College of Engineering

www.coe.neu.edu

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GENERAL ENGINEERING FACULTY

RESEARCH PROFESSOR
Christos Zahopoulous, PhD

ACADEMIC SPECIALIST
Khaled Bugrara, PhD

ASSOCIATE ACADEMIC SPECIALISTS
Susan Freeman, PhD
Bala Maheswaran, PhD
Richard Whalen, PhD

ASSISTANT ACADEMIC SPECIALISTS
Donald Goldthwaite, MS
Beverly Jaeger, PhD

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 Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (EAC/ABET).

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 (GPA) 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.

Students transferring from another college or university must complete 32 of the last 40 semester hours at Northeastern University immediately preceding graduation to be eligible to receive the Bachelor of Science degree.

College of Engineering Arts and Humanities Requirements

Each College of Engineering degree program references the following arts and humanities requirements:

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, 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
ENG U520	American Novels 2	4 SH
ENG U611	Shakespeare	4 SH
ENG U671	Multiethnic Literature of the U.S.	4 SH
ENG U687	Modern Poetry	4 SH
ENG U688	Contemporary Poetry	4 SH
GEO U112	Environmental Geology	4 SH
GEO U510	Environmental Planning	4 SH
HRM U201	Organizational Behavior	4 SH
HST U110	Introduction to World History	4 SH
HST U204	Third World Women	4 SH
HST U242	Women in America	4 SH
HST U261	The Modern Caribbean	4 SH
HST U270	Ancient Greece	4 SH
HST U272	The Invention of Europe	4 SH
HST U286	History of the Soviet Union	4 SH
HST U290	Modern Middle East	4 SH
HST U311	Colonialism/Imperialism	4 SH
HST U322	Work and Leisure	4 SH
HST U330	Colonial and Revolutionary America	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 Problems in Medicine	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
POL U425	U.S. Foreign Policy	4 SH
POL U435	Politics in Western Europe	4 SH
POL U440	Politics in Northern Ireland	4 SH
POL U445	Politics in Central and Eastern Europe	4 SH
POL U450	Government and Politics in Russia	4 SH
POL U460	Government and Politics in Africa	4 SH
POL U465	Government and Politics in the Middle East	4 SH
POL U470	Arab-Israeli Conflict	4 SH
POL U475	Government and Politics in Latin America	4 SH
POL U480	Government and Politics in Japan	4 SH
POL U485	Government and Politics in China	4 SH
POL U487	Politics of Developing Nations	4 SH
SOC U215	Society and Culture in Russia	4 SH
SOC U246	Environment and Sociology	4 SH
SOC U280	Sociology of Work	4 SH
SOC U402	Feminist Perspectives on Society	4 SH
SOC U440	Sociology of Human Service Organizations	4 SH
SOC U485	Environment, Technology, and Society	4 SH
SOC U528	Computers and Society	4 SH
THE U210	Theatre and Society	4 SH

INTERDISCIPLINARY MINOR

Materials Science and Engineering

The study of materials science and engineering is a cornerstone of applied engineering. Breakthroughs in modern science and technology are nearly always spurred by the development of new materials having enhanced properties. For example, the discovery of buckeyballs and carbon nanotubes has led to the development of unprecedented reduction in size of prototype electronic components and points the way to tomorrow's electronic technologies. Another example, the development of giant magnetoresistive multilayered structures, took place in the early 1990s and directly led to the reduction in size and dramatic improvements in performance of today's computer hard drives. Of course, many more examples can be used to illustrate this cause-and-effect relationship.

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 of the students may vary across disciplines—for example, electronic, mechanical, civil, and chemical engineering—the minor will entail an interdisciplinary selection of courses and afford a high degree of flexibility to the student. The fundamental goals of this program will be 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 of the program are to serve the needs of the electrical and computer engineering, mechanical and industrial engineering, chemical engineering, and civil engineering departments in providing a vehicle to expose the students to materials science and engineering and, in particular, to 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 Materials Science	4 SH

and complete one other course with corresponding lab as indicated from the following list:

CHE U364	Nanomaterials (pending approval)	4 SH
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 capstone design):

Electrical and Computer Engineering		
ECE U606	Integrated Circuit Fabrication	4 SH
ECE U608	Nanotechnology (pending approval)	4 SH
Chemical Engineering		
CHE U364	Nanomaterials (pending approval)	4 SH
CHE U608	Nanotechnology (pending approval)	4 SH
CHE U619	Polymer Science	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
Capstone Design		
CHE U721	Projects 1	4 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

ERIC J. THORGERSON, PHD
Acting Chair and Visiting Professor

GEORGE A. SNELL PROFESSOR OF ENGINEERING
Albert Sacco Jr., PhD

PROFESSOR
Ronald J. Willey, PhD, PE

ASSOCIATE PROFESSOR
Gilda A. Barabino, PhD

DIPIETRO ASSISTANT PROFESSOR
Katherine S. Ziemer, PhD

ASSISTANT PROFESSORS
Daniel D. Burkey, PhD
Rebecca L. Carrier, PhD
Carolyn W. T. Lee-Parsons, PhD
Shashi K. Murthy, 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 groundwork 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 meets the following educational objectives: Students will be able to (1) identify and solve chemical engineering problems; (2) understand, analyze, and design chemical processes; (3) be proficient in the use of modern engineering tools; (4) be proficient in oral and written communication of their work and ideas; (5) become independent learners and workers; (6) participate effectively in intradisciplinary and interdisciplinary groups; (7) design and perform laboratory experiments to acquire data and evaluate theories; (8) understand the environmental and safety impact of their work as chemical engineers; (9) understand the global and societal impact of engineering problems and solutions; (10) conduct themselves in accordance with the highest ethical and professional standards; and (11) be prepared for lifelong learning and continuing education.

The chemical engineering curriculum shown below is designed to meet the above objectives and is periodically evaluated and revised to ensure that graduates of the program achieve these objectives. See pages 282–284 for course descriptions.

BSCHE—Bachelor of Science in Chemical 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.

CHEMICAL 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

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 four courses with corresponding labs and one advanced-level chemistry elective as approved by the department:

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

ELECTIVE

BIO U323	Biochemistry	4 SH
with BIO U324	Lab for BIO U323	1 SH
CHM U214	General Chemistry 2	4 SH
with CHM U215	Lab for CHM U214	1 SH
CHM U500 to CHM U999		
GEO U410	Environmental Geochemistry	4 SH

DIFFERENTIAL EQUATIONS AND LINEAR ALGEBRA

Complete the following course:

MTH U343	Differential Equations and Linear Algebra for Engineering	4 SH

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.

CHEMICAL 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:

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

Chemical Engineering Fundamentals

Complete the following course and corresponding lab:

CHE U308	Chemical Engineering Calculations	3 SH
with CHE U309	Lab for CHE U308	2 SH

Transport Processes and Operations

Complete the following two courses:

CHE U310	Transport Processes and Operations 1	4 SH
CHE U312	Transport Processes and Operations 2	4 SH

Thermodynamics

Complete the following two courses:

CHE U320	Chemical Engineering Thermodynamics 1	4 SH
CHE U322	Chemical Engineering Thermodynamics 2	4 SH

Process

Complete the following three courses and corresponding lab:

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

Chemical Process Design

Complete the following two courses and corresponding labs:

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 Technical Electives

Complete one course from the following list:

CHE U619	Polymer Science	4 SH
CHE U624	Chemical Process Safety	4 SH
CHE U630	Biochemical Engineering Fundamentals	4 SH
CHE U634	Nanomaterials: Thin Films and Structures	4 SH
CHE U699	Special Topics in Chemical Engineering	4 SH
CHE U721	Projects 1	4 SH
CHE U722	Projects 2	4 SH
CHE U970	Junior/Senior Project 1	4 SH
CHE U971	Junior/Senior Project 2	4 SH

CHEMICAL 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

139 total semester hours required

Minimum 2.000 GPA required

Minor in Biochemical Engineering

REQUIRED BREADTH COURSES

Complete the following five courses and corresponding labs as indicated:

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
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

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

CHE U308	Chemical Engineering Calculations	3 SH
with CHE U309	Lab for CHE U308	2 SH
CHE U310	Transport Processes and Operations 1	4 SH
CHE U312	Transport Processes and Operations 2	4 SH

Chemical engineering majors should also complete the following course:

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
Akram N. Alshawabkeh, PhD
Dionisio Bernal, PhD
Haris N. Koutsopoulos, PhD
Richard J. Scranton, SM
Thomas C. Sheahan, ScD
Ali Touran, PhD
Sara Wadia-Fascetti, PhD
Irvine W. Wei, PhD

ASSISTANT PROFESSORS
Luca Caracoglia, PhD
Ferdinand L. Hellweger, EngScD
Mehrdad Sasani-Kolori, PhD
James Y. Wang, 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. They supervise the construction of bridges, tunnels, buildings, dams, and aqueducts. Civil engineers also plan, design, construct, and manage highways, railroads, canals, and airports; regulate rivers and control floods; design and build systems for water distribution, wastewater treatment, refuse 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 impact 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 college's 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 292–295 for course descriptions.

BSCE—Bachelor of Science in Civil 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.

CIVIL 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 and 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 for Engineering	4 SH

CALCULUS 3 FOR SCIENCE AND ENGINEERING

Complete the following course:

MTH U341	Calculus 3 for Science and Engineering	4 SH

ECONOMICS

Complete one course from the following list:

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

MATH AND SCIENCE ELECTIVES

Complete one course from the following list with corresponding lab if applicable:

BIO U121	Basic Microbiology	4 SH
BIO U151	Introduction to Marine Biology	4 SH
CHM U311	Organic Chemistry 1	4 SH
with CHM U312	Lab for CHM U311	1 SH
CHM U321	Analytical Chemistry	4 SH
with CHM U322	Lab for CHM U321	1 SH
CHM U401	Physical Chemistry 1	4 SH
with CHM U402	Lab for CHM U401	1 SH
CHM U403	Physical Chemistry 2	4 SH
with CHM U404	Lab for CHM U403	1 SH
GEO U400	Field Geology	4 SH
GEO U410	Environmental Geochemistry	4 SH
GEO U418	Geophysics	4 SH
GEO U520	Applied Hydrogeology	4 SH
GEO U582	Groundwater Geochemistry	4 SH
MIM U380	Thermodynamics	4 SH
MIM U455	Dynamics and Vibrations	4 SH
MIM U515	Operations Research	4 SH
MIM U520	Stochastic Modeling	4 SH
MTH U481	Probability and Statistics	4 SH
MTH U530	Numerical Analysis	4 SH
MTH U532	Numerical Solutions of Differential Equations	4 SH
MTH U581	Statistics and Stochastic Processes	4 SH
PHY U611	Astrophysics and Cosmology	4 SH

Arts and Humanities

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

CIVIL 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:

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

Materials

Complete the following three courses:

CIV U221	Statics and Strength of Materials	4 SH
CIV U260	Civil Engineering Materials	3 SH
CIV U261	Materials and Measurements Lab	2 SH

Structural Analysis and Design

Complete the following two courses:

CIV U320	Structural Analysis 1	4 SH
CIV U324	Reinforced Concrete Design	4 SH

Fluid Mechanics

Complete the following course:

CIV U331	Fluid Mechanics	4 SH

Environmental Engineering and Soil Mechanics

Complete the following two courses and corresponding lab:

CIV U334	Environmental Engineering 1	4 SH
CIV U340	Soil Mechanics	4 SH
with CIV U341	Lab for CIV U340	1 SH

Probability and Engineering Economy

Complete the following course:

CIV U464	Probability and Engineering Economy for Civil Engineering	4 SH

Civil Engineering Technical Electives

Complete three courses from the following list with corresponding lab if applicable:

CIV U425	Steel Design	4 SH
CIV U522	Structural Analysis 2	4 SH
CIV U534	Environmental Engineering 2	3 SH
with CIV U535	Lab for CIV U534	1 SH
CIV U542	Foundation Engineering	4 SH
CIV U553	Transport Analysis and Planning	4 SH
CIV U556	Traffic Engineering	4 SH
CIV U575	Construction Management	3 SH

Civil Engineering Project Elective

Complete one course from the following list:

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

Capstone

Complete the following course:

CIV U769	Senior Design Project	5 SH

CIVIL 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

136 total semester hours required
Minimum 2.000 GPA required

ELECTRICAL AND COMPUTER ENGINEERING

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Stephen W. McKnight, PhD
Professor and Interim Chair

WILLIAM LINCOLN SMITH PROFESSOR OF ELECTRICAL AND COMPUTER ENGINEERING
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