

BIOLOGY**www.biology.neu.edu**

SUSAN POWERS-LEE, PhD
Professor and Chair

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By majoring in biology, students develop a basic understanding of the organization and the processes of life, from molecules and cells through organs and organ systems to populations, species, ecosystems, and evolution. The major offers the mathematical, chemical, and physical background

necessary for understanding biology and the practical scientific skills associated with each of these areas. It allows students to begin to specialize in a subdiscipline of biology such as animal physiology, cell biology, ecology, marine biology, microbiology, molecular biology, plant biology, zoology, and so forth.

Numerous opportunities for relevant positions are available through Northeastern's program of cooperative education. A marine biology concentration, designed to provide biology majors with a strong foundation in marine biology and related disciplines, is now offered through the Northeastern University Marine Science Center in Nahant.

The undergraduate biology major prepares students for careers in the life sciences, including medical, dental, and other health-related fields. Students may find employment in federal, state, industrial, hospital, or university laboratories or in industries involved in the manufacture and distribution of pharmaceuticals, biological products, food, or scientific equipment. Biologists also work in fisheries, forestry services, county and state agencies, museums, aquariums, research vessels, and marine stations. Graduate study culminating in a master's or doctoral degree can lead to careers in upper-level teaching or research in any of the life sciences.

Premedical, pre dental, and other preprofessional students are urged to consult with the preprofessional advisory committee early in their careers at Northeastern.

To graduate with a major in biology, a student must have a cumulative GPA of 2.000 for all science and mathematics courses required for the major.

BS in Biology**COLLEGE OF ARTS AND SCIENCES BS CORE
REQUIREMENTS FOR NATURAL SCIENCE MAJORS**

See page 48 for requirement list.

BREADTH COURSES FOR BIOLOGY**Mathematics**

Complete the following two courses:

MTH U151	Calculus and Differential Equations for Biology 1	4 SH
MTH U152	Calculus and Differential Equations for Biology 2	4 SH

Chemistry

Complete the following four courses with corresponding labs:

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
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

Physics

Complete two courses from the following list with corresponding labs (PHY U145 and PHY U147 are recommended):

PHY U145	Physics for Life Sciences 1	4 SH
with PHY U146	Lab for PHY U145	1 SH
or 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 U147	Physics for Life Sciences 2	4 SH
with PHY U148	Lab for PHY U147	1 SH
or 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

Intermediate or Advanced Science

Complete one intermediate or advanced science course from the following list:

BIO U311 to BIO U699		
CHM U321	Analytical Chemistry	4 SH
with CHM U322	Lab for CHM U321	1 SH
CHM U331 to CHM U699		
GEO U300 to GEO U699		
MTH U280 to MTH U699		
PHY U303 to PHY U699		
PSY U202	Biological Basis of Mental Illness	4 SH
PSY U458	Psychobiology	4 SH
PSY U510	Psychopharmacology	4 SH

BIOLOGY MAJOR REQUIREMENTS**Required Biology**

Complete the following three courses with corresponding labs:

BIO U101	Principles of Biology 1	4 SH
with BIO U102	Lab for BIO U101	1 SH
or BIO U111	General Biology 1	4 SH
with BIO U112	Lab for BIO U111	1 SH
BIO U103	Principles of Biology 2	4 SH
with BIO U104	Lab for BIO U103	1 SH
or BIO U113	General Biology 2	4 SH
with BIO U114	Lab for BIO U113	1 SH
BIO U301	Genetics and Molecular Biology	4 SH
with BIO U302	Lab for BIO U301	1 SH

Experiential Education Introduction

Complete the following course:

BIO U106	Introduction to Experiential Education	1 SH
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BIOLOGY MAJOR ELECTIVES**Cellular and Molecular Biology**

Complete one course with corresponding lab from the following list:

BIO U319	Regulatory Cell Biology	4 SH
with BIO U320	Lab for BIO U319	1 SH
or BIO U321	Microbiology	4 SH
with BIO U322	Lab for BIO U321	1 SH
or BIO U323	Biochemistry	4 SH
with BIO U324	Lab for BIO U323	1 SH

Organismal and Population Biology

Complete one course with corresponding lab from the following list:

BIO U311	Ecology	4 SH
with BIO U312	Lab for BIO U311	1 SH
or BIO U313	Plant Biology	4 SH
with BIO U314	Lab for BIO U313	1 SH
or BIO U315	Invertebrate Zoology	4 SH
with BIO U316	Lab for BIO U315	1 SH
or BIO U317	Vertebrate Zoology	4 SH
with BIO U318	Lab for BIO U317	1 SH

Intermediate and Advanced Biology

Complete three biology courses (at least 13 semester hours) from the following list:

BIO U311 to BIO U699

Experiential Education

An activity related to biology and approved by the experiential education adviser must be completed before the capstone.

Among the possibilities are co-op experience, junior/senior honors thesis, research project in a faculty lab, study abroad with submission of a paper, 120 hours of supervised volunteer work in a biology-related area, participation in the East-West Marine Biology Program with submission of a project, paper, or other approved experiences.

Biology Capstone

Complete the following course:

BIO U701	Biology Capstone	4 SH
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BIOLOGY MAJOR CREDIT/GPA REQUIREMENTS

Complete 85 semester hours in the major with a cumulative GPA of 2.000.

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 Biology with Concentration in Marine Biology**COLLEGE OF ARTS AND SCIENCES BS CORE REQUIREMENTS FOR NATURAL SCIENCE MAJORS**

See page 48 for requirement list.

BREADTH COURSES FOR BIOLOGY**Mathematics**

Complete the following two courses:

MTH U151	Calculus and Differential Equations for Biology 1	4 SH
MTH U152	Calculus and Differential Equations for Biology 2	4 SH

Chemistry

Complete the following four courses with corresponding labs:

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
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

Physics

Complete two courses from the following list with corresponding labs (PHY U145 and PHY U147 are recommended):

PHY U145	Physics for Life Sciences 1	4 SH
with PHY U146	Lab for PHY U145	1 SH
or 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 U147	Physics for Life Sciences 2	4 SH
with PHY U148	Lab for PHY U147	1 SH
or 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

Intermediate or Advanced Science

Complete one intermediate or advanced science course from the following list:

BIO U311 to BIO U699		
CHM U321	Analytical Chemistry	4 SH
with CHM U322	Lab for CHM U321	1 SH
CHM U331 to CHM U699		
GEO U300 to GEO U699		
MTH U280 to MTH U699		
PHY U303 to PHY U699		
PSY U202	Biological Basis of Mental Illness	4 SH
PSY U458	Psychobiology	4 SH
PSY U510	Psychopharmacology	4 SH

REQUIREMENTS FOR BIOLOGY MAJOR WITH MARINE BIOLOGY CONCENTRATION**Required Biology**

Complete the following three courses with corresponding labs:

BIO U101	Principles of Biology 1	4 SH
with BIO U102	Lab for BIO U101	1 SH
or BIO U111	General Biology 1	4 SH
with BIO U112	Lab for BIO U111	1 SH
BIO U103	Principles of Biology 2	4 SH
with BIO U104	Lab for BIO U103	1 SH
or BIO U113	General Biology 2	4 SH
with BIO U114	Lab for BIO U113	1 SH
BIO U301	Genetics and Molecular Biology	4 SH
with BIO U302	Lab for BIO U301	1 SH

Experiential Education Introduction

Complete the following course:

BIO U106	Introduction to Experiential Education	1 SH
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Cellular and Molecular Biology

Complete one course with corresponding lab from the following list:

BIO U319	Regulatory Cell Biology	4 SH
with BIO U320	Lab for BIO U319	1 SH
or BIO U321	Microbiology	4 SH
with BIO U322	Lab for BIO U321	1 SH
or BIO U323	Biochemistry	4 SH
with BIO U324	Lab for BIO U323	1 SH

Organismal and Population Biology

Complete one course with corresponding lab from the following list:

BIO U311	Ecology	4 SH
with BIO U312	Lab for BIO U311	1 SH
or BIO U313	Plant Biology	4 SH
with BIO U314	Lab for BIO U313	1 SH
or BIO U315	Invertebrate Zoology	4 SH
with BIO U316	Lab for BIO U315	1 SH
or BIO U317	Vertebrate Zoology	4 SH
with BIO U318	Lab for BIO U317	1 SH

Marine Biology Courses

Complete two required courses and one elective course from the following lists:

REQUIRED

BIO U151	Introduction to Marine Biology	4 SH
BIO U315	Invertebrate Zoology	4 SH

ELECTIVES

BIO U501 to BIO U531

Marine Biology Directed Study

Complete 4 semester hours of directed study from the following list:

BIO U921 to BIO U924

Experiential Education

An activity related to biology and approved by the experiential education adviser must be completed before the capstone. Among the possibilities are co-op experience, junior/senior honors thesis, research project in a faculty lab, study abroad with submission of a paper, 120 hours of supervised volunteer work in a biology-related area, participation in the East-West Marine Biology Program with submission of a project, paper, or other approved experiences.

Biology Capstone

Complete the following course:

BIO U701	Biology Capstone	4 SH
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BIOLOGY MAJOR CREDIT/GPA REQUIREMENTS

Complete 88 semester hours in the major with a cumulative GPA of 2.000.

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 Biology and Geology**COLLEGE OF ARTS AND SCIENCES BS CORE REQUIREMENTS FOR NATURAL SCIENCE MAJORS**

See page 48 for requirement list.

BREADTH COURSES FOR BIOLOGY/GEOLOGY DUAL MAJOR**Mathematics**

Complete the following two courses:

MTH U151 Calculus and Differential Equations 4 SH
for Biology 1MTH U152 Calculus and Differential Equations 4 SH
for Biology 2**Chemistry**

Complete the following four courses with corresponding labs:

CHM U211 General Chemistry 1 4 SH
with CHM U212 Lab for CHM U211 1 SHCHM U214 General Chemistry 2 4 SH
with CHM U215 Lab for CHM U214 1 SHCHM U311 Organic Chemistry 1 4 SH
with CHM U312 Lab for CHM U311 1 SHCHM U313 Organic Chemistry 2 4 SH
with CHM U314 Lab for CHM U313 1 SH**Physics**

Complete two courses with corresponding labs from the following list (PHY U145 and PHY U147 are recommended):

PHY U145 Physics for Life Sciences 1 4 SH
with PHY U146 Lab for PHY U145 1 SHor PHY U151 Physics for Engineering 1 4 SH
with PHY U152 Lab for PHY U151 1 SHor PHY U161 Physics 1 4 SH
with PHY U162 Lab for PHY U161 1 SHPHY U147 Physics for Life Sciences 2 4 SH
with PHY U148 Lab for PHY U147 1 SHor PHY U155 Physics for Engineering 2 4 SH
with PHY U156 Lab for PHY U155 1 SHor PHY U165 Physics 2 4 SH
with PHY U166 Lab for PHY U165 1 SH**BIOLOGY/GEOLOGY DUAL-MAJOR REQUIREMENTS****Required Biology**

Complete the following three courses with corresponding labs:

BIO U101 Principles of Biology 1 4 SH
with BIO U102 Lab for BIO U101 1 SHor BIO U111 General Biology 1 4 SH
with BIO U112 Lab for BIO U111 1 SHBIO U103 Principles of Biology 2 4 SH
with BIO U104 Lab for BIO U103 1 SHor BIO U113 General Biology 2 4 SH
with BIO U114 Lab for BIO U113 1 SHBIO U301 Genetics and Molecular Biology 4 SH
with BIO U302 Lab for BIO U301 1 SH**Required Geology**

Complete the following four courses with corresponding labs:

GEO U200 Dynamic Earth 4 SH
with GEO U201 Lab for GEO U200 1 SHGEO U220 History of Earth and Life 4 SH
with GEO U221 Interpreting Earth History 1 SHGEO U310 Earth Materials 4 SH
with GEO U311 Lab for GEO U310 1 SHGEO U320 Igneous Petrology and Volcanology 4 SH
with GEO U321 Lab for GEO U320 1 SH**Experiential Education Introduction**

Complete the following course:

BIO U106 Introduction to Experiential Education 1 SH

BIOLOGY/GEOLOGY DUAL-MAJOR ELECTIVES**Intermediate and Advanced Biology**Complete two biology courses with at least one lab (for a minimum total of 9 semester hours) from the following list:
BIO U311 to BIO U699**Intermediate and Advanced Geology**

Complete one advanced geology course and lab elective for a total of 5 semester hours.

Integrative Courses

Complete two courses with corresponding labs from the following list:

BIO U571 Microbial Ecology 4 SH
with BIO U572 Lab for BIO U571 1 SHBIO U585 Evolution 4 SH
with BIO U586 Lab for BIO U585 1 SHGEO U523 Soil Science 4 SH
GEO U560 Geographic Information Systems 4 SH

with GEO U561 Lab for GEO U560 1 SH

Experiential Education

An activity related to biology or geology and approved by the experiential education adviser must be completed before the capstone. Among the possibilities are co-op experience, junior/senior honors thesis, research project in a faculty lab, study abroad with submission of a paper, 120 hours of supervised volunteer work in a biology-related area, participation in the East-West Marine Biology Program with submission of a project paper, or other approved experiences.

Biology Capstone

Complete the following course:

BIO U701 Biology Capstone 4 SH

BIOLOGY/GEOLOGY DUAL-MAJOR CREDIT/GPA REQUIREMENTS

Complete 99 semester hours in the major with a cumulative GPA of 2.000.

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 Computer Science and Biology

See page 202.

Minor in Biology

This minor is not available for students who major in biochemistry, behavioral neuroscience, or any dual major that involves biology.

REQUIRED BIOLOGY COURSES

Complete five biology courses for a credit total of at least 23 semester hours. At least three courses must be intermediate or advanced (in the BIO U300 to BIO U699 range).

REQUIRED LABS

Three of the five courses must contain a lab co-requisite.

BREADTH COURSE

To provide breadth of knowledge, complete one additional science course from the BIO, CHM, GEO, or PHY department or from the following list:

PSY U202	Biological Basis of Mental Illness	4 SH
PSY U458	Psychobiology	4 SH
PSY U510	Psychopharmacology	4 SH

GPA REQUIREMENT

2.000 GPA required in the minor

Minor in Marine Biology**REQUIRED COURSES**

Complete the following two courses with corresponding labs:

BIO U101	Principles of Biology 1	4 SH
with BIO U102	Lab for BIO U101	1 SH
or BIO U111	General Biology 1	4 SH
with BIO U112	Lab for BIO U111	1 SH
BIO U103	Principles of Biology 2	4 SH
with BIO U104	Lab for BIO U103	1 SH
or BIO U113	General Biology 2	4 SH
with BIO U114	Lab for BIO U113	1 SH

ELECTIVE COURSES

Complete three courses from the following list:

BIO U151	Introduction to Marine Biology	4 SH
BIO U315	Invertebrate Zoology	4 SH
BIO U501	Marine Botany	4 SH
with BIO U502	Lab for BIO U501	1 SH
BIO U503	Marine Invertebrate Zoology	4 SH
with BIO U504	Lab for BIO U503	1 SH
BIO U505	Biology of Corals and Coral Reefs	3 SH
BIO U507	Biology and Ecology of Fishes	3 SH
BIO U509	Marine Birds and Mammals	2 SH
with BIO U510	Lab for BIO U509	1 SH
BIO U511	Adaptations of Aquatic Organisms	3 SH
BIO U515	Benthic Marine Ecology	3 SH
BIO U517	Oceanography	2 SH
with BIO U518	Lab for BIO U517	1 SH

NORTHEASTERN UNIVERSITY

BIO U519	Ocean and Coastal Processes	3 SH
BIO U521	Experimental Design Marine Ecology	4 SH
with BIO U522	Lab for BIO U521	1 SH
BIO U523	Molecular Marine Biology	3 SH
BIO U525	Marine Microbial Ecology	2 SH
with BIO U526	Lab for BIO U525	1 SH
BIO U527	Marine Conservation Biology	3 SH
BIO U529	Physiological and Molecular Marine Ecology	3 SH
BIO U589	Diving Research Methods	2 SH

BREADTH COURSE

To provide breadth of knowledge, complete one additional science course from the BIO, CHM, GEO, or PHY department or from the following list:

PSY U202	Biological Basis of Mental Illness	4 SH
PSY U458	Psychobiology	4 SH
PSY U510	Psychopharmacology	4 SH

GPA REQUIREMENT

2.000 GPA required in the minor

CHEMISTRY AND CHEMICAL BIOLOGY

www.chem.neu.edu/web

GRAHAM B. JONES, PhD, DIC
Professor and Chair

RAYMOND AND CLAIRE BRADSTREET CHAIR

William S. Hancock, PhD

JAMES A. WATERS PROFESSOR OF ANALYTICAL CHEMISTRY

Barry L. Karger, PhD

MATTHEWS DISTINGUISHED UNIVERSITY PROFESSORS

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Philip M. Warner, PhD

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Bill C. Giessen, ScD
Robert N. Hanson, PhD
Philip W. LeQuesne, PhD, DSc
Patricia A. Mabrouk, PhD
Alexandros Makriyannis, PhD
Mary Jo Ondrechen, PhD
William M. Reiff, PhD
Paul Vouros, PhD

ASSOCIATE PROFESSORS

David E. Budil, PhD
Thomas R. Gilbert, PhD
Rein U. Kirss, PhD
Ira S. Krull, PhD
Sanjeev Mukerjee, PhD

ASSISTANT PROFESSOR

Eriks Rozners, PhD

LABORATORY COORDINATOR

Edward H. Witten, PhD

PROFESSORS EMERITI

John L. Roebber, PhD

Alfred Viola, PhD

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 provides 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.

BS in Chemistry**COLLEGE OF ARTS AND SCIENCES BS CORE REQUIREMENTS FOR NATURAL SCIENCE MAJORS**

See page 48 for requirement list.

CHEMISTRY MAJOR TECHNICAL REQUIREMENTS**Mathematics**

Complete the following three 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
MTH U341	Calculus 3 for Science and Engineering	4 SH
or MTH U343	Differential Equations and Linear Algebra for Engineering	4 SH
or MTH U345	Ordinary Differential Equations	4 SH

Biochemistry

Complete the following course and corresponding lab:

BIO U323	Biochemistry	4 SH
with BIO U324	Lab for BIO U323	1 SH

Physics

Complete the following two courses and 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**

Complete the following two courses and corresponding labs:

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

Intermediate-Level Chemistry

Complete the following five courses and corresponding labs:

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
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

Advanced-Level Chemistry

Complete the following four courses and corresponding labs:

CHM U501	Inorganic Chemistry	4 SH
CHM U521	Instrumental Methods of Analysis	1 SH
with CHM U522	Lab for CHM U521	4 SH
CHM U531	Chemical Synthesis Characterization	1 SH
with CHM U532	Lab for CHM U531	4 SH
CHM U628	Spectroscopy of Organic Compounds	3 SH
with CHM U629	Identification of Organic Compounds	2 SH

Senior Research

Complete the following course:

CHM U750	Senior Research	4 SH
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Chemistry Capstone

Complete the following course:

CHM U770	Chemistry Capstone	4 SH
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EXPERIENTIAL EDUCATION REQUIREMENT

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

CHEMISTRY MAJOR CREDIT REQUIREMENT

Complete 93 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 in Environmental Geology and Chemistry

See page 83.

BS in Geology and Chemistry

See page 82.

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:

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
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 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

GPA REQUIREMENT

2.000 GPA required in the minor

CINEMA STUDIES

www.cinemastudies.neu.edu

INEZ HEDGES, PhD, *Professor, Modern Languages*

KATHY HOWLETT, PhD, *Associate Professor, English*
Codirectors of the Program in Cinema Studies

MATTHEWS DISTINGUISHED UNIVERSITY PROFESSOR

Harlow L. Robinson, PhD, *History and Modern Languages*

PROFESSORS

Kathleen Kelly, PhD, *English*

Constance H. Rose, PhD, *Modern Languages*

Michael Ryan, PhD, *English*

ASSISTANT PROFESSORS

Gerald H. Herman, MA, *History*

Rei Okamoto, PhD, *Modern Languages*

Alan West-Durán, PhD, *Modern Languages*

ASSISTANT ACADEMIC SPECIALISTS

Kalo Clarke, MA, *English*

Emily Fox Kales, PhD, *Interdisciplinary Studies*

Louise McBryde, MA, *Interdisciplinary Studies*

LECTURER

Michele Cao-Danh, PhD, *Modern Languages*

The cinema studies curriculum is formulated upon a systematic historical, critical, and practice-oriented approach to the study of cinema. Students in the dual major are exposed to film as art, and become aware of the elements that comprise narrative film, such as editing, mise en scène, sound, and cinematography; explore different modes of cinematic narrative, in particular, the differences between Hollywood and art cinema; broaden their understanding of international cinema and become conscious of the characteristics of distinctive national cinemas, with an in-depth study of at least three different cinemas; and examine the productive interchange between film and the literary text. In many of the cinema studies offerings, students are encouraged to reflect upon the crucial role of film in the art movements of the twentieth century and to make connections between the classroom and practical experience in small-group discussions. A number of screenwriting and production courses allow students to make practical applications of their analytical skills.

Students may enroll in the dual major in cinema studies in combination with the following other dual majors: communication studies, English, journalism, modern languages, philosophy, and theatre.

Cooperative education placements (arranged through the student's other dual major program) and internships (arranged