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, predental, 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
Biology

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

**Physics**

- 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

**Biology 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

**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 4 SH for Biology 1
- MTH 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 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

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

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/GEOLGY
DUAL MAJOR

Mathematics
Complete the following two courses:
MTH U151 Calculus and Differential Equations 4 SH
for Biology 1
MTH 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 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 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 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

BIOLOGY/GEOLGY 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 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

Required Geology
Complete the following four courses with corresponding labs:
GEO U200 Dynamic Earth 4 SH
with GEO U201 Lab for GEO U200 1 SH
GEO U220 History of Earth and Life 4 SH
with GEO U221 Interpreting Earth History 1 SH
GEO U310 Earth Materials 4 SH
with GEO U311 Lab for GEO U310 1 SH
GEO 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/GEOLGY 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 SH
BIO U585 Evolution 4 SH
with BIO U586 Lab for BIO U585 1 SH
GEO 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 proj-
et paper, or other approved experiences.

Biology Capstone
Complete the following course:
BIO U701 Biology Capstone 4 SH

BIOLOGY/GEOLGY 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

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

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
Geoffrey Davies, DSc
Philip M. Warner, PhD

PROFESSORS
David A. Forsyth, PhD
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
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.

**Chemistry Major Technical Requirements**

**Mathematics**

Complete the following three courses:

- MTH U151 Calculus and Differential Equations 4 SH for Biology 1
- MTH U241 Calculus 1 for Science and Engineering 4 SH
- MTH U152 Calculus and Differential Equations 4 SH for Biology 2
- MTH U242 Calculus 2 for Science and Engineering 4 SH
- MTH U341 Calculus 3 for Science and Engineering 4 SH
- MTH U343 Differential Equations and Linear Algebra for Engineering 4 SH
- 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
- 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
- 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

**BS in Chemistry**

**College of Arts and Sciences BS Core Requirements for Natural Science Majors**

See page 48 for requirement list.
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

Chemistry Capstone
Complete the following course:
- CHM U770 Chemistry Capstone 4 SH

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
IN_{\text{E}}Z 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-Duran, PhD, Modern Languages

ASSISTANT ACADEMIC SPECIALISTS
Kalo Clarke, MA, English
Rei Okamoto, PhD, Modern Languages

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