

**BIOLOGY**[www.biology.neu.edu](http://www.biology.neu.edu)

FREDERICK C. DAVIS, PhD  
*Professor and Interim Chair*

Office: 134 Mugar Life Sciences Building  
 Phone: 617.373.2260  
 Fax: 617.373.3724  
 Advising Web site: [www.biology.neu.edu/bioadvising.html](http://www.biology.neu.edu/bioadvising.html)

By majoring in biology, students are exposed to 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.

There are several interdisciplinary opportunities involving biology: BS in biochemistry; BS in behavioral neuroscience; BS in computer science and biology; BS in biology and geology; BS in biology and environmental geology; BS in biology/MS in biotechnology; and BS in biochemistry/MS in biotechnology. A marine biology concentration, designed to provide biology majors with a strong foundation in marine biology and related disciplines, is offered through the Northeastern University Marine Science Center in Nahant.

The undergraduate biology major seeks to prepare 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, premedical, and other preprofessional students are urged to consult with the preprofessional advisory committee early in their careers at Northeastern.

The Biology department strongly encourages undergraduate research by providing opportunities and support through a number of departmental programs, including research co-ops and internships, course credit for research in faculty labs, honors theses, and work-study research positions.

Undergraduates are encouraged to present their findings at Northeastern's annual Scholarship and Technology Expo, as well as at external research conferences and in scholarly journals.

**Transferring to the Major**

Students transferring to biology must have a minimum cumulative GPA of 2.000 and have completed the following course:

MTH U121 Precalculus 4 SH  
 or one semester of calculus with a grade of C or better.

Acceptance into the major will be based on students' meeting the department's criteria for admission and availability of space in the programs.

**Academic Progression Standards**

After four semesters in the major, students must have a GPA of at least 2.000 in all science and math courses and have completed at least six of the following courses:

BIO U101	Principles of Biology 1	4 SH
with BIO U102	Lab for BIO U101	1 SH
and BIO U103	Principles of Biology 2	4 SH
with BIO U104	Lab for BIO U103	1 SH
BIO U301	Genetics and Molecular Biology	4 SH
with BIO U302	Lab for BIO U301	1 SH
CHM U211	General Chemistry 1	4 SH
with CHM U212	Lab for CHM U211	1 SH
and 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
and CHM U313	Organic Chemistry 2	4 SH
with CHM U314	Lab for CHM U313	1 SH
MTH U151	Calculus and Differential Equations for Biology 1	4 SH
and MTH U152	Calculus and Differential Equations for Biology 2	4 SH

Students who transfer into the biology major will be allowed two semesters after entering the major to meet the minimum standards for their class. Students who fail to meet the above standards will be placed on departmental probation. Two consecutive semesters on departmental probation will result in dismissal from the major.

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. No double majors are offered in biology and biochemistry or in biology and behavioral neuroscience due to similarity in course curricula.

**BS in Biology****NU CORE REQUIREMENTS**

See page 42 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 a lecture/lab set for Physics 1 and Physics 2 (PHY U145 and PHY U147 are recommended):

PHYSICS 1		
PHY U145	Physics for Life Sciences 1	4 SH
with PHY U146	Lab for PHY U145	1 SH
PHY U151	Physics for Engineering 1	4 SH
with PHY U152	Lab for PHY U151	1 SH
PHY U161	Physics 1	4 SH
with PHY U162	Lab for PHY U161	1 SH
PHYSICS 2		
PHY U147	Physics for Life Sciences 2	4 SH
with PHY U148	Lab for PHY U147	1 SH
PHY U155	Physics for Engineering 2	4 SH
with PHY U156	Lab for PHY U155	1 SH
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
CHM U331 to CHM U699		
ENV U300 to ENV 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
PSY U608	Laboratory in Animal Behavior Research	4 SH

**BIOLOGY MAJOR REQUIREMENTS****Required Biology**

Complete the following three courses with corresponding labs:

BIOLOGY 1		
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
BIOLOGY 2		
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
GENETICS		
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
BIO U321	Microbiology	4 SH
with BIO U322	Lab for BIO U321	1 SH
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
BIO U313	Plant Biology	4 SH
with BIO U314	Lab for BIO U313	1 SH
BIO U315	Invertebrate Zoology	4 SH
with BIO U316	Lab for BIO U315	1 SH
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) at level 311 and above from the following list. Up to 4 semester hours may be research in a faculty lab.

BIO U311 to BIO U699		
RESEARCH		
BIO U921	Directed Study	1 SH
BIO U922	Directed Study	2 SH
BIO U923	Directed Study	3 SH
BIO U924	Directed Study	4 SH
BIO U964	Research	4 SH
BIO U970	Junior/Senior Honors Project 1	4 SH

HNR U921	Directed Study	1 SH
HNR U922	Directed Study	2 SH
HNR U923	Directed Study	3 SH
HNR U924	Directed Study	4 SH

**Experiential Education**

An activity related to biology and approved by the experiential education advisor 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 Three Seas 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 for the major with a cumulative GPA of 2.000.

Due to overlap in course content, double majoring in biology and biochemistry or biology and behavioral neuroscience is not permitted.

**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****NU CORE REQUIREMENTS**

See page 42 for requirement list.

**BREADTH COURSES FOR BIOLOGY  
(MARINE BIOLOGY CONCENTRATION)****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 a lecture/lab set for Physics 1 and for Physics 2 (PHY U145 and PHY U147 are recommended):

**PHYSICS 1**

PHY U145	Physics for Life Sciences 1	4 SH
with PHY U146	Lab for PHY U145	1 SH
PHY U151	Physics for Engineering 1	4 SH
with PHY U152	Lab for PHY U151	1 SH
PHY U161	Physics 1	4 SH
with PHY U162	Lab for PHY U161	1 SH

**PHYSICS 2**

PHY U147	Physics for Life Sciences 2	4 SH
with PHY U148	Lab for PHY U147	1 SH
PHY U155	Physics for Engineering 2	4 SH
with PHY U156	Lab for PHY U155	1 SH
PHY U165	Physics 2	4 SH
with PHY U166	Lab for PHY U165	1 SH

**BIOLOGY MAJOR REQUIREMENTS  
(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 the following course with corresponding lab:

BIO U311	Ecology	4 SH
with BIO U312	Lab for BIO U311	1 SH



PSY U202	Biological Basis of Mental Illness	4 SH
PSY U458	Psychobiology	4 SH
PSY U510	Psychopharmacology	4 SH
PSY U608	Laboratory in Animal Behavior Research	4 SH

### BIOLOGY MAJOR REQUIREMENTS

#### Required Biology

Complete the following three courses with corresponding labs:

#### BIOLOGY 1

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

#### BIOLOGY 2

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

#### GENETICS

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 the following course with corresponding lab:

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

#### Biology Capstone

Complete the following course:

BIO U701	Biology Capstone	4 SH
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### GRADUATE COURSES TAKEN AS AN UNDERGRADUATE

#### Required Courses

Complete the following five courses for graduate credit:

BIO G279	Biochemistry/Molecular Biology Experimental Approaches	5 SH
BIO G301	Molecular Cell Biology	4 SH
INT G120	Introduction to Biotechnology	2 SH
INT G245	Biotechnology Applications Laboratory	2 SH
PSC G100	Concepts in Pharmaceutical Science	2 SH

#### Elective Course Work

Complete two additional advanced graduate biology elective courses.

### GRADUATE COURSES TAKEN AS A GRADUATE STUDENT

#### Required Courses

Complete the following five courses:

BIO G382	Research Problem Solving	2 SH
CHM G211	Analytical Separations	3 SH
CHM G212	Principles of Mass Spectrometry	3 SH
CHM G316	Analytical Biochemistry	3 SH
MGT G219	The Business of Biotechnology	3 SH

#### Elective Course Work

Complete 2 semester hours of graduate electives.

### COOPERATIVE EDUCATION

#### Required Co-op

Complete three co-op assignments.

### BIOLOGY/BIOTECHNOLOGY MAJOR CREDIT/GPA REQUIREMENTS

Complete 107 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.

### UNIVERSITY-WIDE REQUIREMENTS

156 total semester hours required

Minimum 3.000 GPA required

### Minor in Biology

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

### REQUIRED BIOLOGY COURSES

Complete five biology courses from the following list for a total of at least 23 semester hours. At least three courses must be intermediate or advanced. Three of the five courses must contain a lab corequisite.

**Introductory**

BIO U101 to BIO U299

**Intermediate to Advanced**

BIO U301 to BIO U599

**BREADTH COURSE**

To provide breadth of knowledge, complete one additional science course from the BIO, CHM, ENV, or PHY departments or any course 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**

This minor is not available for students who major in biology or any dual major that involves biology. Biology majors interested in marine biology should consider the concentration in marine biology.

**REQUIRED COURSES**

Complete the following two courses with 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	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	Marine Ecology	4 SH
BIO U517	Oceanography	2 SH
with BIO U518	Lab for BIO U517	1 SH
BIO U519	Ocean and Coastal Processes	2 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, ENV, or PHY departments or any course 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