

Biochemistry, Biology (BCH, BIO)**Majors and Minor in Biochemistry, Biology****Departments of Biochemistry and Cell Biology, Ecology and Evolution, Neurobiology and Behavior, and Undergraduate Biology Program; College of Arts and Sciences**

Minors of particular interest to students majoring in Biology or Biochemistry: Biomaterials (BES), Bioengineering (BNG), Chemistry (CHE), Environmental Studies (ENS), Health and Wellness (LHW), Science and Engineering (LSE)

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The Undergraduate Biology Program

Biology is the study of organisms, including the molecular and cellular basis of life, development of the individual and its genetic basis, maintenance of the individual, and interaction of organisms with their biotic and physical environment.

The Biology major introduces students to the concepts and methodologies associated with the multiple levels of biological complexity. Students explore the Fundamentals of Biology (BIO 201, 202, 203), a thorough introduction to organisms, ecosystems, cellular and molecular biology, and physiology. These courses, along with the Introductory Biology Laboratory Course (BIO 204, 205), provide a solid background for students interested in the health professions. Students go on to advanced laboratory work and have the opportunity to specialize in any of several areas, including: biomedical engineering, developmental genetics, ecology and evolution, environmental biology, and neuroscience. Students may also elect the General Biology specialization. Students may design their own curriculum, in consultation with an advisor, within the context of these specializations, based on individual interest. The Biology major requires a strong foundation in mathematics, chemistry, and physics.

Majors are encouraged to explore research opportunities in biology, typically beginning in their second or third year.

Most positions for biologists require graduate training. Most students majoring in biology prepare for professional study in the biological or health sciences. Some prepare for secondary school teaching, and others for technical positions in industry, including biotechnology, government agencies, and research institutes.

Students should contact the Undergraduate Biology Office for information and brochures related to the Biology major and minor, and for the forms mentioned in requirements and some course descriptions. The office receives completed forms and petitions concerning the Biology major and minor and all requests for evaluations of transferred biology courses. The office also coordinates advising and processes graduation clearances for major and minor requirements. Students may not declare a double major among biology, biochemistry, pharmacology, marine sciences and marine vertebrate biology.

Requirements for the Major in Biology (BIO)

Students must complete a minimum of 33 credits in Requirements A and C. (See Note 1). All courses used to satisfy requirements A and C must be passed with a letter grade of C or higher. At least one semester of each of the following two-semester sequences must be passed with a letter

grade of C or higher: calculus, general chemistry lecture, organic chemistry lecture, and physics lecture/lab. Courses taken under the Pass/ No Credit option may not be used to satisfy major requirements.

Completion of the major requires approximately 67 to 69 credits.

A. Biology Core

1. BIO 150 The Living World (See Note 1)
2. BIO 201, BIO 202, BIO 203 Fundamentals of Biology (See Note 2)
3. BIO 204 and BIO 205 Fundamentals of Scientific Inquiry in the Biological Sciences I and IIA or BIO 204 and BIO 207 Fundamentals of Scientific Inquiry in the Biological Sciences IIB

B. Courses Required in Related Fields

1. MAT 125, MAT 126 Calculus A, B or MAT 131, MAT 132 Calculus I, II or MAT 141, MAT 142 Calculus I, II: Honors or MAT 171 Accelerated Single Variable Calculus or level 8 or 9 on the Mathematics Placement Examination.
2. CHE 129/CHE 130 or CHE 131, CHE 132 General Chemistry and CHE 133, CHE 134 General Chemistry Laboratory or CHE 141, CHE 142 Honors Chemistry and CHE 143, CHE 144 Honors General Chemistry Laboratory
3. CHE 321, CHE 322 or CHE 326 Organic Chemistry I, IIA or IIB or CHE 341, CHE 342 Honors Organic Chemistry
4. CHE 327 Organic Chemistry Laboratory or CHE 383 Introductory Synthetic and Spectroscopic Laboratory Techniques
5. PHY 121/PHY 123, PHY 122/PHY 124 Physics for Life Sciences I, II and labs or PHY 125, PHY 126, PHY 127 Classical Physics A, B, C or PHY 131/PHY 133, PHY 132/PHY 134 Classical Physics I, II and labs or PHY 141, PHY 142 Classical Physics I, II: Honors
6. BIO 211 Statistics and Data Analysis or AMS 110 Probability and Statistics in Life Sciences or AMS 310 Survey of Probability and Statistics

C. Advanced Courses

All advanced Biology courses have one or more 200 level courses as a prerequisite. A grade of C or higher is required in each 200 level prerequisite in order to enroll in any 300 level Biology course. Students must complete one of the following specializations using the advanced biology lecture and laboratory courses listed below, and courses offered by related departments where specified:

Advanced Lecture Courses:

Area I: Cell Biology and Biochemistry - BIO 310, BIO 314*, BIO 315 (or HBM 320), BIO 316, BIO 317*, BIO 361, BIO 362

Area II: Genetics and Development - BIO 314*, BIO 320, BIO 325, BIO 339*, BIO 354*

Area III: Neurobiology and Physiology - BIO 317*, BIO 328, BIO 334, BIO 337, BIO 338, BIO 339*, BCP 401

Area IV: Organisms - BIO 340, BIO 341, BIO 343, BIO 344, BIO 348, BIO 380, MAR 370, MAR 371

Area V: Ecology and Evolution - BIO 301, BIO 336, BIO 350, BIO 351, BIO 353, BIO 354, BIO 358, BIO 359, BIO 371, BIO 385, BIO 386, MAR 301, MAR 302, MAR 366, ANP 325.02, ANP 350.02, ANP 391.02

*BIO 314, BIO 317, BIO 339, and BIO 354 may each be used to satisfy only one area.

Advanced Laboratory Courses:

Area I BIO 311, BIO 365

Area II BIO 327

Area III BIO 335

Area IV BIO 340, BIO 341, BIO 343, BIO 344, BIO 380, MAR 380

Area V BIO 319, BIO 352, BIO 356, BIO 367, BIO 371, MAR 301, MAR 303, MAR 305, MAR 320, MAR 388

Area VI BIO 312

1. General Biology Specialization

a. Advanced Lecture Courses: At least one lecture course in four of the five areas above. Students in the Biology Secondary Teacher Education Program must take a course in each of the five areas.

b. Advanced Laboratory Courses: Two advanced laboratory courses chosen from any two of the six areas above. (see Note 3)

c. Study in Depth: A second lecture course in one of the five areas of inquiry or any 400-level BIO course for majors or SCI 454 (for students enrolled in the Biology Secondary Teacher Education Program) or SCI 554 (for students enrolled in the BS/MAT program in Biology).

d. Biology Electives: Additional advanced biology lecture, laboratory, independent research and reading courses, as needed, for a minimum of 33 credits in Requirements A and C.

2. Developmental Genetics Specialization

a. Lecture/Laboratory Courses Requirement:

i. BIO 320 General Genetics

ii. BIO 325 Animal Development

iii. BIO 327 Developmental Genetics Laboratory

iv. BIO 310 Cell Biology, BIO 314 Cancer Biology, BIO 339 Molecular Development of the Nervous System, or BIO 354 Evolution

b. Breadth Requirement

- i. Two advanced biology lecture or lecture/laboratory courses including at least one from outside the Developmental Genetics specialization chosen in consultation with the undergraduate biology advisor.
 - ii. One advanced biology laboratory (or lecture with laboratory) from outside the Developmental Genetics specialization. (See Note 3)
- c. Biology Electives

Additional advanced biology lecture, laboratory, independent research and reading courses, as needed, for a minimum of 33 credits in Requirements A and C.)

3. Neuroscience Specialization

a. Area Lecture/Laboratory Requirement:

- i. BIO 334 Principles of Neurobiology
- ii. BIO 328 Mammalian Physiology
- iii. BIO 335 Animal Physiology Laboratory
- iv. One of the following:

BIO 317 Principles of Cellular Signaling
 BIO 337 Neurotransmission
 BIO 338 Self Organization of the Brain
 BIO 339 Molecular Development of the Nervous System
 BCP 401 Principles of Pharmacology

b. Breadth Requirement

- i. Two advanced biology lecture or lecture with laboratory courses including at least one chosen from outside the Neurobiology specialization.
 - ii. One advanced biology laboratory (or lecture with laboratory) course chosen from outside the Neurobiology specialization.
- c. Biology Electives

Additional advanced biology lecture, laboratory, independent research and reading courses, as needed, for a minimum of 33 credits in Requirements A and C.

4. Ecology and Evolution Specialization

- a. BIO 351 Ecology
- b. BIO 354 Evolution
- c. Area Lecture/Laboratory Requirement: Students must choose one course from i. Lecture/Laboratory Courses or one course each from ii. Lecture Courses and iii. Laboratory Courses below.

i. Lecture/Laboratory Courses

BIO 340 Zoology
 BIO 341 Plant Diversity
 BIO 343 Invertebrate Zoology
 BIO 344 Chordate Zoology
 BIO 371 Restoration of Aquatic Ecosystems
 BIO 380 Entomology
 MAR 301 Environmental Microbiology

ii. Lecture Courses

BIO 301 Sustainability of the Long Island Pine Barrens
 BIO 336 Conservation Biology
 BIO 348 Diversity and Evolution of Reptiles
 BIO 350 Darwinian Medicine
 BIO 353 Marine Ecology
 BIO 358 Biology and Human Social and Sexual Behavior
 BIO 359 Behavioral Ecology
 BIO 385 Plant Ecology
 BIO 386 Ecosystem Ecology in a Changing World
 MAR 302 Marine Microbiology and Microbial Ecology
 MAR 366 Plankton Ecology
 MAR 370 Marine Mammals
 MAR 371 The Biology and Conservation of Marine Birds and Sea Turtles
 MAR 373 Marine Apex Predators: Ecology and Conservation

ANP 325.02 Primate Behavior (Madagascar)
 ANP 350.02 Methods of Studying Primates (Madagascar)
 ANP 391.02 Topics in Physical Anthropology (Madagascar)

iii. Laboratory Courses

BIO 319 Landscape Ecology Laboratory
 BIO 352 Ecology Laboratory
 BIO 356 Applied Ecology and Conservation Biology Laboratory
 BIO 367 Molecular Diversity Laboratory
 MAR 303 Long Island Marine Habitats
 MAR 305 Experimental Marine Biology
 MAR 320 Limnology
 MAR 380 Ichthyology
 MAR 388 Tropical Marine Ecology

d. Breadth Requirement

i. Two advanced biology lecture or lecture/laboratory courses including at least one chosen from any area excluding Area IV, Organisms and Area V, Ecology and Evolution above.

ii. One advanced biology laboratory (or lecture with laboratory) course chosen from any area excluding Area IV, Organisms and Area V, Ecology and Evolution above. (See Note 3).

e. Biology Electives

Additional advanced biology lecture, laboratory, independent research and reading courses, as needed, for a minimum of 33 credits in Requirements A and C.

5. Environmental Biology Specialization

a. BIO 351 Ecology

b. Area Lecture/Laboratory Requirement: Three courses chosen from the lists below. In choosing courses, students must include at least one course with laboratory. Students may take no more than one course from i. Organisms, and no more than one course from iii. The Environment.

i. Organisms

BIO 340 Zoology (with lab)
 BIO 341 Plant Diversity (with lab)
 BIO 343 Invertebrate Zoology (with lab)
 BIO 344 Chordate Zoology (with lab)
 BIO 348 Diversity and Evolution of Reptiles
 BIO 380 Entomology (with lab)
 MAR 370 Marine Mammals
 MAR 371 The Biology and Conservation of Marine Birds and Sea Turtles
 MAR 380 Ichthyology (lab)

ii. Ecology

BIO 301 Sustainability of the Long Island Pine Barrens
 BIO 319 Landscape Ecology Laboratory
 BIO 336 Conservation Biology
 BIO 350 Darwinian Medicine
 BIO 352 Ecology Lab
 BIO 353 Marine Ecology
 BIO 354 Evolution
 BIO 356 Applied Ecology and Conservation Biology Laboratory
 BIO 358 Biology and Human Social and Sexual Behavior
 BIO 359 Behavioral Ecology
 BIO 367 Molecular Diversity Laboratory
 BIO 371 Restoration of Aquatic Ecosystems (with lab)
 BIO 385 Plant Ecology
 BIO 386 Ecosystem Ecology in a Changing World
 MAR 301 Environmental Microbiology (with lab)
 MAR 302 Marine Microbiology and Microbial Ecology
 MAR 303 Long Island Marine Habitats (lab)
 MAR 305 Experimental Marine Biology (lab)
 MAR 320 Limnology (lab)
 MAR 366 Plankton Ecology

MAR 388 Tropical Marine Ecology (lab)
 ANP 325.02 Primate Behavior (Madagascar)
 ANP 350.02 Methods of Studying Primates (Madagascar)
 ANP 391.02 Topics in Physical Anthropology (Madagascar)

iii. The Environment

ATM 305 Global Atmospheric Change
 ATM 397 Air Pollution and its Control
 MAR 318 Engineering Geology and Coastal Processes
 MAR 333 Coastal Oceanography

c. Breadth Requirement

i. Two advanced biology lecture courses from outside the Environmental Biology specialization, chosen in consultation with the undergraduate biology advisor.

ii. One advanced biology laboratory course from any area excluding Area IV, Organisms and Area V, Ecology and Evolution. (See Note 3).

d. Biology Electives

Additional advanced biology lecture, laboratory, independent research and reading courses, as needed, for a minimum of 33 credits in Requirements A and C.

6. Biomedical Engineering Specialization

Unlike other specializations, this one requires MAT 127 Calculus C, but not AMS 110. Students who complete this specialization will automatically receive a Bioengineering minor (BNG).

a. Lecture/Laboratory Courses - Requirement:

BME 100 Introduction to Biomedical Engineering
 ESG 111 Programming for Engineers
 or MEC 112 Practical C/C++ for Scientists and Engineers
 or ESE 124 Computer Techniques for Electronic Design I
 or CSE 130 Introduction to Programming in C

b. Subspecializations:

Students in this specialization must choose one of the three sub specializations described below.

i. Biomechanics and Biomaterials Subspecialization

MEC 260 Engineering Statics
 BME 303 Biomechanics
 AMS 261 Applied Calculus III (or equivalent)

One of the following two courses:

BME 304 Genetic Engineering
 BME 381 Nanofabrication in Biomedical Applications

ii. Bioelectricity Subspecialization

ESE 271 Electrical Circuit Analysis I
 BME 301 Bioelectricity
 AMS 210 Applied Linear Algebra
 BME 313 Bioinstrumentation

iii. Molecules and Cells Subspecialization

BME 304 Genetic Engineering
 BME 381 Nanofabrication in Biomedical Applications
 ESG 332 Materials Science I: Structures and Properties of Materials

One of the following three courses:

BME 353 Biomaterials: Manufacture, Properties and Applications
 BME 404 Essentials of Tissue Engineering
 BME 430 Engineering Approaches to Drug and Gene Delivery

c. Breadth Requirement:

i. One advanced biology lecture or one advanced lecture/laboratory course chosen from any area.

ii. One advanced biology laboratory course chosen from any area (see Note 3).

D. Upper-Division Writing Requirement

The advanced writing component of the major in Biology requires approval by the writing committee of either a term paper or a laboratory report written for an upper-division course in biological sciences at Stony Brook (including readings and research).

Students who wish to use material from a participating course should obtain the necessary form and present it to the course director prior to submission of the material. The course director will sign the form and the graded material, and submit the completed form as well as the graded material to the Undergraduate Biology Office. The Writing Center will evaluate the submitted material and contact the student directly if remedial efforts are needed. Students are urged to submit appropriate materials in their junior year, or by the end of their next-to-last term, in order to allow for evaluation and possible remedial effort. Later submissions are considered, but may delay graduation. If material is rejected, the student will be instructed by the Writing Center before resubmitting the paper or material from another biology course.

Notes:

1. Students with a high school Biology course and a math placement score of 3 or better can receive a waiver of BIO 150 The Living World. A waiver of BIO 150 does not count toward the minimum 33 credits in Requirements A and C. Although not a required course, BIO 150 is recommended for majors with a math placement score of less than 3 and/or without prior biology training. The three credits of BIO 150 will count toward the Biology major, but not the minor.
2. Requests for waivers of major requirements must be approved by the Undergraduate Biology Studies Committee. Biology majors must meet the major requirements of the bulletin of their latest matriculation date.
3. Four credits and at least 2 consecutive semesters of independent biology research (BIO 486, BIO 487, BIO 489) may replace one upper division laboratory course. For specializations other than General Biology, the laboratory course outside of the concentration may be replaced by such independent research.
4. Students having completed one or fewer of BIO 201, BIO 202, BIO 203 prior to Fall 2007 must complete BIO 204 and BIO 205; Students having completed two or more of BIO 201, BIO 202, BIO 203 prior to Fall 2007 are exempt from completing BIO 204 AND BIO 205.

Advanced Courses

All advanced Biology courses have one or more 200-level BIO courses as a prerequisite(s). A C or better grade is required in each 200-level prerequisite in order to enroll in any 300-level Biology course.

Application of Transfer Credits to Biology Requirements

Biology courses taken elsewhere apply to major requirements only if authorized by the biology transfer evaluator or if listed as equivalent to a Stony Brook course in Stony Brook Transfer Guides. Transfer students must take at least 15 of the 33 credits in Requirements A and C at Stony Brook in courses for majors at the 200 level or higher. At least 12 of the 15 credits must be in BIO-designator courses. Both of the two advanced laboratory experiences must be taken at Stony Brook (see Note 3). Transfer students may meet Section B (Courses Required in Related Fields) requirements with transferred courses, if the courses are approved as being equivalent (even if the number of credits is different).

Biology Secondary Teacher Education Program

See the Education and Teacher Certification entry in the alphabetical listings of Approved Majors, Minors, and Programs.

Honors Programs in Biology and in Biology and Society

Graduation with departmental honors in Biology or in Biology and Society requires both of the following:

1. A cumulative grade point average of 3.50 or higher in all courses for the major.
2. Presentation of an honors thesis based on a research project (see list of approved research and internship courses for each specialization below) written in the form of a paper for a scientific journal. The completed thesis must be approved by a thesis committee.

A student interested in becoming a candidate for honors should submit an outline of the proposed thesis research project to the director of undergraduate biology as early as possible but no later than the second week of classes in the last semester. The director of undergraduate biology and the research sponsor appoint a thesis committee consisting of the research sponsor and two additional faculty members, one of them from a department different from that of the research sponsor. The student must present a copy of the finished thesis to each member of the thesis committee for their approval at least 14 days before the date of graduation.

Approved Research and Internship Courses

1. General Biology Specialization

BIO 484, BIO 486, BIO 487, BIO 489 Independent Research
BIO 488 Internship

2. Biomedical Engineering Specialization

BME 499 Research in Bioengineering
BIO 488 Internship

3. Developmental Genetics Specialization

BIO 487 Independent Research
BIO 488 Internship

4. Ecology and Evolution Specialization

BIO 489 Research in Ecology and Evolution
BIO 488 Internship

5. Environmental Biology Specialization

One of the following:
ATM 487, BIO 489, MAR 487 Independent Research
BIO 488, MAR 488 Internship

6. Neuroscience Specialization

BIO 486 Research in Neurobiology and Physiology
BIO 488 Internship

Requirements for the Minor in Biology (BIO)

Only students with majors other than Biology, Biochemistry, Pharmacology, Marine Sciences or Marine Vertebrate Biology may elect the Biology minor. All courses for the minor must be taken for a letter grade. (See Note 1) All credits for the minor, except for those in Requirement A, must be in BIO major courses taken at Stony Brook. Requests for waivers of minor requirements must be approved by the Undergraduate Biology Studies Committee.

Completion of the minor requires at least 20 credits in those biology courses designed for the Biology major, including:

A. At least two of the following courses:

BIO 201 Fundamentals of Biology: Organisms to Ecosystems; BIO 202 Fundamentals of Biology: Cell and Molecular Biology; BIO 203 Fundamentals of Biology: Cellular and Organ Physiology

B. Both of the following courses:

BIO 204 Fundamentals of Scientific Inquiry in the Biological Sciences I and BIO 205 Fundamentals of Scientific Inquiry in the Biological Sciences II

C. At least nine credits at the 300 level

D. A lecture or lecture/laboratory course in at least two of the five areas of inquiry (I-V) listed under the biology major.

Note:

- All 20 credits of biology courses intended for the biology minor must be passed with a grade of C or higher, including 9 credits at the 300 level.
- A grade of Satisfactory in readings and research courses apply to the quality requirements within credit limitations noted below: Up to two credits of biology independent research (BIO 484, 486, 487, 489) and one credit of tutorial readings (BIO 444, 446, 447, 449) may be applied toward the minor.
- The list of substitute electives for the major does not apply to the minor.

Sample Course Sequence for the Major in Biology

Freshman Fall	Credits	Spring	Credits
First Year Seminar 101	1	First Year Seminar 102	1
D.E.C. A	3	D.E.C. A	3
CHE 131	4	CHE 132	4
CHE 133	1	BIO 201, BIO 202, or BIO 203	3
MAT 125	3	CHE 134	1
D.E.C.	3	MAT 126	3
		D.E.C.	3
Total	15	Total	18
Sophomore Fall	Credits	Spring	Credits

CHE 321	4	CHE 322 or CHE 326	4
AMS 110	3	CHE 327	2
BIO 201 or BIO 202	3	BIO 201, BIO 202, or BIO 203	3
and BIO 204	2	BIO 205	2
D.E.C.	3	D.E.C.	3
D.E.C.	3	D.E.C.	3
Total	18	Total	17
Junior Fall	Credits	Spring	Credits
PHY 121/PHY 123	4	PHY 122/PHY 124	4
BIO Area	3	BIO Area	3
BIO Area	3	BIO Lab	2-3
D.E.C.	3	D.E.C.	3
Upper-Division elective	3	Upper-Division elective	3
Total	16	Total	15-16
Senior Fall	Credits	Spring	Credits
BIO Area	3	BIO Area	3
BIO Lab	2-3	Upper-Division elective	3
Upper-Division elective	3	D.E.C.	3
D.E.C.	3	Electives	6
Electives	6		
Total	17-18	Total	15

BIO

Biology

BIO 101 - E: Human Biology

The major concepts of biology are presented from historical, contemporary, and critical viewpoints. These concepts include the cell, the gene, molecular biology, development, and evolution. The human implications or values associated with each concept are emphasized. Not for major credit.

3 credits

BIO 103 - E: Introduction to Biotechnology

Gene therapy, genetic modification, cloning, stem cells, and vaccines are covered in this course. Lectures and four supplemental laboratory activities use modern equipment and techniques to illustrate core concepts which class discussions relate to health, society, and public policy. Not for biology major credit.

3 credits

BIO 104 - E: How Science Works

The course aims at expanding students' knowledge about the methods of the natural sciences and to develop the critical thinking abilities to understand scientific claims presented by the media. Students will learn about scientific discoveries as well as the differences between science and pseudoscience. The course includes lectures and discussions based on textbook material, examination of case studies in science, and discussion of items in the news.

3 credits

BIO 113 - E: General Ecology

A survey of the principles of ecology in the context of finding solutions to local, national, and global environmental problems. Not for major credit.

3 credits

BIO 114 - E: Dinosaur Paleontology

A study of paleontology that includes evolution of dinosaurs, their classification system, a study of the important dinosaur families, dinosaur behavior, ecology, current controversies, hot topics and the KT extinction. Dinosaur paleontology will also cover the excavation of dinosaurs and the colorful history of the 'dinosaur hunters.' This course will emphasize the science and research involved in studying dinosaurs. Using dinosaurs as a vehicle, students will be

exposed to the scientific method of inquiry and will leave this course with a better understanding on how to evaluate science in the real world.

Advisory prerequisite: Entry level biology
3 credits

BIO 115 - E: Evolution and Society

The historical development of evolutionary thought, the evolutionary diversification of life, and the mechanisms of evolution are presented. The geological, genetic, and other biological principles necessary to comprehend evolutionary concepts are introduced as background. Current controversies over the evidence for evolution are reviewed. Human evolution, medical and agricultural applications of evolutionary theory, and its implications for the development of human and other social systems are considered. Not for major credit.

Advisory Prerequisite: One biology course
3 credits

BIO 150 - E: The Living World

An exploration of life from organisms to molecules. The connections between biodiversity, molecules, and evolution are examined. Recitations/laboratories familiarize students with the tools, models, and concepts of modern biology.

Prerequisites: High school biology and chemistry; satisfaction of entry skill in mathematics requirement

3 credits

BIO 201 - E: Fundamentals of Biology: Organisms to Ecosystems

An introduction to the major groups of living organisms. Structure, functions, the ecological roles of organisms in communities and ecosystems, and their evolutionary history are covered. Genetics and demography are discussed in the context of evolution by natural selection. This course has been designated as a High Demand/Controlled Access (HD/CA) course. Students registering for HD/CA courses for the first time will have priority to do so.

Prerequisite: Level 3 or higher on the mathematics placement examination or corequisite MAT 123 or higher MAT course
Advisory Prerequisite: High School Biology
3 credits

BIO 202 - E: Fundamentals of Biology: Molecular and Cellular Biology

The fundamentals of cell biology, biochemistry, and genetics. The biochemical and molecular bases of cell structure, energy

metabolism, gene regulation, heredity, and development in living organisms from bacteria to man are discussed. This course has been designated as a High Demand/Controlled Access (HD/CA) course. Students registering for HD/CA courses for the first time will have priority to do so.

Prerequisite: Level 3 or higher on the mathematics placement examination or BME 100
Pre- or Corequisites: CHE 129 or 131 or 141; MAT 125 or higher or AMS 151
3 credits

BIO 203 - E: Fundamentals of Biology: Cellular and Organ Physiology

The fundamentals of cell and organ physiology in mammalian and non-mammalian organisms. The structure and function of cell membranes and the physiology of cell to cell signaling, cellular respiration, and homeostasis of organs and organisms are examined with an emphasis on the comparative physiology of vertebrates and invertebrates. This course has been designated as a High Demand/Controlled Access (HD/CA) course. Students registering for HD/CA courses for the first time will have priority to do so.

Prerequisite: Level 3 or higher on the mathematics placement examination or BME 100
Pre- or Corequisites: CHE 129 or 131 or 141; MAT 125 or higher or AMS 151
3 credits

BIO 204: Fundamentals of Scientific Inquiry in the Biological Sciences I

First in the foundational laboratory sequence for all biology students, and students in related fields. Students will experience the laboratory process, research process, a wide range of laboratory tools, methods, skills, learn to read and write scientific presentations, and collaborate in formal inquiry. This course has been designated as a High Demand/Controlled Access (HD/CA) course. Students registering for HD/CA courses for the first time will have priority to do so. This course has an associated fee. Please see www.stonybrook.edu/ coursefees for more information.

Pre- or Corequisite: BIO 201, 202, or 203; CHE 123 or 129 or 131 or 141
2 credits

BIO 205: Fundamentals of Scientific Inquiry in the Biological Sciences IIA

Second course in the foundational laboratory sequence for all biology students, and students in related fields. Students will experience the laboratory process, research process, a wide range of laboratory tools, methods, skills, learn

to read and write scientific presentations, and collaborate in formal inquiry. This course has been designated as a High Demand/Controlled Access (HD/CA) course. Students registering for HD/CA courses for the first time will have priority to do so. Not for credit in addition to BIO 207. This course has an associated fee. Please see www.stonybrook.edu/coursefees for more information.

Prerequisite: BIO 204

Pre- or Corequisites: BIO 201, 202, or 203

2 credits

BIO 207: Fundamentals of Scientific Inquiry in the Biological Sciences IIB

An alternative to BIO 205, this course focuses on a relatively narrow range of current research topics but in greater depth. BIO 207 is the second course in the foundational laboratory sequence for all biology majors and students in related fields. Students will experience the laboratory process, research process, a wide range of laboratory tools, methods, and skills, learn to read and write scientific works, and collaborate in formal inquiry. This course has been designated as a High Demand/Controlled Access (HD/CA) course. Students registering for HD/CA courses for the first time will have priority to do so. Not for credit in addition to BIO 205. This course has an associated fee. Please see www.stonybrook.edu/coursefees for more information.

Prerequisite: BIO 204

Pre- or Corequisites: BIO 201, 202, or 203

2 credits

BIO 208 - H: Cell, Brain, Mind

An introduction to the human brain and how it is the target of diseases, drugs, and psychological disturbances. The course explores these topics through a knowledge of basic cell neurobiology. The implications of brain science for human behavior in society are also considered. Not for major credit.

Prerequisite: Any BIO course

Advisory prerequisite: High school chemistry

3 credits

BIO 211 - C: Statistics and Data Analysis: A Conceptual Approach

A conceptually-focused introduction to probability and data analysis emphasizing statistical literacy and critical thinking. Topics will include probability, t-tests, chi-squared tests, correlation, regression, and Analysis of Variance, as well as special topics of interest to undergraduate Biology majors such as case-control studies and meta-analysis. This course includes a one-hour recitation in which students will do hands-on activities, discuss

papers from the primary literature, and gain experience with data analysis. May not be taken by students with credit for AMS 102, 110, 310, 311, 312; ECO 320; POL 201; PSY 201; or SOC 202.

Prerequisite: satisfaction of entry skill in mathematics requirement

4 credits

BIO 301 - H: Sustainability of the Long Island Pine Barrens

The ecologically diverse Long Island Pine Barrens region provides a habitat for a large number of rare and endangered species, but faces challenges associated with protection of a natural ecosystem that lies in close proximity to an economically vibrant urban area that exerts intense development pressure. In this course we will consider the interaction of the ecological, developmental and economic factors that impact the Pine Barrens and the effectiveness of decision support systems in promoting sustainability of the Pine Barrens. This course is offered as BIO 301, GEO 301, ECO 301, ENV 301, and ESG 301.

Prerequisites: BIO 201 or ECO 108 or GEO 101 or 102 or ESG 100 or ESG 198 or CHE 131; and upper division status

3 credits

BIO 310: Cell Biology

The cell is studied as the unit of structure, biochemical activity, genetic control, and differentiation. The principles of biochemistry and genetics are applied to an understanding of nutrition, growth, and development.

Prerequisites: C or higher in BIO 202 and 203; CHE 321 or CHE 341

3 credits

BIO 311: Techniques in Molecular and Cellular Biology

Techniques used in recombinant DNA and cell biology research. Topics include DNA manipulation and analysis, protein expression and analysis, and advanced microscopy.

This course has an associated fee. Please see www.stonybrook.edu/coursefees for more information.

Prerequisites: BIO 202; BIO 204 and BIO 205 or BIO 204 and BIO 207; CHE 132 or 142; MAT 125 or higher or AMS 151; or permission of instructor

3 credits

BIO 312: Bioinformatics and Computational Biology

This course uses computational methods to analyze current problems and solutions in molecular biology research. Students are

exposed to algorithms and tools available for both single gene and larger scale genome research. Emphasis is on practical application. Laboratories allow students to apply their knowledge to real life molecular biology problems.

Prerequisites: BIO 202; BIO 204; BIO 205 or BIO 207; MAT 126 or MAT 132 or MAT 142 or MAT 171 or AMS 161

3 credits

BIO 314: Cancer Biology

An examination of the biology of cancer. Emphasis is on molecular and cellular events, such as regulation of gene expression, genome maintenance, cell growth and death, differentiation, cell-cell recognition, signaling and homeostasis, that are frequently disrupted in cancer. Recent advances in diagnosis and therapy will also be discussed.

Prerequisite: BIO 202

3 credits

BIO 315: Microbiology

The organization, structure, energetics, and reproduction of microorganisms. Interactions of bacteria and viruses are discussed. This course has been designated as a High Demand/Controlled Access (HD/CA) course. Students registering for HD/CA courses for the first time will have priority to do so.

Prerequisites: BIO 202; CHE 132

3 credits

BIO 316: Molecular Immunology

Structure, function, and organization of the immune response at the molecular and cellular levels. Molecular mechanisms of immunological responses to microorganisms and various disease states are explored.

Prerequisites: BIO 202 and 203

Pre- or Corequisite: CHE 322 or 326

3 credits

BIO 317: Principles of Cellular Signaling

Basic principles of cellular signaling and maintenance of cellular and organismic homeostasis through intra- and intercellular signaling mechanisms. Emphasis is on relationships between nuclear events and ongoing processes of the cell. The roles of membrane receptors and second-messenger pathways in mediating such diverse events as bacterial chemotaxis, protozoan locomotion, and secretion are discussed.

Prerequisites: C or higher in BIO 202 and 203

3 credits

BIO 319: Landscape Ecology Laboratory

A computer lab course focusing on spatial concepts, methods, and tools for addressing ecological and environmental problems.

The course will be based on fundamental concepts in ecology and environmental science and extend that knowledge, as well as teaching technical skills, including the use of geographic information systems (GIS) software, image processing, spatially explicit modeling, and spatial statistics. The lab exercises will introduce a variety of spatial approaches addressing problems in environmental protection, ecotoxicology, natural resource management, conservation biology, and wildlife management.

Pre- or Corequisite: BIO 201 and BIO 204 and BIO 205 or BIO 207

Advisory Prerequisite: MAT 126 or higher
3 credits

BIO 320: General Genetics

An advanced course in genetics for biology majors. General areas to be discussed include transmission genetics, cytogenetics, immunogenetics, molecular genetics, population genetics, and quantitative genetics.

Prerequisite: BIO 202

Pre- or Corequisite: CHE 131 or 141

3 credits

BIO 321: Introduction to Ecological Genetics and Genomics

An introduction to the concepts, research questions, and methods involved in modern ecological genetics and genomics. The goal of the course is to provide a broad conceptual framework for students planning to engage in empirical work in conservation, management, ecology, and evolutionary biology. The course will cover basic Mendelian genetics, meiosis, and mating systems, standard population genetics methods for describing variation within and between populations, basic quantitative genetics, methods for molecular marker genotyping, informatic and genomic concepts, and organism-specific methods and case studies (e.g. plant ecological genetics).

Prerequisite: BIO 201 and BIO 202

Advisory prerequisite: BIO 320 and BIO 351

3 credits

BIO 325: Animal Development

An overview of animal embryonic development, emphasizing molecular mechanisms regulating embryonic growth and differentiation. General areas to be discussed include: molecular basis of human birth defects, cloning, identification of developmental genes, establishing polarity

in *Drosophila* and vertebrates, regulation of cell differentiation, morphogenesis and organ development, development of cancer.

Prerequisite: C or higher in BIO 202

3 credits

BIO 327: Developmental Genetics Laboratory

Exploration of the fundamental concepts in developmental biology and genetics through a combination of classical and modern molecular genetic approaches. Experiments are conducted using *Xenopus* and *Drosophila*, two important animal models for research in developmental biology and genetics. Students gain hands-on experience with the approaches used to investigate processes that control embryonic development on these two model systems, including the use of modern molecular methods for examining the regulation of gene expression during development. Exposure to the genetic approaches that are available in the *Drosophila* system will include participation in a genetic screen for new mutations. This course has an associated fee. Please see www.stonybrook.edu/coursefees for more information.

Prerequisite: BIO 325; BIO 204 and BIO 205

Pre- or Corequisite: BIO 320

3 credits

BIO 328: Mammalian Physiology

The basic principles of mammalian physiology. The subject matter includes circulation, respiration, nutrition, excretion (and their control by the nervous and endocrine systems), and sensation and coordination. May not be taken for credit in addition to HBY 350.

Prerequisite: BIO 203

Advisory Prerequisite: CHE 132 or 142

3 credits

BIO 334: Principles of Neurobiology

The ionic basis of nerve potentials, the physiology of synapses, sense organs and effectors, and the integrative action of the nervous system are discussed.

Prerequisites: BIO 203; CHE 131 or 141

3 credits

BIO 335: Animal Physiology Laboratory

Laboratory exercises designed to illustrate principles learned in BIO 328. Topics include muscles and hormones, physiological activities of nerves, circulation, respiration, excretion, digestion, sensory function, and central processes of coordination. One hour of lecture, one hour of recitation, and one three-hour laboratory per week. This

course has an associated fee. Please see www.stonybrook.edu/coursefees for more information.

Prerequisites: CHE 132, 133; BIO 204 and BIO 205 or BIO 204 and BIO 207

Pre- or Corequisite: BIO 328

3 credits

BIO 336 - H: Conservation Biology

Society and individual lives are increasingly affected by environmental degradation at different scales. From the decline of local fisheries to global climate change, multiple crises threaten the biodiversity and ecosystems that sustain us humans. This course introduces the scientific foundations of conservation biology, along with examples from real-world conservation. The course reviews the biological concepts that underlie conservation including habitat requirements, population dynamics, biogeography, and population genetics. Analysis of case studies on the effects of human activities on biological diversity and ecosystem services will be used to explore the interdisciplinary nature of the practice of conservation. This course will prepare students for careers in environmental sciences and ecology.

Prerequisite: BIO 201

Advisory Prerequisites: BIO 351, BIO 320

3 credits

BIO 337: Neurotransmission and neuromodulation: implications for brain function

Exploration of fundamental concepts of neurotransmission and neuromodulation of synaptic transmission. The subject matter includes an overview of the basic principles of neurotransmission and of the neuromodulatory systems in the brain. The involvement of these systems in behavior and neurological disorders is emphasized. We will discuss how specific neurological disorders can be investigated experimentally and how experimental results can contribute to understanding and treating these disorders.

Prerequisite: C or higher in BIO 203

3 credits

BIO 338: From Synapse to Circuit: Selforganization of the Brain

Exploration of basic neural and synaptic mechanisms and the operation of representative brain circuits, using both theoretical approaches and experimental evidence. Particular attention is given to Hebb's Rule, its cellular basis, its consequences for circuit selforganization, and its limits. A solid background in a mathematical, physical, or biological science

is desirable, but most relevant background material is covered in the course.

Prerequisite: BIO 203 or CHE 132 or PHY 122

Advisory Prerequisite: BIO 334

3 credits

BIO 339: Molecular Development of the Nervous System

An introduction to the molecular events that underlie development and plasticity of both the peripheral and central nervous systems, with a focus on neuronal mechanisms. Molecular and genetic approaches to the analysis of neural induction, neuronal differentiation, neuronal death and survival, neurotrophic factors, synapse formation and plasticity are presented.

Prerequisite: BIO 202 or BIO 203

3 credits

BIO 340: Zoology

Aspects of the natural history, morphology, and evolution of selected marine invertebrates, arthropods, and vertebrates. Three hours of lecture and one three-hour laboratory per week. Not for credit in addition to BIO 343 or BIO 344 if passed with C or higher. This course has an associated fee. Please see www.stonybrook.edu/coursefees for more information.

Prerequisite: BIO 201 or MAR 104; BIO 204 and 205

4 credits

BIO 341: Plant Diversity

An introduction to the study of plants, especially green plants, including the origin and evolution of land plants. Topics include cellular structure and function, photosynthesis and respiration, gross anatomy, taxonomy and the diversity of organisms, plant ecology, agriculture. Three hours of lecture and one three-hour laboratory per week. This course has an associated fee. Please see www.stonybrook.edu/coursefees for more information.

Prerequisites: BIO 201 and BIO 202, BIO 204 and BIO 205 or BIO 204 and BIO 207

4 credits

BIO 343: Invertebrate Zoology

Aspects of the diversity, comparative and functional morphology, natural history, evolution, and water-land transitions of invertebrate animals. Three hours of lecture and one three-and-one-half hour laboratory per week. This course has an associated fee. Please see www.stonybrook.edu/coursefees for more information.

Prerequisites: BIO 201 or MAR 104; BIO 204 and BIO 205 or BIO 204 and BIO 207

4 credits

BIO 344: Chordate Zoology

Introduction to the diversity, natural history, and evolution of chordates, emphasizing the living vertebrates. Three hours of lecture or discussion and one three-hour laboratory per week. This course has an associated fee. Please see www.stonybrook.edu/coursefees for more information.

Prerequisite: BIO 201, BIO 204, and BIO 205 or BIO 207

4 credits

BIO 348: Diversity and Evolution of Reptiles and Amphibians

The course will survey the diversity and natural history of the major groups of reptiles and amphibians, including snakes, lizards, turtles, crocodylians, frogs, and salamanders. Extinct groups (such as dinosaurs and pterosaurs) will also be covered. Furthermore, the course will showcase how studies of reptiles and amphibians have increased our general understanding of evolution and ecology, and will illustrate how diverse aspects of organismal biology (such as physiology, ecology, behavior, morphology) evolve and are interconnected.

Prerequisite: BIO 201

3 credits

BIO 350 - H: Darwinian Medicine

The ecology and evolution of disease, including evolution of human resistance to infection by pathogens, pathogen evolution in response to natural and technological defenses, and the ecological context of disease. Evolutionary phenomena are treated from molecular, organismal, populational, and environmental perspectives.

Prerequisites: BIO 201 and 202

3 credits

BIO 351 - H: Ecology

An examination of the interactions of living organisms with their physical and biological environments. Special attention is given to population dynamics and the interactions among organisms that determine the structure, function, and evolutionary development of biological communities.

Prerequisite: BIO 201 or permission of instructor

3 credits

BIO 352: Ecology Laboratory

Stresses the collection, analysis, and interpretation of ecological data, mostly in terrestrial settings. Laboratory and field exercises demonstrate the operation of general ecological principles in specific populations and communities. One lecture, one three-hour field trip or laboratory, and one hour of recitation per week. Three all-day Saturday field trips. This course has an associated fee. Please see www.stonybrook.edu/coursefees for more information.

Prerequisite: BIO 204 and BIO 205 or BIO 204 and BIO 207

Pre- or Corequisites: BIO 351 or permission of instructor

3 credits

BIO 353: Marine Ecology

A survey of biotic responses to ecological challenges in different marine realms. Controls of diversity and trophic structure in the marine ecosystem, historical aspects of marine realms, productivity in the oceans, plankton, soft-bottom communities, intertidal habitats, coral reefs, deep-sea environments, and effects of pollution in the ocean are discussed. This course is offered as both BIO 353 and GEO 353.

Prerequisite: BIO 201 or MAR 104

Advisory Prerequisite: BIO 343

3 credits

BIO 354: Evolution

A detailed discussion of the mechanisms of evolution, focusing on the ways in which genetic changes in populations lead to adaptation, speciation, and historical patterns of evolutionary change.

Prerequisite: BIO 201 and 202, or BIO 320

3 credits

BIO 356: Applied Ecology and Conservation Biology Laboratory

A computer laboratory course introducing students to ecological risk analysis and conservation biology. Laboratories are based on interactive software. Computer simulation techniques for addressing problems in applied ecology are emphasized.

Prerequisites: BIO 201 or BIO 202 or BIO 203; BIO 204 and BIO 205 or BIO 204 and BIO 207; MAT 126 or higher

2 credits

BIO 358 - H: Biology and Human Social and Sexual Behavior

Major features of human social and sexual behavior are examined from a biological perspective. Insights from ethology, evolutionary biology, and neurobiology are

synthesized into a picture of human nature and behavior. Implications of this picture for human sexual and social behavior are considered. This course has been designated as a High Demand/Controlled Access (HD/CA) course. Students registering for HD/CA courses for the first time will have priority to do so.

Prerequisites: U3 or U4 standing; one of the following: BIO 101, 201, 202, or 203

3 credits

BIO 359: Behavioral Ecology

A consideration of the patterns of animal behavior in relation to ecological circumstances and evolutionary history. Vertebrate examples are emphasized.

Prerequisites: BIO 201 and 203

3 credits

BIO 361: Biochemistry I

First course of a two-semester survey of the major chemical constituents of the cell, including carbohydrates, lipids, and proteins. Emphasis is on enzyme structure, enzyme kinetics, reaction mechanisms, and metabolic pathways.

Prerequisites: C or higher in BIO 202 and C or higher in CHE 322 or 326 or permission of instructor

3 credits

BIO 362: Biochemistry II

Second course of a two-semester survey. BIO 362 treats nucleic acid structure, replication, and transcription, both in vivo and in vitro. The machinery of protein synthesis is also covered, including amino acid activation; transfer RNA; ribosomes; the genetic code; and peptide chain initiation, elongation, and termination.

Prerequisites: C or higher in BIO 361

3 credits

BIO 364: Laboratory Techniques in Cancer Biology

This course will introduce contemporary concepts of cancer initiation, progression, metastasis and therapy. The lectures and recitations will include discussions of appropriate review articles, textbook readings and research articles. In the laboratory, students will be introduced to and recapitulate key techniques used in the selected research articles. This course will require significant work on computers outside of class time (more than 3 hours per week).

Prerequisite: BIO 314 with a grade of C or better; BIO 204 and BIO 205

3 credits

BIO 365: Biochemistry Laboratory

A series of laboratory experiments and discussions designed particularly to complement BIO 361 and BIO 362. This laboratory covers such topics as enzyme kinetics, spectrophotometry, recombinant DNA technology, the polymerase chain reaction and genotyping, cellular extraction of DNA, RNA, and proteins, and analytical biochemistry. Four hours of laboratory and discussion per week. This course has an associated fee. Please see www.stonybrook.edu/coursefees for more information.

Prerequisites: BIO 204 and BIO 205 or BIO 204 and BIO 207

Pre- or Corequisite: BIO 310 or BIO 361

2 credits

BIO 367: Molecular Diversity Laboratory

Hands-on experience with methods to detect and analyze molecular (DNA, RNA, protein) variation to study ecology, adaptation, and evolutionary history using natural populations of *Drosophila*, plankton, and other locally available species.

Prerequisites: BIO 201 and BIO 202, BIO 204 and BIO 205 or BIO 204 and BIO 207, and BIO 320 or BIO 351 or BIO 354

3 credits

BIO 371: Restoration of Aquatic Ecosystems

A field and laboratory course designed to introduce students to field methods in assessing the long-term effects of pollution and restoration of aquatic and marsh systems. Students will work in teams to collaborate on measuring exchange of pollutants between a restored Superfund site and adjacent areas, the long-term effects of ecological restoration, habitat assessment, aquatic community structure in restored and adjacent systems, and long-term evolutionary effects on aquatic pollutants. Other restoration systems will be compared. This course has an associated fee. Please see www.stonybrook.edu/coursefees for more information.

Prerequisites: BIO 201 and BIO 202 and BIO 204; BIO 205 or BIO 207

Advisory Prerequisite: BIO 353

4 credits

BIO 380: Entomology

A survey of the anatomy, development, classification, biogeography, physiology, ecology, and evolution of the insects. The laboratory stresses a knowledge of insect diversity and morphology. Three hours of lecture and three hours of laboratory per week.

Prerequisites: BIO 201 and 202, BIO 204 and BIO 205 or BIO 204 and BIO 207

4 credits

BIO 385 - H: Plant Ecology

Basic ecological principles as applied to the biology of individual plants, plant populations, communities, and ecosystems in relation to their environments. Examples from Long Island pine barrens, tropical rain forests, beaches, deserts, and other plant communities are studied. Examination of the connections between human societies and plant communities, which are rapidly being altered or destroyed worldwide.

Prerequisite: BIO 201

Advisory Prerequisite: BIO 351

3 credits

BIO 386 - H: Ecosystem Ecology and the Global Environment

Ecosystem ecology with an emphasis on biogeochemical cycling in oceans and on land, as well as on biosphere-atmosphere interactions. Topics include earth system processes such as climate and atmospheric composition, the hydrological cycle, cycling of chemicals such as nutrients and metals in the oceans, the soil cycle, and the fate and transport of materials in the atmosphere. Natural and perturbed systems are discussed. This course is offered as both BIO 386 and ENS 311.

Prerequisites: BIO 201; CHE 131 or 141

Advisory Prerequisite: MAR 104

3 credits

BIO 401: Seminar in Biology

Discussions of a specific area of current interest in biology. The work of each semester covers a different area of biology. Semester Supplements to this Bulletin contain topic description when standard course is offered. May be repeated as the topic changes.

Prerequisite: Permission of instructor

2-3 credits

BIO 402: Seminar in Biology

Discussions of a specific area of current interest in biology. The work of each semester covers a different area of biology. Semester Supplements to this Bulletin contain topic description when standard course is offered. May be repeated as the topic changes.

Prerequisite: Permission of instructor

2-3 credits

BIO 403: Seminar in Biology

Discussions of a specific area of current interest in biology. The work of each semester

covers a different area of biology. Semester Supplements to this Bulletin contain topic description when standard course is offered. May be repeated as the topic changes.

Prerequisite: Permission of instructor
2-3 credits

BIO 404: Seminar in Biology

Discussions of a specific area of current interest in biology. The work of each semester covers a different area of biology. Semester Supplements to this Bulletin contain topic description when standard course is offered. May be repeated as the topic changes.

Prerequisite: Permission of instructor
2-3 credits

BIO 405: Seminar in Biology

Discussions of a specific area of current interest in biology. The work of each semester covers a different area of biology. Semester Supplements to this Bulletin contain topic description when standard course is offered. May be repeated as the topic changes.

Prerequisite: Permission of instructor
2-3 credits

BIO 446: Readings in Neurobiology and Physiology

Tutorial readings in the biological sciences. These courses may be repeated, but not more than two credits may be used toward biology major requirements. Limit of one topic per semester.

Prerequisites: Written permission of instructor and undergraduate studies committee
1-2 credits, S/U grading

BIO 447: Readings in Molecular, Cellular, and Developmental Biology

Tutorial readings in the biological sciences. These courses may be repeated, but not more than two credits may be used toward biology major requirements. Limit of one topic per semester.

Prerequisites: Permission of instructor and Department of Biochemistry and Cell Biology
1-2 credits, S/U grading

BIO 449: Readings in Ecology and Evolution

Tutorial readings in the biological sciences. These courses may be repeated, but not more than two credits may be used toward biology major requirements. Limit of one topic per semester.

Prerequisites: Written permission of instructor and undergraduate studies committee
1-2 credits, S/U grading

BIO 475: Undergraduate Teaching Practicum in College Biology I

Study of the literature, resources, and teaching strategies in a field of biology, coordinated with a supervised clinical experience in instruction. Not for major credit. Students may not serve as teaching assistants in the same course twice.

Prerequisites: Permission of instructor and undergraduate studies committee
0-3 credits, S/U grading

BIO 476: Undergraduate Teaching Practicum in College Biology II

Study of the literature, resources, and teaching strategies in a field of biology, coordinated with a supervised clinical experience in instruction. Not for major credit. Students may not serve as teaching assistants in the same course twice.

Prerequisites: BIO 475; permission of instructor and undergraduate studies committee
0-3 credits, S/U grading

BIO 484: Research in Biology and Society

In these courses, the student works under the supervision of a faculty member in developing an individual project that makes use of the knowledge and techniques acquired in previous courses. The student prepares an appropriate report on the project. Any of the courses may be taken for more than two semesters, but no more than four credits of research and internship may be used for biology major requirements. Limit of one topic per semester.

Prerequisite: Written permission of instructor and undergraduate studies committee. Request for committee approval must be submitted no later than two days prior to the last day of the add period as scheduled in the academic calendar.
0-6 credits, S/U grading

BIO 486: Research in Neurobiology and Physiology

In these courses, the student works under the supervision of a faculty member in developing an individual project that makes use of the knowledge and techniques acquired in previous courses. The student prepares an appropriate report on the project. Any of the courses may be taken for more than two semesters, but no more than four credits of research and internship may be used for biology major requirements. Limit of one topic per semester.

Prerequisite: Written permission of instructor and undergraduate studies committee. Request for committee approval must be submitted no later than two days prior to the last day of the add period as scheduled in the academic calendar.

0-6 credits, S/U grading

BIO 487: Research in Molecular, Cellular, and Developmental Biology

In these courses, the student works under the supervision of a faculty member in developing an individual project that makes use of the knowledge and techniques acquired in previous courses. The student prepares an appropriate report on the project. Any of the courses may be taken for more than two semesters, but no more than four credits of research may be used for biology major requirements. Limit of one topic per semester.

Prerequisite: Permission of instructor and Department of Biochemistry and Cell Biology
0-6 credits, S/U grading

BIO 488: Internship in Biological Sciences

May be repeated up to a limit of 12 credits. Not for biology major credit.

Prerequisites: BIO 201, 202, 203; CHE 132; permission of faculty sponsor and biology internship committee
0-6 credits, S/U grading

BIO 489: Research in Ecology and Evolution

In these courses, the student works under the supervision of a faculty member in developing an individual project that makes use of the knowledge and techniques acquired in previous courses. The student prepares an appropriate report on the project. Any of the courses may be taken for more than two semesters, but no more than four credits of research may be used for biology major requirements. Limit of one topic per semester.

Prerequisite: Written permission of instructor and undergraduate studies committee. Request for committee approval must be submitted no later than two days prior to the last day of the add period as scheduled in the academic calendar.

0-6 credits, S/U grading