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 materials fields, including nanotechnology. For example, chemical engineers are creating new materials needed for space exploration, alternative 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 techniques. Chemical engineers employ 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 educational objectives of the chemical engineering program are that all students will develop and apply: (1) a fundamental knowledge and understanding of the underlying science, mathematics, and engineering subjects needed to function effectively and efficiently in the many fields of chemical engineering practice; (2) an ability to identify problems, to identify, acquire, and critically analyze needed information and data, to draw appropriate conclusions, and to make decisions based on those conclusions; (3) interpersonal and communicative skills to function effectively in a diverse workplace and work confidently and effectively within intra- and interdisciplinary work groups; and (4) an ability to incorporate practice-based and information-based knowledge of contemporary societal issues and ethical and professional responsibilities as part of engineering solutions and business activities.

The faculty of the chemical engineering program is committed to providing a practice-oriented education through active learning and by drawing connections between classroom learning and co-op experiences. The educational curriculum provides fundamentals in mathematics, physical sciences, and engineering science as well as real-world design and laboratory experiences. Through the University’s general education requirements, students gain awareness of the impact of engineering decisions in a broader societal and ethical context. Cooperative education offers students the opportunity to integrate practical workplace knowledge with classroom learning so the educational experiences are synergistic and deepen the learning process. The chemical engineering community encourages professional development through active participation and leadership in student organizations, professional societies, and departmental activities. As a result, the chemical engineering program prepares successful students for industrial careers, graduate programs, or professional medical, law, and business schools.

Through faculty expertise and scholarship, a rigorous set of academic courses, and real-world cooperative education experiences, the chemical engineering program seeks to enable 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; understand professional behavior, culture, expectations, and contemporary issues; 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.

**BSCHE—Bachelor of Science in Chemical Engineering**

**MATHEMATICS/SCIENCE REQUIREMENT**

Complete 55 semester hours in mathematics and science as indicated below.

**Required Mathematics/Science**

Complete each of the following courses with corresponding labs, as indicated:

- BIOL 1111 General Biology 1 4 SH
- with BIOL 1112 Lab for BIOL 1111 1 SH
- CHEM 1151 General Chemistry for Engineers 4 SH
CHEM 2311 Organic Chemistry 1 4 SH
with CHEM 2312 Lab for CHEM 2311 1 SH
or CHEM 2315 Organic Chemistry 1 for Chemistry Majors 4 SH
with CHEM 2316 Lab for CHEM 2315 2 SH
CHEM 2313 Organic Chemistry 2 4 SH
with CHEM 2314 Lab for CHEM 2313 1 SH
or CHEM 2317 Organic Chemistry 2 for Chemistry Majors 4 SH
with CHEM 2318 Lab for CHEM 2317 2 SH
CHEM 3403 Physical Chemistry 2 4 SH
with CHEM 3404 Lab for CHEM 3403 1 SH
MATH 1341 Calculus 1 for Science and Engineering 4 SH
MATH 1342 Calculus 2 for Science and Engineering 4 SH
MATH 2321 Calculus 3 for Science and Engineering 4 SH
MATH 2341 Differential Equations and Linear Algebra for Engineering 4 SH
PHYS 1151 Physics for Engineering 1 4 SH
with PHYS 1152 Lab for PHYS 1151 1 SH
PHYS 1155 Physics for Engineering 2 4 SH
with PHYS 1156 Lab for PHYS 1155 1 SH

Advanced Chemistry Elective
Complete one advanced chemistry elective from the following list:
BIOL 2313 Plant Biology 4 SH
BIOL 2323 Biochemistry 4 SH
CHEM 2321 Analytical Chemistry 4 SH
CHEM 2331 Bioanalytical Chemistry 4 SH
CHEM 3421 Biophysical Chemistry 4 SH
CHEM 3501 Inorganic Chemistry 4 SH
CHEM 5637 Foundations of Spectroscopy 3 SH
ENVR 2310 Earth Materials 4 SH
ENVR 3410 Environmental Geochemistry 4 SH
ENVR 5282 Groundwater Geochemistry 4 SH
PHSC 2320 Biochemistry 4 SH
PHSC 3412 Pharmacetics 2 4 SH
TOXC 5576 Experimental Toxicology 3 SH

Further Credit
1 semester hour from the following course counts toward the mathematics/science requirement:
GE 1111 Engineering Problem Solving and Computation 4 SH

ENGINEERING REQUIREMENT
Complete 49 semester hours in engineering as indicated below.
Required Engineering
Complete each of the following courses with corresponding labs, as indicated:
CHME 2308 Conservation Principles in Chemical Engineering 4 SH
CHME 2310 Transport Processes 1 4 SH
with CHME 2311 Lab for CHME 2310 1 SH
CHME 2320 Chemical Engineering 4 SH
with CHME 3313 Lab for CHME 3312 1 SH
CHME 3322 Chemical Engineering Thermodynamics 2 4 SH
CHME 3330 Chemical Engineering Process Analysis 4 SH
with CHME 4702 Lab for CHME 4701 1 SH
CHME 4703 Chemical Process Design 2 3 SH
with CHME 4704 Lab for CHME 4703 2 SH

Further Credit
3 semester hours from the following course count toward the engineering requirement:
GE 1110 Engineering Design 4 SH
2 semester hours from the following course count toward the engineering requirement:
GE 1111 Engineering Problem Solving and Computation 4 SH

PROFESSIONAL DEVELOPMENT REQUIREMENT
Complete 5 semester hours in professional development as indicated below.
Professional Development
Complete the following three courses:
GE 1000 Introduction to the Study of Engineering 1 SH
CHME 2000 Introduction to Engineering Co-op Education 1 SH
CHME 3000 Professional Issues in Engineering 1 SH

Further Credit
1 semester hour from each of the following courses counts toward the professional development requirement:
GE 1110 Engineering Design 4 SH
GE 1111 Engineering Problem Solving and Computation 4 SH

ADDITIONAL NU CORE COURSES
Complete 16 semester hours in NU Core course work as indicated below.
Writing
Complete the following two courses with a grade of C or higher in each course:
ENGL 1111 College Writing 4 SH
ENGL 3302 Advanced Writing in the Technical Professions 4 SH

Arts/Humanities Level 1
Complete 4 semester hours from the NU Core arts/humanities level 1 domain, as described on page 26.
Social Science Level 1
Complete 4 semester hours from the NU Core social science level 1 domain, as described on page 26.

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

RESIDENCY REQUIREMENT
32 of the final 40 semester hours must be taken at Northeastern University.

MAJOR GPA REQUIREMENT
Minimum 2.000 required in all chemical engineering courses

NU CORE REQUIREMENTS
See page 26 for requirement list.

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

COOPERATIVE EDUCATION

UNIVERSITY-WIDE REQUIREMENTS
141 total semester hours required
Minimum 2.000 GPA required

BSCHE in Chemical Engineering and Physics
For degree requirements, please visit the myNEU Web Portal (www.myneu.neu.edu), click on the “Self-Service” tab, then on “My Degree Audit.”

Minor in Biochemical Engineering

REQUIREMENTS FOR NON–CHEMICAL ENGINEERING MAJORS
Students with majors other than chemical engineering should complete the requirements below.

Required Breadth Courses
Complete the following eight courses, with corresponding labs, as indicated:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>SH</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 1111</td>
<td>General Biology 1</td>
<td>4</td>
</tr>
<tr>
<td>with BIOL 1112</td>
<td>Lab for BIOL 1111</td>
<td>1</td>
</tr>
<tr>
<td>BIOL 2301</td>
<td>Genetics and Molecular Biology</td>
<td>4</td>
</tr>
<tr>
<td>with BIOL 2302</td>
<td>Lab for BIOL 2301</td>
<td>1</td>
</tr>
<tr>
<td>BIOL 2323</td>
<td>Biochemistry</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 2311</td>
<td>Organic Chemistry 1</td>
<td>4</td>
</tr>
<tr>
<td>with CHEM 2312</td>
<td>Lab for CHEM 2311</td>
<td>1</td>
</tr>
<tr>
<td>MATH 1241</td>
<td>Calculus 1</td>
<td>4</td>
</tr>
<tr>
<td>or MATH 1341</td>
<td>Calculus 1 for Science and Engineering</td>
<td>4</td>
</tr>
<tr>
<td>MATH 1242</td>
<td>Calculus 2</td>
<td>4</td>
</tr>
<tr>
<td>or MATH 1342</td>
<td>Calculus 2 for Science and Engineering</td>
<td>4</td>
</tr>
<tr>
<td>MATH 2341</td>
<td>Differential Equations and Linear Algebra for Engineering</td>
<td>4</td>
</tr>
<tr>
<td>or MATH 2351</td>
<td>Ordinary Differential Equations</td>
<td>4</td>
</tr>
</tbody>
</table>

Required Chemical Engineering Courses
Complete the following four courses:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>SH</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHME 2308</td>
<td>Conservation Principles in Chemical Engineering</td>
<td>4</td>
</tr>
<tr>
<td>CHME 2310</td>
<td>Transport Processes 1</td>
<td>4</td>
</tr>
<tr>
<td>CHME 3312</td>
<td>Transport Processes 2 and Separations</td>
<td>4</td>
</tr>
<tr>
<td>CHME 5630</td>
<td>Biochemical Engineering</td>
<td>4</td>
</tr>
</tbody>
</table>

Capstone
Complete the following course:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>SH</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHME 4703</td>
<td>Chemical Process Design 2</td>
<td>4</td>
</tr>
</tbody>
</table>

GPA REQUIREMENT
2.000 GPA required in the minor