CHEMISTRY AND CHEMICAL BIOLOGY

www.chem.neu.edu/web

GRAHAM B. JONES, PhD, DIC
Professor and Chair

Office: 121 Hurtig Hall
Phone: 617.373.4498
Fax: 617.373.8795
E-mail contact: Jordan Swift, Assistant Cooperative Education Coordinator, j.swift@neu.edu

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 will be 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:

CHM U217 General Chemistry 1 for Chemical Science Majors 4 SH
with CHM U218 Lab for CHM U217 2 SH
CHM U220 General Chemistry 2 for Chemical Science Majors 4 SH
with CHM U221 Lab for CHM U220 2 SH
CHM U315 Organic Chemistry 1 for Chemistry Majors 4 SH
with CHM U316 Lab for CHM U315 2 SH
CHM U317 Organic Chemistry 2 for Chemistry Majors 4 SH
with CHM U318 Lab for CHM U317 2 SH
CHM U321 Analytical Chemistry 4 SH
with CHM U322 Lab for CHM U321 1 SH

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:

CHM U211 General Chemistry 1 4 SH
with CHM U212 Lab for CHM U211 1 SH
CHM U214 General Chemistry 2 4 SH
with CHM U215 Lab for CHM U214 1 SH
or equivalent courses.

BS in Chemistry

NU CORE REQUIREMENTS
See page 42 for requirement list.

CHEMISTRY MAJOR TECHNICAL REQUIREMENTS

Mathematics
Complete the following two courses:
MTH U151 Calculus and Differential Equations for Biology 1 4 SH
or MTH U241 Calculus 1 for Science and Engineering 4 SH
MTH U152 Calculus and Differential Equations for Biology 2 4 SH
or MTH U242 Calculus 2 for Science and Engineering 4 SH
Biochemistry
Complete one of the following courses with corresponding lab:
BIO U323  Biochemistry 4 SH
with BIO U324  Lab for BIO U323 1 SH
CHM U621  Principles of Chemical Biology 3 SH
for Chemists
with CHM U622  Lab for CHM U621 1 SH

Physics
Complete the following two courses with corresponding labs:
PHY U145  Physics for Life Sciences 1 4 SH
with PHY U146  Lab for PHY U145 1 SH
or PHY U161  Physics 1 4 SH
with PHY U162  Lab for PHY U161 1 SH
PHY U147  Physics for Life Sciences 2 4 SH
with PHY U148  Lab for PHY U147 1 SH
or PHY U165  Physics 2 4 SH
with PHY U166  Lab for PHY U165 1 SH

CHEMISTRY MAJOR REQUIREMENTS
General Chemistry 1
Complete the following course with corresponding lab:
CHM U217  General Chemistry 1 for Chemical 4 SH
Science Majors
with CHM U218  Lab for CHM U217 2 SH

General Chemistry 2
Complete the following course with corresponding lab:
CHM U220  General Chemistry 2 for Chemical 4 SH
Science Majors
with CHM U221  Lab for CHM U220 2 SH

Intermediate-Level Chemistry—Organic Chemistry 1
Complete the following course with corresponding lab:
CHM U315  Organic Chemistry 1 4 SH
for Chemistry Majors
with CHM U316  Lab for CHM U315 2 SH

Intermediate-Level Chemistry—Organic Chemistry 2
Complete the following course with corresponding lab:
CHM U317  Organic Chemistry 2 4 SH
for Chemistry Majors
with CHM U318  Lab for CHM U317 2 SH

Intermediate-Level Chemistry 1
Complete the following two courses with corresponding labs:
BIOANALYTICAL CHEMISTRY
CHM U331  Bioanalytical Chemistry 4 SH
with CHM U332  Lab for CHM U331 1 SH

PHYSICAL CHEMISTRY
CHM U401  Physical Chemistry 1 4 SH
with CHM U402  Lab for CHM U401 1 SH

Advanced-Level Chemistry
Complete the following four courses with corresponding labs:
CHM U501  Inorganic Chemistry 4 SH
or CHM U696  Organometallic Chemistry 3 SH
CHM U521  Instrumental Methods of Analysis 1 SH
with CHM U522  Instrumental Methods of Analysis Lab 4 SH
CHM U531  Chemical Synthesis Characterization 1 SH
with CHM U532  Chemical Synthesis Characterization Lab 4 SH
CHM U628  Spectroscopy of Organic Compounds 3 SH
with CHM U629  Identification of Organic Compounds 2 SH

Senior Research/Capstone
Complete the following course:
CHM U750  Senior Research 4 SH

CHEMISTRY MAJOR CREDIT REQUIREMENT
Complete 85 semester hours for 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 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.”

BS/MS in Chemistry

NU CORE REQUIREMENTS
See page 42 for requirement list.

CHEMISTRY MAJOR TECHNICAL REQUIREMENTS
Mathematics
Complete the following two courses:
MTH U151  Calculus and Differential Equations 4 SH
for Biology 1
or MTH U241  Calculus 1 for Science 4 SH
and Engineering
MTH U152  Calculus and Differential Equations 4 SH
for Biology 2
or MTH U242  Calculus 2 for Science 4 SH
and Engineering
Biochemistry
Complete one of the following courses with corresponding lab:
- BIO U323 Biochemistry 4 SH
  with BIO U324 Lab for BIO U323 1 SH
- CHM U621 Principles of Chemical Biology for Chemists 3 SH
  with CHM U622 Lab for CHM U621 1 SH

Physics
Complete the following two courses with corresponding labs:
- PHY U145 Physics for Life Sciences 1 4 SH
  with PHY U146 Lab for PHY U145 1 SH
  or PHY U161 Physics 1 4 SH
  with PHY U162 Lab for PHY U161 1 SH
- PHY U147 Physics for Life Sciences 2 4 SH
  with PHY U148 Lab for PHY U147 1 SH
  or PHY U165 Physics 2 4 SH
  with PHY U166 Lab for PHY U165 1 SH

CHEMISTRY MAJOR REQUIREMENTS

General Chemistry 1
Complete the following course with corresponding lab:
- CHM U217 General Chemistry 1 for Chemical Science Majors 4 SH
  with CHM U218 Lab for CHM U217 2 SH

General Chemistry 2
Complete the following course with corresponding lab:
- CHM U220 General Chemistry 2 for Chemical Science Majors 4 SH
  with CHM U221 Lab for CHM U220 2 SH

Intermediate-Level Chemistry—Organic Chemistry 1
Complete the following course with corresponding lab:
- CHM U315 Organic Chemistry 1 for Chemistry Majors 4 SH
  with CHM U316 Lab for CHM U315 2 SH

Intermediate-Level Chemistry—Organic Chemistry 2
Complete the following course with corresponding lab:
- CHM U317 Organic Chemistry 2 for Chemistry Majors 4 SH
  with CHM U318 Lab for CHM U317 2 SH

Intermediate-Level Chemistry 1
Complete the following two courses with corresponding labs:
- BIOANALYTICAL CHEMISTRY
  CHM U331 Bioanalytical Chemistry 4 SH
  with CHM U332 Lab for CHM U331 1 SH
- PHYSICAL CHEMISTRY
  CHM U401 Physical Chemistry 1 4 SH
  with CHM U402 Lab for CHM U401 1 SH

Intermediate-Level Chemistry 2
Complete the following course with corresponding lab:
- CHM U421 Biophysical Chemistry 4 SH
  with CHM U404 Lab for CHM U403 1 SH

Advanced-Level Chemistry
Complete the following four courses with corresponding labs, where indicated:
- CHM G246 Synthesis and Reactivity of Inorganic Compounds 3 SH
- or CHM G346 Organometallic Chemistry 3 SH
- CHM U521 Instrumental Methods of Analysis 1 SH
  with CHM U522 Instrumental Methods of Analysis Lab 4 SH
- CHM U531 Chemical Synthesis Characterization 1 SH
  with CHM U532 Chemical Synthesis Characterization Lab 4 SH
- CHM G268 Spectroscopy of Organic Compounds 3 SH

Senior Research/Capstone
Complete the following course:
- CHM U750 Senior Research 4 SH

GRADUATE REQUIREMENTS

Graduate Seminars
Complete the following (repeatable) course three times:
- CHM G504 Graduate Seminar 1 SH

Graduate Electives
Complete five graduate electives.

Master’s Research and Thesis
Complete 10 semester hours of master’s thesis research:
- CHM G661 Master’s Research 1 SH
- CHM G662 Master’s Research 2 SH
- CHM G663 Master’s Research 3 SH
- CHM G664 Master’s Research 4 SH
- CHM G665 Master’s Research 5 SH
- CHM G666 Master’s Research 6 SH

CHEMISTRY BS/MS MAJOR CREDIT REQUIREMENT
Complete 113 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
160 total semester hours required
Minimum 2.000 GPA required for undergraduate courses
Minimum 3.000 GPA required for graduate courses

Minor in Chemistry

REQUIRED COURSES
Complete the following six courses with corresponding labs.
Engineering students may take CHM U151 in place of CHM U211 and two other chemistry courses in place of CHM U214 and CHM U401:

General Chemistry 1
- CHM U211 General Chemistry 1 4 SH
  with CHM U212 Lab for CHM U211 1 SH
### General Chemistry 2
- CHM U214 General Chemistry 2 4 SH
- with CHM U215 Lab for CHM U214 1 SH

### Organic Chemistry 1
- CHM U311 Organic Chemistry 1 4 SH
- with CHM U312 Lab for CHM U311 1 SH

### Organic Chemistry 2
- CHM U313 Organic Chemistry 2 4 SH
- with CHM U314 Lab for CHM U313 1 SH

### Physical Chemistry 1
- CHM U401 Physical Chemistry 1 4 SH
- with CHM U402 Lab for CHM U401 1 SH

### Physical Chemistry 2
- CHM U403 Physical Chemistry 2 4 SH
- with CHM U404 Lab for CHM U403 1 SH
- or CHM U637 Foundations of Spectroscopy 3 SH
- or CHM U421 Biophysical Chemistry 4 SH

### GPA REQUIREMENT
2.000 GPA required in the minor