2	4 SH
CHE U320	Chemical Engineering Thermodynamics 1	4 SH
CHE U322	Chemical Engineering Thermodynamics 2	4 SH
CHE U510	Chemical Engineering Kinetics	4 SH
CHE U512	Chemical Engineering Process Control	4 SH
CHE U520	Unit Operations and Separation Processes	3 SH
with CHE U521	Lab for CHE U520	2 SH
CHE U701	Chemical Process Design 1	4 SH
with CHE U702	Lab for CHE U701	1 SH
CHE U703	Chemical Process Design 2	3 SH
with CHE U704	Lab for CHE U703	2 SH

Chemical Engineering Elective

Complete 4 semester hours from the Chemical Engineering department.

Further Credit

3 semester hours from the following course count toward the engineering requirement:

GE U110	Engineering Design	4 SH
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2 semester hours from the following course count toward the engineering requirement:

GE U111	Engineering Problem Solving and Computation	4 SH
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RESTRICTED ELECTIVES

Complete 4 semester hours from the “Historical Perspective Elective” list in the “College of Engineering Arts, Humanities, and Social Sciences Electives” on page 228.

Complete 4 semester hours from the “Social/Cultural Perspective Elective” list in the “College of Engineering Arts, Humanities, and Social Sciences Electives” on page 228.

GENERAL ELECTIVES

Complete four 4-SH-equivalent academic, nonremedial, nonrepetitive courses.

OTHER REQUIRED COURSE WORK

Complete 13 semester hours as indicated below.

Writing

Complete the following two courses with a grade of C or higher in both courses:

ENG U111	College Writing	4 SH
ENG U302	Advanced Writing in the Technical Professions	4 SH

Professional Development

Complete the following three courses:

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

Further Credit

1 semester hour from each of the following courses counts toward other required course work:

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

RESIDENCY REQUIREMENT

32 of your final 40 semester hours must be taken at Northeastern University.

MAJOR GPA REQUIREMENT

2.000 minimum 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**

139 total semester hours required

Minimum 2.000 GPA required

Minor in Biochemical Engineering**REQUIRED BREADTH COURSES**

Complete the following five courses with corresponding labs as indicated:

MTH U141	Calculus 1	4 SH
or MTH U241	Calculus 1 for Science and Engineering	4 SH
MTH U142	Calculus 2	4 SH
or MTH U242	Calculus 2 for Science and Engineering	4 SH
MTH U343	Differential Equations and Linear Algebra for Engineering	4 SH
or MTH U345	Ordinary Differential Equations	4 SH
CHM U311	Organic Chemistry 1	4 SH
with CHM U312	Lab for CHM U311	1 SH
CHM U313	Organic Chemistry 2	4 SH
with CHM U314	Lab for CHM U313	1 SH

Chemical engineering majors should also complete the following three courses with corresponding labs as indicated:

BIO U111	General Biology 1	4 SH
with BIO U112	Lab for BIO U111	1 SH
BIO U301	Genetics and Molecular Biology	4 SH
with BIO U302	Lab for BIO U301	1 SH
BIO U323	Biochemistry	4 SH

REQUIRED CHEMICAL ENGINEERING COURSES

Complete the following four courses with corresponding labs as indicated:

CHE U308	Chemical Engineering Calculations	4 SH
with CHE U309	Lab for CHE U308	1 SH
CHE U310	Transport Processes and Operations 1	4 SH
CHE U312	Transport Processes and Operations 2	4 SH
CHE U630	Biochemical Engineering Fundamentals	4 SH

CAPSTONE

Complete the following course and corresponding lab:

CHE U703	Chemical Process Design 2	3 SH
with CHE U704	Lab for CHE U703	2 SH

GPA REQUIREMENT

2.000 GPA required in the minor

CIVIL AND ENVIRONMENTAL ENGINEERING

www.coe.neu.edu/Depts/civil

PETER G. FURTH, PhD

Professor and Chair

CAMP, DRESSER & MCKEE, INC. PROFESSOR OF ENGINEERING

Vladimir Novotny, PhD

COLLEGE OF ENGINEERING DISTINGUISHED PROFESSOR

Mishac K. Yegian, PhD

ASSOCIATE PROFESSORS

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Haris N. Koutsopoulos, PhD

Richard J. Scranton, SM

Thomas C. Sheahan, ScD

Ali Touran, PhD

Sara Wadia-Fascetti, PhD

Irvine W. Wei, PhD

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Luca Caracoglia, PhD

Ferdinand L. Hellweger, EngScD

Mehrdad Sasani-Kolori, PhD

PROFESSORS EMERITI

Paul H. King, PhD

Kenneth M. Leet, ScD

Civil engineers judiciously apply their knowledge of mathematics and physical sciences to improve and protect the environment and to provide facilities and structures for community living, industry, and transportation. Civil engineering encompasses several disciplines, including structural engineering, environmental engineering, transportation planning and engineering, and geotechnical engineering. Civil engineers supervise the construction of bridges, tunnels, buildings, dams, and aqueducts. They also plan, design, construct, and manage highways, railroads, canals, and airports; regulate rivers and control floods; and design and build systems for water distribution, wastewater treatment, waste disposal, and environmental remediation.

The civil engineering program has four educational objectives. The first is that our students gain an understanding of the natural and cultural world. Mathematics, physics, and chemistry are the foundation of civil engineering. Such a foundation enables students to properly understand and apply engineering principles, and makes the Northeastern education one that can keep pace with the advances in this dynamic field. Likewise, it is important for students to understand the historical and cultural context in which engineering takes place and to understand the social and environmental impacts of engineering projects.

The second objective is that our students become technically prepared for engineering practice. Students acquire a common base of knowledge in the engineering sciences, including mechanics and environmental science. In more advanced courses, students learn to analyze and design building frames and bridges, water and wastewater treatment systems, highways and traffic systems, hydraulic systems, earth dams, building foundations, and construction management systems. Our program is designed to give students proficiency in at least four areas of civil engineering.

The third program objective is that our students develop skills in critical thinking, communication, information literacy, and aesthetics. These subjects are integrated into courses throughout the program. Particular emphasis is placed on the importance of effective writing and public speaking.

The fourth program objective is that our students develop a personal and professional ethic—that is, an understanding of the profession, its ethical codes, history, contemporary issues, and the need for lifelong learning. Course work, cooperative education, and participation in the activities of the award-winning student chapter of the American Society of Civil Engineers help students meet this goal.

The civil engineering program provides students with a broad education appropriate for a variety of career choices and lifelong learning. Experience tells us that civil engineering graduates will enter almost every field imaginable. The knowledge and skills acquired—understanding science, critical thinking, effective communication, and understanding the social context, among them—form an excellent foundation for a host of careers, as well as for a fulfilling life outside the world of work. The civil engineering program has been designed with four general electives that permit students to explore or acquire further depth in other fields of interest. Students can use these electives to earn a minor in business, architectural history, music, computer science, or any number of other fields.

The co-op program parallels the academic program in level of responsibility and sophistication. A beginning job might involve layout at a construction site or laboratory testing; in senior-level co-op assignments, students are often working alongside engineers on design teams. See pages 304–307 for course descriptions.

BSCE—Bachelor of Science in Civil Engineering**MATHEMATICS/SCIENCE REQUIREMENT**

Complete 34 semester hours in mathematics and science as indicated below.

Required Mathematics/Science

Complete each of the following courses:

CHM U151	General Chemistry for Engineers	4 SH
MTH U241	Calculus 1 for Science and Engineering	4 SH
MTH U242	Calculus 2 for Science and Engineering	4 SH
MTH U341	Calculus 3 for Science and Engineering	4 SH
MTH U343	Differential Equations and Linear Algebra for Engineering	4 SH
PHY U151	Physics for Engineering 1	4 SH
with PHY U152	Lab for PHY U151	1 SH
PHY U155	Physics for Engineering 2	4 SH
with PHY U156	Lab for PHY U155	1 SH

Further Credit

3 semester hours from the following course count toward the mathematics/science requirement:

CIV U464	Probability and Engineering Economy for Civil Engineering	4 SH
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1 semester hour from the following course counts toward the mathematics/science requirement:

GE U111	Engineering Problem Solving and Computation	4 SH
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ENGINEERING REQUIREMENT

Complete 56 semester hours in engineering as indicated below.

Required Engineering

Complete each of the following courses:

CIV U221	Statics and Strength of Materials	4 SH
CIV U260	Civil Engineering Materials	3 SH
with CIV U261	Materials and Measurements Lab	2 SH
CIV U320	Structural Analysis 1	4 SH
CIV U324	Reinforced Concrete Design	4 SH
CIV U331	Fluid Mechanics	4 SH
CIV U334	Environmental Engineering 1	4 SH
CIV U340	Soil Mechanics	4 SH
CIV U341	Lab for CIV U340	1 SH
CIV U769	Senior Design Project	5 SH

Civil Engineering Project Elective

Complete 4 semester hours from the following list:

CIV U536	Hydrologic Engineering	4 SH
CIV U554	Highway Engineering	4 SH

Civil Engineering Technical Electives

Complete 11 semester hours from the following list:

CIV U425	Steel Design	4 SH
CIV U522	Structural Analysis 2	4 SH
CIV U534	Environmental Engineering 2	3 SH
CIV U536	Hydrologic Engineering	4 SH
CIV U542	Foundation Engineering	4 SH
CIV U545	Geoenvironmental Engineering	4 SH
CIV U553	Transport Analysis and Planning	4 SH
CIV U554	Highway Engineering	4 SH
CIV U556	Traffic Engineering	4 SH
CIV U575	Construction Management	3 SH

Further Credit

3 semester hours from the following course count toward the engineering requirement:

GE U110	Engineering Design	4 SH
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2 semester hours from the following course count toward the engineering requirement:

GE U111	Engineering Problem Solving and Computation	4 SH
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1 semester hour from the following course counts toward the engineering requirement:

CIV U464	Probability and Engineering Economy for Civil Engineering	4 SH
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RESTRICTED ELECTIVES

Complete 4 semester hours from the “Historical Perspective Elective” list in the “College of Engineering Arts, Humanities, and Social Sciences Electives” on page 228.

Complete 4 semester hours from the “Social/Cultural Perspective Elective” list in the “College of Engineering Arts, Humanities, and Social Sciences Electives” on page 228.

GENERAL ELECTIVES

Complete four 4-SH-equivalent academic, nonremedial, non-repetitive courses.

OTHER REQUIRED COURSE WORK

Complete 21 semester hours as indicated below.

Writing

Complete the following two courses with a grade of C or higher in both courses:

ENG U111	College Writing	4 SH
ENG U302	Advanced Writing in the Technical Professions	4 SH

Micro- or Macroeconomics

Complete one of the following courses:

ECN U115	Principles of Macroeconomics	4 SH
ECN U116	Principles of Microeconomics	4 SH

Mathematics/Science Elective

Complete 4 semester hours from one of the following departments: BIO, CHM, GEO, MIM, MTH, or PHY.

Professional Development

Complete the following three courses:

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

Further Credit

1 semester hour from each of the following courses counts toward other required course work:

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

RESIDENCY REQUIREMENT

32 of your final 40 semester hours must be taken at Northeastern University.

MAJOR GPA REQUIREMENT

2.000 minimum 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

135 total semester hours required
Minimum 2.000 GPA required