The Department of Chemistry and Chemical Biology provides education in basic chemistry and modern chemistry-related disciplines. The department offers an American Chemical Society–certified program leading to a Bachelor of Science in Chemistry, and also offers a Bachelor of Science in Biochemistry jointly with the Department of Biology. The overall objective of the Bachelor of Science in Chemistry major program is to provide the fundamental scientific background and practical training for students as they prepare for chemically related careers or advanced study in fields including the traditional chemical specialties, as well as biochemistry, materials science, forensic science, medicine, education, law, and other endeavors that may draw upon an understanding of the chemical basis of the world around us.

Key general objectives are the development of qualitative and quantitative problem-solving skills and effective communication skills. Specific learning objectives for the chemistry major include to develop conceptual understanding and problem-solving abilities in the fundamental chemical subfields of analytical chemistry, biochemistry, inorganic chemistry, organic chemistry, and physical chemistry; gain a foundation of physics and mathematics and integrate these areas with chemical principles; perform quantitative measurements; synthesize and characterize compounds; learn proper laboratory practices including safety; develop proficiency with modern instruments and computers for data acquisition and analysis; and learn the relevance of chemistry to biology, pharmacology, medicine, manufactured and natural materials, and the environment.

Most of our chemistry majors participate in the cooperative education program and thereby gain invaluable professional experience to augment their classroom and laboratory work. Not only does that experience add immensely to the overall education received, it also has the potential to provide contacts and references for later employment or graduate school admissions. Chemistry majors also undertake a research project for at least one semester under the supervision of a faculty member. Sufficient electives are available in the program either to take more advanced courses or research within the department, or to add courses in an area of special interest, such as criminal justice in the case of an interest in forensic science. Qualified students may also participate in a five-year combined BS/MS program.

Transferring to the Major
A GPA of 2.500 is required in all chemistry, physics, and math courses taken. Acceptance into the major is based on students’ meeting the department’s criteria for admission and availability of space in the program.

Academic Progression Standards
Students who began as freshman chemistry majors must, after four semesters, have completed 64 semester hours and the following courses with grades of C or better:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 1217</td>
<td>General Chemistry 1 for Chemical Science Majors</td>
<td>4 SH</td>
</tr>
<tr>
<td>with CHEM 1218</td>
<td>Lab for CHEM 1217</td>
<td>2 SH</td>
</tr>
<tr>
<td>CHEM 1220</td>
<td>General Chemistry 2 for Chemical Science Majors</td>
<td>4 SH</td>
</tr>
<tr>
<td>with CHEM 1221</td>
<td>Lab for CHEM 1220</td>
<td>2 SH</td>
</tr>
<tr>
<td>CHEM 2315</td>
<td>Organic Chemistry 1 for Chemistry Majors</td>
<td>4 SH</td>
</tr>
<tr>
<td>with CHEM 2316</td>
<td>Lab for CHEM 2315</td>
<td>2 SH</td>
</tr>
<tr>
<td>CHEM 2317</td>
<td>Organic Chemistry 2 for Chemistry Majors</td>
<td>4 SH</td>
</tr>
<tr>
<td>with CHEM 2318</td>
<td>Lab for CHEM 2317</td>
<td>2 SH</td>
</tr>
<tr>
<td>CHEM 2331</td>
<td>Bioanalytical Chemistry</td>
<td>4 SH</td>
</tr>
<tr>
<td>with CHEM 2332</td>
<td>Lab for CHEM 2331</td>
<td>1 SH</td>
</tr>
</tbody>
</table>

Students who transferred into the major must, after two semesters in the major, have completed 64 semester hours and the following courses with grades of C or better:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 1211</td>
<td>General Chemistry 1</td>
<td>4 SH</td>
</tr>
<tr>
<td>with CHEM 1212</td>
<td>Lab for CHEM 1211</td>
<td>1 SH</td>
</tr>
<tr>
<td>CHEM 1214</td>
<td>General Chemistry 2</td>
<td>4 SH</td>
</tr>
<tr>
<td>with CHEM 1215</td>
<td>Lab for CHEM 1214</td>
<td>1 SH</td>
</tr>
</tbody>
</table>

or equivalent courses.

BS in Chemistry

NU CORE REQUIREMENTS
See page 26 for requirement list.

CHEMISTRY MAJOR TECHNICAL REQUIREMENTS

Mathematics
Complete the following two courses:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 1251</td>
<td>Calculus and Differential Equations for Biology 1</td>
<td>4 SH</td>
</tr>
<tr>
<td>or MATH 1341</td>
<td>Calculus 1 for Science and Engineering</td>
<td>4 SH</td>
</tr>
<tr>
<td>MATH 1252</td>
<td>Calculus and Differential Equations for Biology 2</td>
<td>4 SH</td>
</tr>
<tr>
<td>or MATH 1342</td>
<td>Calculus 2 for Science and Engineering</td>
<td>4 SH</td>
</tr>
</tbody>
</table>

Biochemistry
Complete the following course with corresponding lab:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 5621</td>
<td>Principles of Chemical Biology for Chemists</td>
<td>3 SH</td>
</tr>
<tr>
<td>with CHEM 5622</td>
<td>Lab for CHEM 5621</td>
<td>1 SH</td>
</tr>
</tbody>
</table>
Physics 1
Complete one of the following courses with corresponding lab:

- PHYS 1145 Physics for Life Sciences 1 4 SH
  with PHYS 1146 Lab for PHYS 1145 1 SH
- PHYS 1161 Physics 1 4 SH
  with PHYS 1162 Lab for PHYS 1161 1 SH

Physics 2
Complete one of the following courses with corresponding lab:

- PHYS 1147 Physics for Life Sciences 2 4 SH
  with PHYS 1148 Lab for PHYS 1147 1 SH
- PHYS 1165 Physics 2 4 SH
  with PHYS 1166 Lab for PHYS 1165 1 SH

CHEMISTRY MAJOR REQUIREMENTS

General Chemistry 1
Complete the following course with corresponding lab:

- CHEM 1217 General Chemistry 1 for Chemical Science Majors 4 SH
  with CHEM 1218 Lab for CHEM 1217 2 SH

General Chemistry 2
Complete the following course with corresponding lab:

- CHEM 1220 General Chemistry 2 for Chemical Science Majors 4 SH
  with CHEM 1221 Lab for CHEM 1220 2 SH

Intermediate-Level Chemistry—Organic Chemistry 1
Complete the following course with corresponding lab:

- CHEM 2315 Organic Chemistry 1 for Chemistry Majors 4 SH
  with CHEM 2316 Lab for CHEM 2315 2 SH

Intermediate-Level Chemistry—Organic Chemistry 2
Complete the following course with corresponding lab:

- CHEM 2317 Organic Chemistry 2 for Chemistry Majors 4 SH
  with CHEM 2318 Lab for CHEM 2317 2 SH

Intermediate-Level Chemistry 1
Complete the following two courses with corresponding labs:

- BIOANALYTICAL CHEMISTRY
  - CHEM 2331 Bioanalytical Chemistry 4 SH
    with CHEM 2332 Lab for CHEM 2331 1 SH
- PHYSICAL CHEMISTRY
  - CHEM 3401 Physical Chemistry 1 4 SH
    with CHEM 3402 Lab for CHEM 3401 1 SH

Intermediate-Level Chemistry 2
Complete one of the following courses with CHEM 3404 as corresponding lab:

- CHEM 3403 Physical Chemistry 2 4 SH
  or CHEM 3421 Biophysical Chemistry 4 SH
  or CHEM 5637 Foundations of Spectroscopy 3 SH
  with CHEM 3404 Lab for CHEM 3403 1 SH

Advanced-Level Chemistry
Complete the following four courses with corresponding labs:

- CHEM 3501 Inorganic Chemistry 4 SH
  or CHEM 5696 Organometallic Chemistry 3 SH
- CHEM 3521 Instrumental Methods of Analysis 1 SH
  with CHEM 3522 Instrumental Methods of Analysis Lab 4 SH
- CHEM 3531 Chemical Synthesis Characterization 1 SH
  with CHEM 3532 Chemical Synthesis Characterization Lab 4 SH
- CHEM 5628 Spectroscopy of Organic Compounds 3 SH
  with CHEM 4629 Identification of Organic Compounds 2 SH

Senior Research/Capstone
Complete the following course:

- CHEM 4750 Senior Research 4 SH

EXPERIENTIAL LEARNING
Complete one course in experiential education. Please see department for approved courses.

CHEMISTRY MAJOR CREDIT REQUIREMENT
Complete 85 semester hours in the major.

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

COOPERATIVE EDUCATION
If elected

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

BS/MS in Chemistry

NU CORE REQUIREMENTS
See page 26 for requirement list.

CHEMISTRY MAJOR TECHNICAL REQUIREMENTS

Mathematics
Complete the following two courses:

- MATH 1251 Calculus and Differential Equations for Biology 1 4 SH
  or MATH 1341 Calculus 1 for Science and Engineering 4 SH
- MATH 1252 Calculus and Differential Equations for Biology 2 4 SH
  or MATH 1342 Calculus 2 for Science and Engineering 4 SH

Biochemistry
Complete the following course with corresponding lab:

- CHEM 5621 Principles of Chemical Biology for Chemists 3 SH
  with CHEM 5622 Lab for CHEM 5621 1 SH
Physics 1
Complete one of the following courses with corresponding lab:

- PHYS 1145 Physics for Life Sciences 1 4 SH
  with PHYS 1146 Lab for PHYS 1145 1 SH
- PHYS 1161 Physics 1 4 SH
  with PHYS 1162 Lab for PHYS 1161 1 SH

Physics 2
Complete one of the following courses with corresponding lab:

- PHYS 1147 Physics for Life Sciences 2 4 SH
  with PHYS 1148 Lab for PHYS 1147 1 SH
- PHYS 1165 Physics 2 4 SH
  with PHYS 1166 Lab for PHYS 1165 1 SH

CHEMISTRY MAJOR REQUIREMENTS

General Chemistry 1
Complete the following course with corresponding lab:

- CHEM 1217 General Chemistry 1 for Chemical Science Majors 4 SH
  with CHEM 1218 Lab for CHEM 1217 2 SH

General Chemistry 2
Complete the following course with corresponding lab:

- CHEM 1220 General Chemistry 2 for Chemical Science Majors 4 SH
  with CHEM 1221 Lab for CHEM 1220 2 SH

Intermediate-Level Chemistry—Organic Chemistry 1
Complete the following course with corresponding lab:

- CHEM 2315 Organic Chemistry 1 for Chemistry Majors 4 SH
  with CHEM 2316 Lab for CHEM 2315 2 SH

Intermediate-Level Chemistry—Organic Chemistry 2
Complete the following course with corresponding lab:

- CHEM 2317 Organic Chemistry 2 for Chemistry Majors 4 SH
  with CHEM 2318 Lab for CHEM 2317 2 SH

Intermediate-Level Chemistry 1
Complete the following two courses with corresponding labs:

- BIOANALYTICAL CHEMISTRY
  CHEM 2331 Bioanalytical Chemistry 4 SH
  with CHEM 2332 Lab for CHEM 2331 1 SH
- PHYSICAL CHEMISTRY
  CHEM 3401 Physical Chemistry 1 4 SH
  with CHEM 3402 Lab for CHEM 3401 1 SH

Intermediate-Level Chemistry 2
Complete the following course with CHEM 3404:

- CHEM 3421 Biophysical Chemistry 4 SH
- CHEM 3404 Lab for CHEM 3403 1 SH

Advanced-Level Chemistry
Complete the following four courses with corresponding labs, where indicated:

- CHEM 3521 Instrumental Methods of Analysis 1 SH
  with CHEM 3522 Instrumental Methods of Analysis Lab 4 SH
- CHEM 3531 Chemical Synthesis Characterization 1 SH
  with CHEM 3532 Chemical Synthesis Characterization Lab 4 SH
- CHEM 5628 Spectroscopy of Organic Compounds 3 SH
- CHEM 5646 Synthesis and Reactivity of Inorganic Compounds 3 SH
  or CHEM 5696 Organometallic Chemistry 3 SH

Senior Research/Capstone
Complete the following course:

- CHEM 4750 Senior Research 4 SH

GRADUATE REQUIREMENTS
Graduate Seminars
Complete the following (repeatable) course two times:

- CHEM 8504 Graduate Seminar 1 SH

Graduate Electives
Complete six graduate electives from the following range:

- CHEM 5000 to CHEM 9999

Master’s Research and Thesis
Complete 10 semester hours of master’s thesis research:

- CHEM 8984 Research 1 to 4 SH

EXPERIENTIAL LEARNING
Complete one course in experiential education. Please see department for approved courses.

CHEMISTRY BS/MS MAJOR CREDIT REQUIREMENT
Complete 117 semester hours in the major.

GRADUATE GPA REQUIREMENT
Minimum 3.000 GPA required in all graduate courses

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

COOPERATIVE EDUCATION
If elected

UNIVERSITY-WIDE REQUIREMENTS
160 total semester hours required
Minimum 2.000 GPA required for undergraduate courses
Minimum 3.000 GPA required for graduate courses

BS in Environmental Geology and Chemistry
For degree requirements, please visit the myNEU Web Portal (www.myneu.neu.edu), click on the “Self-Service” tab, then on “My Degree Audit.”

BS in Geology and Chemistry
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 Chemistry

**REQUIRED COURSES**
Complete the following six courses with corresponding labs. Engineering students may take CHEM 1151 in place of CHEM 1211 and two other chemistry courses in place of CHEM 1214 and CHEM 3401:

**General Chemistry 1**
- CHEM 1211 General Chemistry 1 4 SH
- with CHEM 1212 Lab for CHEM 1211 1 SH

**General Chemistry 2**
- CHEM 1214 General Chemistry 2 4 SH
- with CHEM 1215 Lab for CHEM 1214 1 SH

**Organic Chemistry 1**
- CHEM 2311 Organic Chemistry 1 4 SH
- with CHEM 2312 Lab for CHEM 2311 1 SH

**Organic Chemistry 2**
- CHEM 2313 Organic Chemistry 2 4 SH
- with CHEM 2314 Lab for CHEM 2313 1 SH

**Physical Chemistry 1**
- CHEM 3401 Physical Chemistry 1 4 SH
- with CHEM 3402 Lab for CHEM 3401 1 SH

**Physical Chemistry 2**
*Note:* CHEM 3404 should be taken as corresponding lab with CHEM 3403, CHEM 3421, or CHEM 5637.
- CHEM 3403 Physical Chemistry 2 4 SH
- or CHEM 3421 Biophysical Chemistry 4 SH
- or CHEM 5637 Foundations of Spectroscopy 3 SH
- with CHEM 3404 Lab for CHEM 3403 1 SH

**GPA REQUIREMENT**
2.000 GPA required in the minor