

**Biochemistry, Biology (BCH, BIO)****Majors and Minor in Biochemistry, Biology****Departments of Biochemistry and Cell Biology, Ecology and Evolution, Neurobiology and Behavior; College of Arts and Sciences**Undergraduate Biology web address: <http://www.bio.sunysb.edu>

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

**The Biology Program**

Undergraduate Director: Eugene R. Katz  
Assistant Director: Paula Di Pasquale  
Advisor: Ellen Lopez - [Ellen.Lopez@stonybrook.edu](mailto:Ellen.Lopez@stonybrook.edu)  
Office: G-05 Biology Learning Laboratories  
Phone: (631) 632-8530  
Web address: <http://www.bio.sunysb.edu>

**Department of Biochemistry and Cell Biology**

Interim Chairperson: Robert Haltiwanger  
Assistant to the Chair: Ann Fuhr  
Director of Undergraduate Studies: Harvard Lyman - [Harvard.Lyman@stonybrook.edu](mailto:Harvard.Lyman@stonybrook.edu)  
Department Administrator: Ann Fuhr  
Office: 450 Life Sciences Building  
Phone: (631) 632-8550  
Web address: <http://www.sunysb.edu/biochem/BIOCHEM/undergraduate.html>

**Department of Ecology and Evolution**

Chairperson: Jessica Gurevitch  
Assistant to the Chair: Donna DiGiovanni  
Director of Undergraduate Studies: John True

**Department of Neurobiology and Behavior**

Chairperson: Lorna W. Role  
Assistant to the Chair: Catherine Costanzo  
Director of Undergraduate Studies: John B. Cabot

**Department Information - Departments of Biochemistry and Cell Biology**

The Biochemistry Program

The Biochemistry Undergraduate Major Program provides a challenging and exciting introduction to the chemical basis of biological phenomena.

The major is designed to prepare students who intend to pursue graduate study, attend health-related professional schools, pursue secondary school teaching careers, and fill entry-level positions in private, state, and federal laboratories or in pharmaceutical and biotechnical industries.

The undergraduate curriculum provides a fundamental background in biology, chemistry, genetics, cell biology, and biochemistry, with courses in mathematics and physics necessary for advanced understanding of this broad field. Students may not declare a double major among biochemistry, biology, and pharmacology majors.

Requirements for the Major in Biochemistry (BCH)

All courses offered for the major must be taken for a letter grade. A minimum grade of C must be obtained in all courses in requirements A, B, and C below. Completion of the major requires approximately 70 to 74 credits.

Transfer students who wish to complete the requirements for the Biochemistry major must take Biochemistry I and II (BIO 361 and 362) and must complete at least a minimum of nine additional credits at Stony Brook in required upper-division Biology courses (BIO 310, 320, 311, or 365) and/or approved upper-division Biology elective courses.

A. Courses in Related Fields

1. CHE 131, CHE 132 General Chemistry or CHE 141, CHE 142 Honors Chemistry
2. CHE 133, CHE 134 General Chemistry Laboratory or CHE 143, CHE 144 Honors Chemistry Laboratory
3. CHE 321, CHE 326 Organic Chemistry I, IIB (See Note)
4. CHE 327 Organic Chemistry Laboratory A or CHE 383 Introductory Synthetic and Spectroscopic Laboratory Techniques
5. CHE 301 or CHE 312 Physical Chemistry

6. MAT 125, MAT 126, MAT 127 Calculus A, B, C or MAT 131, MAT 132 Calculus I, II or MAT 141, MAT 142 or MAT 171 or level 9 on mathematics placement examination.
7. PHY 121/PHY 123, PHY 122/PHY 124 Physics for the Life Sciences and Labs or PHY 125, PHY 126, PHY 127 Classical Physics A, B, C or PHY 141, PHY 142 Classical Physics I, II: Honors

Note: The Chemistry Department offers two Organic Chemistry II Courses, CHE 322 (IIA) and CHE 326 (IIB). Biochemistry majors must take CHE 326 Organic Chemistry IIB.

#### B. Core Courses in Biology

1. BIO 201 Fundamentals of Biology: Organisms to Ecosystems
2. BIO 202 Fundamentals of Biology: Molecular and Cellular Biology
3. BIO 203 Fundamentals of Biology: Cellular and Organ Physiology
4. BIO 204 Fundamentals of Scientific Inquiry in the Biological Sciences I
5. BIO 205 Fundamentals of Scientific Inquiry in the Biological Sciences II

Note: Beginning in fall 2007 BIO 201, BIO 202, and BIO 203 will be only lecture courses. Two new laboratory classes, BIO 204 and BIO 205, will be required of all biochemistry majors. 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 or BIO 205.

#### C. Advanced Courses in Biology

1. BIO 320 General Genetics (See Note 1)
2. BIO 310 Cell Biology
3. BIO 361, BIO 362 Biochemistry I,II (See Note 2)
4. One of the following laboratories:
  - BIO 365 Biochemistry Laboratory (fall only, See Note 3)
  - BIO 311 Techniques in Molecular and Cellular Biology
5. Two additional courses, totaling at least five credits, chosen after consultation with an advisor from the following list. It is highly recommended that students take more than the suggested minimum number of electives. (See Note 2)
  - BCP 401 Principles of Pharmacology
  - BCP 402 Advanced Pharmacology
  - BIO 311 Techniques in Molecular and Cellular Biology or BIO 365 Biochemistry Laboratory (See Note 3)
  - BIO 314 Cancer Biology
  - BIO 315 Microbiology
  - BIO 316 Molecular Immunology
  - BIO 317 Principles of Cellular Signaling
  - BIO 325 Animal Development
  - BIO 328 Mammalian Physiology
  - BIO 334 Principles of Neurobiology
  - BIO 339 Molecular Development of the Nervous System
  - BIO 358-H Biology of Human Social and Sexual Behavior
  - BME 304 Genetic Engineering
  - CHE 346 Bio-molecular Structure and Activity
  - HBP 390 Basic Mechanisms in Pathology

#### Notes:

1. BIO 361 and BIO 362 must be taken in order. Students who wish to take BIO 362 before BIO 361 must get permission from the course instructor. A grade of C or higher in BIO 202 and CHE 321 & CHE 326 or CHE 322 is required to enroll in BIO 361 and BIO 362.
2. A grade of C or higher in BIO 202 is required to enroll in BIO 320.
3. BIO 365 cannot count for both laboratory and elective credit.

#### D. Upper-Division Writing Requirement

To fulfill the upper-division writing requirement in Biochemistry, a sample of writing from an upper-division course in the biological sciences must be submitted to the Department of Biochemistry and Cell Biology for evaluation by the Biochemistry Writing Evaluation Committee. This writing sample can be a graded laboratory report, a graded term paper, or a report for a readings or research course, and it must contain at least 750 words of text. It is to be accompanied by a form (available in the Biochemistry and Cell Biology office) signed by the student and by the instructor of the course for which the material was written. The deadline for submission of the writing sample is February 1 for students graduating the following May or August, and October 1 for students graduating the following December. If the writing in this sample is judged satisfactory by the Writing Evaluation Committee, the requirement is fulfilled. If the writing is judged unsatisfactory, the student is advised to seek help from the Writing Center before resubmitting the writing sample.

#### Honors Program in Biochemistry

Graduation with Honors in Biochemistry requires the following:

1. A cumulative g.p.a. of at least 3.50 in all courses required for the major.
2. Presentation of an acceptable thesis based on laboratory research project. Students interested in graduation with Honors must contact the Biochemistry Honors Coordinator for more detailed information no later than the second week of classes during their last semester.

#### Bachelor of Science Degree in Biochemistry/Master of Science Degree in Chemistry Program

A student interested in this research intensive graduate program, intended to prepare students for professional employment in the chemical or pharmaceutical industries, may apply for admission at the end of the junior year. The program leads to a Bachelor of Science Degree in Biochemistry at the end of the fourth year, followed by a Master of Science in Chemistry at the end of the fifth year. During the senior year the student is expected to take two 500-level CHE courses and begin research. In the fifth year, the student works full-time on research, earning 24 credits in CHE 599. The two 500-level CHE courses taken during the senior year may be counted toward the two electives required by the Biochemistry major.

### Sample Course Sequence for the Major in Biochemistry

<b>Freshman Fall</b>	<b>Credits</b>	<b>Spring</b>	<b>Credits</b>
First Year Seminar 101		1 First Year Seminar 102	1
D.E.C. A		3 D.E.C. A	3
CHE 131		4 BIO 201, 202, or 203	3
CHE 133		1 CHE 132	4
MAT 125 or 131	3-4	CHE 134	1
D.E.C.		3 MAT 126 or 132	3-4
		D.E.C.	3
<b>Total</b>	<b>15-16</b>	<b>Total</b>	<b>18-19</b>
<b>Sophomore Fall</b>	<b>Credits</b>	<b>Spring</b>	<b>Credits</b>
BIO 201 or 202		3 BIO 201 or 202 or 203	3
CHE 321		4 CHE 326	4
MAT 127 (if MAT 125, 126, 127 sequence taken)		3 CHE 327	2
BIO 204		2 BIO 205	2
D.E.C.		3 D.E.C.	3
<b>Total</b>		<b>15</b>	<b>14</b>
<b>Junior Fall</b>	<b>Credits</b>	<b>Spring</b>	<b>Credits</b>
BIO 361*		3 BIO 362*	3
BIO elective**** or BIO 365 or 311****	2-3	BIO 310 or 320	3
PHY 121/123		4 PHY 122/124	4
D.E.C.		3 D.E.C.	3
D.E.C.		3 BIO elective****	3
<b>Total</b>	<b>15-16</b>	<b>Total</b>	<b>16</b>
<b>Senior Fall</b>	<b>Credits</b>	<b>Spring</b>	<b>Credits</b>
CHE 301**		3 BIO 310 or 320	3
BIO 365 or 311****	2-3	CHE 312**	3
D.E.C.		3 BIO elective****	3
D.E.C.		3 D.E.C.	3
D.E.C. or BIO elective****		3 D.E.C. or Elective	3
<b>Total</b>	<b>14-15</b>	<b>Total</b>	<b>15</b>

\*BIO 361 and 362 should be taken in sequence.

\*\*CHE 301 is offered only in the fall; CHE 312 is offered only in the spring

\*\*\*BIO 365 is 2 credits; BIO 311 is 3 credits

\*\*\*\*BIO electives for the major must be chosen from the approved list. Electives not on the list must be approved by a Biochemistry advisor

# 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 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](http://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](http://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](http://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 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, 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](http://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 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](http://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](http://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](http://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](http://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](http://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](http://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](http://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](http://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](http://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*