BIOLOGY

The biology major prepares students for future professional work in the life and health sciences or advanced education in numerous specializations across all fields of Biology. In addition to a high success rate in placing graduates in medical school, physician assistant programs, dental school and other health care professions, a significant number of our students also pursue graduate degrees (both Masters and PhD programs) in fields such as microbiology, physiology, cell biology and ecology. Many other students have been successful in careers in the pharmaceutical industry, and also, importantly, as teachers in primary and secondary education programs.

Programs

- Biology Major (http://catalog.fairfield.edu/undergraduate/arts-sciences/biology/biology-major/)
  - Concentration in Evolution, Ecology, and Biodiversity
  - Concentration in Health and Human Biology
  - Concentration in Marine Biology
  - Concentration in Molecular Biology
- Biology Minor (http://catalog.fairfield.edu/undergraduate/arts-sciences/biology/biology-minor/)

Courses

**BIOL 1015 Fundamentals of Biology I** 3 Credits
This course, an introductory study of biology for the non-science major, familiarizes students with the general biological principles that govern the activities of all living systems. Concepts include the biochemical origin of life, cellular morphology and physiology, and human genetics. Note: This course counts as a natural science core but does not satisfy requirements for the biology major or minor. Previously BI 0015.

**BIOL 1016 Fundamentals of Biology II** 3 Credits
Students examine biological systems, such as the human organism, in detail, with an emphasis on pathophysiology, diversity of life, and evolution. Emphasis varies by instructor. Note: This course counts as a natural science core but does not satisfy requirements for the biology major or minor. Previously BI 0016.

**BIOL 1018 Human Biology: Form and Function** 3 Credits
**Attributes:** EDCG Educational Studies Cognate, HSST Health Studies: Science and Technology
This course, which provides a basic introduction to human anatomy and physiology, examines the major organ systems of the body, focusing on how each system functions and how all systems interact with one another. Genetics, disease and prevention, nutrition, current issues in public health, and environmental health problems that human populations face are discussed. Note: This course counts as a natural science core but does not satisfy requirements for the biology major or minor. Previously BI 0018.

**BIOL 1020 Bioinspiration: Innovation Inspired by Nature** 3 Credits
This course introduces topics in Biology which have inspired developments in technology to the non-science major. Special emphasis is placed on ethical and social issues related to the knowledge and application of these technologies. Topics include biomimicry, antibiotics, gene editing, synthetic biology, and more. Through the semester, students will work together to design a bioengineering solution to an existing problem in nature. Note: This course counts as a natural science interdisciplinary core but does not satisfy requirements for the biology major or minor.

**BIOL 1030 Animal Diversity: The Amazing World of Vertebrates** 3 Credits
What's the difference between an alligator and a crocodile? How do sea turtles find their way back to their birthplace after 20 years at sea? Why do some frogs break their own bones? This course is designed for students interested in learning more about the incredible and sometimes weird world of vertebrate biology. Students will learn about the diversity, evolution, behavior, and current conservation issues of vertebrates. Students will gain a broad understanding of the process of science and an appreciation of the diversity of vertebrate life through lectures supplemented by live animal observations and examinations of preserved specimens.

**BIOL 1070 Science, Technology, and Society** 3 Credits
**Attributes:** EDCG Educational Studies Cognate
This course analyzes the major science and technology issues that confront today's society. Through an examination of the underlying science, students gain an understanding of the impact these issues hold for the environment, our natural resources, and our society, including benefit versus hazard expectations. Course issues, which change to incorporate timely topics, include acid rain; agriculture; diseases such as AIDS, cancer, and heart disease; energy; genetic engineering; the greenhouse effect; ozone depletion; and water pollution. Note: This course counts as a natural science core but does not satisfy requirements for the biology major or minor. Previously BI 0070.

**BIOL 1071 Identity and the Human Genome** 3 Credits
**Attributes:** BSCC Black Studies Component Course, BSSC Black Studies: Physical and Natural Sciences, WSGF Women, Gender, and Sexuality Studies: Gender Focused
This course introduces human genetics to the non-science major. Topics of discussion include the structure and function of genes, modes of inheritance, gene editing, sex and gender, race, and human genetic diversity. Special emphasis is placed on ethical, legal and social issues related to the knowledge and application of genetic information. Note: This course counts as a natural science core but does not satisfy requirements for the biology major or minor. Previously BI 0071.

**BIOL 1073 Contemporary Nutrition: Food for Thought** 3 Credits
**Attributes:** HSST Health Studies: Science and Technology
This course will introduce non-science majors to the core biological processes of nutrition, and contemporary nutrition concerns related to human growth and well-being throughout life. The course will include material on: food selection and preparation, sensory evaluation, human nutrition, diet analysis, and the relationship between diet and disease. Students will gain the knowledge and skill development necessary to achieve a nutritionally healthy lifestyle. Note: This course counts as a natural science core but does not satisfy requirements for the biology major or minor. Previously BI 0073.
BIOL 1074 Biology of Food 3 Credits
Attributes: EVME Environmental Studies Major Elective, EVNS
Environmental Studies: Natural Science, EVPE Environmental Studies Elective, MSID Magis Core: Interdisciplinary
This course will introduce non-science majors to the biological processes behind the food that we produce and harvest as well as the environmental consequences of our diet choices. This course will include material on: the rise of agriculture, plant and animal growth requirements and life cycles, evolution, and a description and discussion of food organisms in the modern North American diet, techniques of food production, and effects on the environment. Note: This course counts as a natural science core but does not satisfy requirements for the biology major or minor. Previously BI 0074.

BIOL 1075 Ecology and Society 3 Credits
Attributes: EDCG Educational Studies Cognate, EVME Environmental Studies Major Elective, EVNS Environmental Studies: Natural Science, EVPE Environmental Studies Elective, PJST Peace and Justice Studies
This course focuses on environmental issues raised by modern society's conflicting needs for land, water, a livable environment, and renewable/nonrenewable resources. Students examine the available scientific evidence and are encouraged to draw their own conclusions concerning these environmentally sensitive issues, which are presented in lectures, readings, films, and occasional, off-campus field trips (by arrangement). Note: This course counts as a natural science core but does not satisfy requirements for the biology major or minor. Previously BI 0075.

BIOL 1076 Environmental Science 3 Credits
Attributes: EVME Environmental Studies Major Elective, EVNS
Environmental Studies: Natural Science, EVPE Environmental Studies Elective, MSID Magis Core: Interdisciplinary, PJST Peace and Justice Studies
The science of the environment is presented through examination of the interconnections among physical, chemical, and biological fields of inquiry. This course looks at how the global environment is altered by the human population, technology, and production of fuels and food. In this course, students will acquire a scientific understanding of current issues in environmental science and learn to evaluate claims about current environmental problems. Note: This course counts as a natural science core but does not satisfy requirements for the biology or chemistry major or minor. Previously CHEM 1076. Previously BI 0076.

BIOL 1078 Introduction to Marine Science 3 Credits
Attributes: EVME Environmental Studies Major Elective, EVNS
Environmental Studies: Natural Science, EVPE Environmental Studies Elective
This course introduces the non-science major to the field of oceanography. Topics dealing with the geological, physical, chemical, and biological aspects of science underscore the interdisciplinary nature of world ocean study. Note: This course counts as a natural science core but does not satisfy requirements for the biology major or minor. Previously BI 0078.

BIOL 1088 Biomedical Science and Society 3 Credits
Attributes: HSST Health Studies: Science and Technology, MSID Magis Core: Interdisciplinary
This core science course will engage students in inquiry-based scientific methodology through exploration of specific topics in biomedical science related to human health and disease. The course will explore four biomedical topics. Each topic will include approaches and contributions from chemistry and mathematics, so students appreciate the inherently interdisciplinary nature of science. The course will cover biomedical concepts, quantitative skills, the collection and analysis of data, and guided activities that utilize approaches from all three fields to address biomedical questions. The societal impact and implications of each topic will also be explored. Previously BI 0088.

BIOL 1095 Philosophy and Biology of Evolutionary Theory 3 Credits
Prerequisite: PHIL 1101.
This course explores the question of evolutionary theory from the perspectives of philosophy and biology. From the biological perspective, the course focuses on genetics, adaptive evolution, neutral evolution, the genetic impact of selection on populations, the origin and maintenance of genetic variation, the importance of development in evolution, and the expression of variation. From the philosophical perspective, the course focuses on evolution as theory and ideology, the critique of the adaptationist program, evolution and contingency, typological versus population thinking, and the developmental systems critique. Note: This course counts as a natural science core but does not satisfy requirements for the biology major or minor. Previously BI 2216. Previously BI 0095.

BIOL 1096 God and Modern Biology 3 Credits
Attributes: CAOT Catholic Studies: Non-Religious Studies
This course introduces students to the dialogue between science and religion with a detailed consideration of recent advances in modern biological research that raise significant religious, theological, and ethical issues. The course emphasizes developing a practical understanding of the scientific method through interactive experiences and lecture material. Students consider how scientific breakthroughs and ideas can influence or be influenced by religious thought through assigned readings and in-class discussion groups and through the historically significant and most recent findings in the areas of evolution, biotechnology, and the neurosciences. Note: This course counts as a natural science core but does not satisfy requirements for the biology major or minor. Previously BI 0096.

BIOL 1107 Human Anatomy and Physiology I 4 Credits
Attributes: HSST Health Studies: Science and Technology
Corequisite: BIOL 1107L.
Homeostasis is the major theme of this course, with form and function covered together each semester. This course introduces the student to anatomical terminology, homeostasis and feedback control, membrane physiology, and tissues followed by the integumentary, skeletal, muscular, and nervous systems. A strong chemistry background is recommended. Note: This course is not open to biology majors except where required for allied health sciences (chair approval required). Previously BI 0107.

BIOL 1107L Human Anatomy and Physiology I Lab 0 Credits
Fee: $75 Science Lab Fee
Corequisite: BIOL 1107.
Laboratory work closely follows the BIOL 1107 lecture and includes microscopic anatomy (histology), use of virtual cadaver (Anatomage Table), anatomical models, human skeletons, and dissections for study of gross anatomy, and physiology experiments including muscle recruitment measurements, reflex tests and cranial nerve tests. Previously BI 0107L.
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<th>Course Title</th>
<th>Credits</th>
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<th>Corequisite/Prerequisite/Attributes</th>
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<td>BIOL 1108L.</td>
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<td>Corequisite: BIOL 1108.</td>
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<td>Prerequisite: BIOL 1107.</td>
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<td>Laboratory work closely follows the BIOL 1108 lecture and includes microscopic anatomy (histology), use of virtual cadaver (Anatomage Table), anatomical models, and dissections for study of gross anatomy, and physiology experiments including blood pressure measurements, blood typing, lung function, and urinalysis. Previously BI 0108L.</td>
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<td>BIOL 1151</td>
<td>Elements of Microbiology</td>
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<td>$75 Science Lab Fee</td>
<td>BIOL 1107, CHEM 1184.</td>
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<td>Corequisites: BIOL 1107L, BIOL 1171P.</td>
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<td>This microbiology course for nursing majors examines the structure and function of bacteria, viruses, yeasts, molds, antibiotics, and bacterial genetics as well as the mechanisms of microbial invasion and the body's immunological response. Note: This course is not open to biology majors. Previously BI 0151.</td>
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<td>BIOL 1171</td>
<td>General Biology I</td>
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<td>BIOL 1171L, BIOL 1171P.</td>
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<td>Corequisites: BIOL 1171L, BIOL 1171P.</td>
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<td>This introductory course for biology majors covers the molecular and cellular basis of life, including cell structure and function, cell communication, inheritance, gene expression and regulation, and developmental genetics. Students receive hands-on experience with a broad range of topics and techniques in the accompanying laboratory. Previously BI 0170.</td>
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<td>BIOL 1172</td>
<td>General Biology II</td>
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<td>Corequisites: BIOL 1172L, BIOL 1172P.</td>
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<td>This introductory course for biology majors covers biochemistry, energy utilization, anatomy and physiology, and the structure and function of plants and animals. Students receive hands-on experience with a broad range of topics and techniques in the accompanying laboratory. Previously BI 0171.</td>
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<td>BIOL 1173</td>
<td>General Biology I</td>
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<td>Corequisite: BIOL 1173L.</td>
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<td>This introductory course for biology majors covers organismal biology with an emphasis on evolution, biological diversity, ecology, and environmental science. Students receive hands-on experience with a broad range of topics and techniques in the accompanying laboratory. Previously BI 0172.</td>
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<td>BIOL 1173L</td>
<td>General Biology III Lab</td>
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<td>$75 Science Lab Fee</td>
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<td>BIOL 2218</td>
<td>Vertebrate Zoology</td>
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<td>$75 Science Lab Fee</td>
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<td>Corequisite: BIOL 2218.</td>
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<td>This lab focuses on the development of a vertebrate research project at the Connecticut's Beardsley Zoo, which currently houses over 130 species of animals, a number of which are currently listed as endangered. As a participant in the Species Survival Plan (SSP) program, the zoo's mission is to promote the preservation of such endangered species as well as provide the best possible enclosures for many of the zoo's other residents. You will be engaged in the design, execution, analysis and presentation of research, which will ultimately be used by the Connecticut's Beardsley Zoo to enhance their care and protection of vertebrates. Previously BI 0218L.</td>
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<td>BIOL 2251</td>
<td>Human Nutrition</td>
<td>3</td>
<td>$75 Science Lab Fee</td>
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<td>Corequisites: BIOL 1107, BIOL 1108; or BIOL 1171, BIOL 1172, BIOL 1173.</td>
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<td>This course offers a comprehensive study of the fundamental principles of human nutrition. The course emphasizes the role diet plays in the prevention of disease and promotion of health. Students will integrate the fundamentals of digestion, absorption, and metabolism as they apply to nutrient intake. Major topics include: weight management as it relates to the physiology, metabolism, and behavioral psychology of energy balance; the nutritional needs of humans at various stages of the life cycle; how scientific evidence has shaped the current dietary guidelines and the food environment. Previously BI 0251.</td>
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<td>BIOL 2260</td>
<td>Ecology</td>
<td>4</td>
<td>$75 Science Lab Fee</td>
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<td>Attributes: EDCG Educational Studies Cognate, EVME Environmental Studies Major Elective, EVNS Environmental Studies: Natural Science, EVPE Environmental Studies Elective</td>
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<td>Corequisite: BIOL 2260L.</td>
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<td>Prerequisites: BIOL 1173, CHEM 1172.</td>
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<td>This course is designed as an overview of the science of ecology. The study of interactions between organisms and their environment. The course uses a hierarchical approach to describe organisms, populations, communities, and ecosystems. We discuss the types of questions ecologists ask, and the methods ecologists use to answer questions. Previously BI 0260.</td>
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<td>Ecology Lab</td>
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BIOL 2261 Genetics 4 Credits
**Attributes:** EDCG Educational Studies Cognate
**Corequisite:** BIOL 2261L.
**Prerequisites:** BIOL 1171, BIOL 1172, BIOL 1173.
This course offers a comprehensive study of the fundamental principles of classical and molecular genetics. Major topics include transmission (Mendelian) genetics, gene linkage and mapping, fundamentals of molecular biology, molecular approaches to genetic analysis, genetic engineering and recombinant DNA technology, microbial genetics, regulation of gene expression, and genomics. Previously BI 0261.

**Fee:** $75 Science Lab Fee

BIOL 2261L Genetics Lab 0 Credits

BIOL 2262 Human Physiology 4 Credits
**Corequisite:** BIOL 2262L.
**Prerequisites:** BIOL 1171, BIOL 1172, BIOL 1173 or PSYC 1610; CHEM 1172.
This course considers homeostasis in humans by means of a comprehensive survey of the morphology and physiology of human organ systems. Special emphasis is given to organ systems associated with water and electrolyte balance, respiration, digestion, movement, and neurological control. Previously BI 0262.

**Fee:** $75 Science Lab Fee

BIOL 2262L Human Physiology Lab 0 Credits

BIOL 2951 Biology Teaching Practicum I 1 Credit
**Prerequisite:** Successful completion of the assigned course and laboratory.
This series of courses represents opportunities (up to six semesters) for Biology majors to gain experience in teaching practices in the laboratory as classroom setting. Students will be paired with an instructor, and assist in instruction, grading and overall successful running of a laboratory section. Strong prior performance in the laboratory to which the student will be assigned is required. Selection will be made by the biology department, after a general call is put out to all students who may be interested in the opportunity. Enrollment by permission only. Previously BI 0201.

BIOL 2952 Biology Teaching Practicum II 1 Credit
**Prerequisite:** Successful completion of the assigned course and laboratory.
This series of courses represents opportunities (up to six semesters) for Biology majors to gain experience in teaching practices in the laboratory as classroom setting. Students will be paired with an instructor, and assist in instruction, grading and overall successful running of a laboratory section. Strong prior performance in the laboratory to which the student will be assigned is required. Selection will be made by the biology department, after a general call is put out to all students who may be interested in the opportunity. Enrollment by permission only. Previously BI 0202.

BIOL 2953 Biology Teaching Practicum III 1 Credit
**Prerequisite:** Successful completion of the assigned course and laboratory.
This series of courses represents opportunities (up to six semesters) for Biology majors to gain experience in teaching practices in the laboratory as classroom setting. Students will be paired with an instructor, and assist in instruction, grading and overall successful running of a laboratory section. Strong prior performance in the laboratory to which the student will be assigned is required. Selection will be made by the biology department, after a general call is put out to all students who may be interested in the opportunity. Enrollment by permission only. Previously BI 0203.

BIOL 2954 Biology Teaching Practicum IV 1 Credit
**Prerequisite:** Successful completion of the assigned course and laboratory.
This series of courses represents opportunities (up to six semesters) for Biology majors to gain experience in teaching practices in the laboratory as classroom setting. Students will be paired with an instructor, and assist in instruction, grading and overall successful running of a laboratory section. Strong prior performance in the laboratory to which the student will be assigned is required. Selection will be made by the biology department, after a general call is put out to all students who may be interested in the opportunity. Enrollment by permission only. Previously BI 0204.

BIOL 2955 Biology Teaching Practicum V 1 Credit
**Prerequisite:** Successful completion of the assigned course and laboratory.
This series of courses represents opportunities (up to six semesters) for Biology majors to gain experience in teaching practices in the laboratory as classroom setting. Students will be paired with an instructor, and assist in instruction, grading and overall successful running of a laboratory section. Strong prior performance in the laboratory to which the student will be assigned is required. Selection will be made by the biology department, after a general call is put out to all students who may be interested in the opportunity. Enrollment by permission only. Previously BI 0205.

BIOL 2956 Biology Teaching Practicum VI 1 Credit
**Prerequisite:** Successful completion of the assigned course and laboratory.
This series of courses represents opportunities (up to six semesters) for Biology majors to gain experience in teaching practices in the laboratory as classroom setting. Students will be paired with an instructor, and assist in instruction, grading and overall successful running of a laboratory section. Strong prior performance in the laboratory to which the student will be assigned is required. Selection will be made by the biology department, after a general call is put out to all students who may be interested in the opportunity. Enrollment by permission only. Previously BI 0206.

BIOL 3314 Endocrinology 3 Credits
**Prerequisites:** BIOL 1173, CHEM 2271.
This course examines the glands of internal secretion and their location, anatomy, and function, including the mechanisms of their secretions and cell signaling importance in the regulation of body functions. Previously BI 0314.

BIOL 3315 Anatomy: Form and Function 3 Credits
**Prerequisites:** BIOL 1173.
This course examines the anatomy of animals emphasizing the functional and evolutionary diversity of vertebrates. The course will consist of lectures focused on morphological variation and evolution, readings of the primary literature and anatomical dissections of comparative structures. Previously BI 0315.
BIOL 3319 Zoology Field Experience 3 Credits
Attributes: EVME Environmental Studies Major Elective, EVNS Environmental Studies: Natural Science, EVPE Environmental Studies Elective, LCEL LACS Minor Elective
Prerequisite: BIOL 2218 or BIOL 3365.
Students will take part in an exciting field-trip experience to Brazil, where they will interact directly with research biologists doing field experiments in the Atlantic coastal rain forest and surrounding ecosystems of Brazil. While in Brazil, students will work in the field collecting data on a particular specialized topic, and work closely with the Brazil research team in analyzing and presenting these data in a scientifically appropriate format. Upon return to Fairfield, the semester will be spent perfecting techniques in data organization, analysis and presentation including a formal paper, poster, and/or talk. Enrollment by permission only. Previously BI 0319.

BIOL 3319L Zoology Field Experience Lab 3 Credits
Attributes: EVME Environmental Studies Major Elective, EVNS Environmental Studies: Natural Science
Fee: $75 Science Lab Fee
Prerequisite: BIOL 2218 or BIOL 3365.
Students will take part in an exciting field-trip experience to Brazil, where they will interact directly with research biologists doing field experiments in the Atlantic coastal rain forest and surrounding ecosystems of Brazil. While in Brazil, students will work in the field collecting data on a particular specialized topic, and work closely with the Brazil research team in analyzing and presenting these data in a scientifically appropriate format. Upon return to Fairfield, the semester will be spent perfecting techniques in data organization, analysis and presentation including a formal paper, poster, and/or talk. Enrollment by permission only. Previously BI 0319L.

BIOL 3323L Biochemistry Lab 1 Credit
Fee: $75 Science Lab Fee
Corequisite: BIOL 3324 or BIOL 3325.
This course will investigate classic and most current methodology used in biochemistry. A semester project will be used to introduce techniques used in biochemistry to investigate the structure and function of a protein. In characterizing this protein, the analysis of DNA, lipids and carbohydrates will also be covered. Crosslisted with CHEM 3323L. Previously BI 0323L.

BIOL 3324 Biochemistry I 3 Credits
Prerequisite: CHEM 2272.
This course will investigate the fundamentals of life: chemistry. The structures and functions of biomolecules, including proteins, DNA, RNA, lipids, and carbohydrates will be covered in depth. The concepts behind biological processes will be discussed, including enzyme kinetics and regulatory strategies, membrane functions, signal transduction, and an overview of metabolism. Crosslisted with CHEM 3324. Previously BI 0324.

BIOL 3325 Biochemistry II 3 Credits
Prerequisite: CHEM 2272.
This course focuses on the regulation of metabolic pathways involved in the synthesis, breakdown, and interconversion of biochemical intermediates that are fundamental to all life. Basic principles of biological thermodynamics will be highlighted in order to understand the processes by which living cells obtain and utilize energy. Students will develop an understanding of basic biomedical principles in the context of overall cell function. This course cannot be taken as a biology block elective if BIOL 3330 has been taken previously. Crosslisted with CHEM 3325. Previously BI 0325.

BIOL 3327 Cell Biology 4 Credits
Attributes: EDCG Educational Studies Cognate
Corequisite: BIOL 3327L.
Prerequisites: BIOL 1173, CHEM 2272.
This course focuses on the structure and function of eukaryotic cells. Students explore the relationship between gene expression and protein synthesis, and discuss how different proteins coordinate a complex array of important biological tasks in the cell. The course covers the biochemical interactions that occur within and between cells that sustain viability and mediate cell communication. Topics include gene expression and protein production, enzyme structure/function, protein to protein interactions, cytoskeleton and extracellular matrix, mechanisms of transport, signal transduction, cell cycle, and apoptosis. Laboratories include analysis of cell morphology, RNA and protein expression, and assays to study the growth, differentiation, and death of eukaryotic cells in response to their environment. Previously BI 0327.

Fee: $75 Science Lab Fee

BIOL 3330 Nutrient Metabolism 3 Credits
Prerequisites: BIOL 1173, CHEM 2272.
This course is designed to provide students with an in-depth understanding of nutrient metabolism in humans. This course will examine the digestion, absorption, and metabolism of macronutrients: carbohydrate, lipid and protein, in addition to the essential biological functions of vitamins and minerals. The emphasis of this course will be on the interrelationship and control of nutrient utilization by various organ systems in the body, building upon principles of human physiology and biochemistry. This course cannot be taken as a biology block elective if BIOL 3325 has been taken previously. Previously BI 0330.

BIOL 3342 Developmental Biology 4 Credits
Attributes: EDCG Educational Studies Cognate
Corequisite: BIOL 3342L.
Prerequisite: BIOL 1173.
This course will investigate classic and most current methodology used in biochemistry. A semester project will be used to introduce techniques used in biochemistry to investigate the structure and function of a protein. In characterizing this protein, the analysis of DNA, lipids and carbohydrates will also be covered. Crosslisted with CHEM 3323L. Previously BI 0323L.

Fee: $75 Science Lab Fee

BIOL 3342L Developmental Biology Lab 0 Credits
Fee: $75 Science Lab Fee

BIOL 3352 Fundamentals of Microbiology 4 Credits
Attributes: EDCG Educational Studies Cognate
Corequisite: BIOL 3352L.
Prerequisites: BIOL 2261, CHEM 2272.
This comprehensive introduction to microbiology includes microbial cell structure, physiology, genetics, evolution and taxonomy, diversity, ecology, and applied microbiology. Lab sessions introduce microbiological techniques (aseptic technique, microscopy, bacterial staining, culture techniques), and other research methods. Students use skills acquired in the lab to design and conduct independent investigations. Previously BI 0352.
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<th>Credits</th>
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<tr>
<td>BIOL 3354</td>
<td>Molecular Biology</td>
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<td>BIOL 3356</td>
<td>Immunology</td>
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**Fee:** $75 Science Lab Fee

**Attributes:**
- EDCG Educational Studies Cognate
- EVME Environmental Studies: Natural Science, EVPE Environmental Studies Elective

**Corequisites:**
- BIOL 3362L, BIOL 3364, BIOL 3364L, BIOL 3365L, BIOL 3365L, BIOL 3366L, BIOL 3372L, BIOL 3372L, BIOL 1173, CHEM 2272.

**Prerequisites:**
- BIOL 1172, CHEM 2272.
BIOL 4971 Biology Research I 1-3 Credits
This course requires a research thesis involving laboratory investigation. Seniors and qualified juniors obtain the consent of the professor supervising their research interest area prior to registering for this program. Past topics include aquatic ecology, bacterial ecology and physiology, biochemistry, cell-wall biosynthesis, evolution of marine invertebrates, genetic regulation of animal development, mammalian physiology, plant biostimulants, plant/insect ecology, population and disease dynamics of shellfish, and signal transduction/gene regulations. Previously BI 0391.

BIOL 4972 Biology Research II 1-3 Credits
This course requires a research thesis involving laboratory investigation. Seniors and qualified juniors obtain the consent of the professor supervising their research interest area prior to registering for this program. Past topics include aquatic ecology, bacterial ecology and physiology, biochemistry, cell-wall biosynthesis, evolution of marine invertebrates, genetic regulation of animal development, mammalian physiology, plant biostimulants, plant/insect ecology, population and disease dynamics of shellfish, and signal transduction/gene regulations. Previously BI 0392.

BIOL 4973 Biology Research III 1-3 Credits
This course requires a research thesis involving laboratory investigation. Seniors and qualified juniors obtain the consent of the professor supervising their research interest area prior to registering for this program. Past topics include aquatic ecology, bacterial ecology and physiology, biochemistry, cell-wall biosynthesis, evolution of marine invertebrates, genetic regulation of animal development, mammalian physiology, plant biostimulants, plant/insect ecology, population and disease dynamics of shellfish, and signal transduction/gene regulations. Previously BI 0393.

BIOL 4974 Biology Research IV 1-3 Credits
This course requires a research thesis involving laboratory investigation. Seniors and qualified juniors obtain the consent of the professor supervising their research interest area prior to registering for this program. Past topics include aquatic ecology, bacterial ecology and physiology, biochemistry, cell-wall biosynthesis, evolution of marine invertebrates, genetic regulation of animal development, mammalian physiology, plant biostimulants, plant/insect ecology, population and disease dynamics of shellfish, and signal transduction/gene regulations. Previously BI 0394.

BIOL 4975 Biology Research V 1-3 Credits
This course requires a research thesis involving laboratory investigation. Seniors and qualified juniors obtain the consent of the professor supervising their research interest area prior to registering for this program. Past topics include aquatic ecology, bacterial ecology and physiology, biochemistry, cell-wall biosynthesis, evolution of marine invertebrates, genetic regulation of animal development, mammalian physiology, plant biostimulants, plant/insect ecology, population and disease dynamics of shellfish, and signal transduction/gene regulations. Previously BI 0395.

BIOL 4976 Biology Research VI 1-3 Credits
This course requires a research thesis involving laboratory investigation. Seniors and qualified juniors obtain the consent of the professor supervising their research interest area prior to registering for this program. Past topics include aquatic ecology, bacterial ecology and physiology, biochemistry, cell-wall biosynthesis, evolution of marine invertebrates, genetic regulation of animal development, mammalian physiology, plant biostimulants, plant/insect ecology, population and disease dynamics of shellfish, and signal transduction/gene regulations. Previously BI 0396.

BIOL 4981 Internship 1-3 Credits
Prerequisite: Junior standing.
Internships are available to biology majors in good academic standing, subject to individual arrangement, for students interested in allied health, environmental science, marine science, medicine, dentistry, biotechnology, and emergency medicine. Students provide their own transportation and must discuss their internships with the department chair and obtain consent of the supervising professor prior to registering for this course. Previously BI 0397.

BIOL 4982 Internship 1-3 Credits
Prerequisite: Junior standing.
Internships are available to biology majors in good academic standing, subject to individual arrangement, for students interested in allied health, environmental science, marine science, medicine, dentistry, biotechnology, and emergency medicine. Students provide their own transportation and must discuss their internships with the department chair and obtain consent of the supervising professor prior to registering for this course. Previously BI 0398.

BIOL 4990 Independent Study 3 Credits
This course requires library research and the writing of a scholarly paper on a special topic. Students discuss topics with and must obtain consent from an appropriate professor prior to registration. Previously BI 0296.

BIOL 4999 Capstone Seminar (Shell) 3 Credits
During the capstone experience, students connect the diverse experience and knowledge they have acquired as biology majors, focusing these skills on examining in depth, a specific topic. In a small class setting (10-12 students maximum), students and the professor delve deeply into the chosen topic, assessing the peer-reviewed literature and current trends around the particular subject. Students bring their breadth of knowledge to the discussion, and apply what they have learned over the course of their academic training to critically analyze the arguments and experiments presented in the literature. In most cases, students will be responsible for presenting a paper to the class, driving the content of discussion and debate with their fellow students and instructor. The capstone is a reading extensive experience, and by definition, shows that the biology major is able to synthesize and apply their knowledge to examine interesting questions. To maximize the value of the capstone experience, students enroll in an upper-level seminar course during their senior year. Previously BI 0399.

BIOL 4999A Senior Capstone Seminar: Biology of Cancer 3 Credits
Attributes: BICP Biology Major Capstone Course
Prerequisites: BIOL 1173, one course from the Molecular Block, senior standing.
This seminar requires students to draw on nearly all of their training as biology majors to understand the disease of cancer in great detail. Topics include the genetic/cellular basis for the disease, physiological effects of tumor progression and metastasis, environmental influences, treatment modalities, and the personal, familial and societal impacts of the disease. Students read extensively for the course and summarize and formally present current research in the field in an effort to develop their scientific communication skills. Numerous short reviews of research articles are also produced by students.
BIOL 4999B Senior Capstone Seminar: Molecular Mechanisms of Human Disease 3 Credits
Attributes: BICP Biology Major Capstone Course
Prerequisites: BIOL 1173, one course from the Molecular Block, senior standing.
This seminar covers the molecular and cellular events that underlie complex human diseases. Students learn to critically analyze and interpret primary literature on the molecular aspects of such diseases as cancer, diabetes, heart disease, Alzheimer’s, and AIDS. Students summarize and present selected articles at each meeting and use these acquired skills to investigate a particular topic of their choice in the form of a grant proposal for their final project.

BIOL 4999C Senior Capstone Seminar: Bacterial Pathogenesis 3 Credits
Attributes: BICP Biology Major Capstone Course
Prerequisites: BIOL 1173, one course from the Molecular Block, senior standing.
This seminar examines the role of prokaryotes in disease, with an emphasis on the genetics and physiology of disease mechanisms. Topics include aspects of the human immune response, host-parasite relationships, and the epidemiology and evolution of infectious disease.

BIOL 4999D Senior Capstone Seminar: Nutritional Epigenetics 3 Credits
Attributes: BICP Biology Major Capstone Course
Prerequisites: BIOL 1173, one course from the Molecular or Physiology Block, senior standing.
This seminar will cover emerging topics in nutritional epigenetics: the mechanisms by which nutrients regulate gene expression. Emphasis will be placed on genes regulated by essential dietary compounds (e.g. carbohydrates, lipids, vitamins and minerals) within the context of conditions such as cardiovascular disease, diabetes and cancer. Students will analyze and present scientific literature and write a grant proposal.

BIOL 4999E Senior Capstone Seminar: Reproductive Tactics 3 Credits
Attributes: BICP Biology Major Capstone Course
Prerequisites: BIOL 1173, one course from the Physiology Block, senior standing.
This seminar explores the ways animals have evolved creative mechanisms, physiological and behavioral, to maximize their reproductive success. Topics will include mate choice and sexual conflict, paternity, variability in reproductive anatomy, mechanisms for successful fertilization, sperm competition, and sperm choice. Course format: A reading extensive course. Students will read from a source text for foundation ideas, then will each find and present to the entire class, scientific research papers from the primary literature.

BIOL 4999F Senior Capstone Seminar: Coral Reef Ecology 3 Credits
Attributes: BICP Biology Major Capstone Course, EVME Environmental Studies Major Elective, EVPE Environmental Studies Elective
Prerequisites: BIOL 1173, one course from the Ecology Block, senior standing.
Students study the complex ecological relationships found in coral reef ecosystems. Topics include discussions of reef development, coral symbiosis and growth, reef trophic dynamics, ecology and behavior of coral reef fish and invertebrates, and effects of natural and human disturbance on coral reef communities. Course format: seminar in which students read, analyze, and present scientific research papers from the primary literature.

BIOL 4999G Senior Capstone Seminar: Ecology of the North Atlantic Coast 3 Credits
Attributes: BICP Biology Major Capstone Course
Prerequisites: BIOL 1173, one course from the Ecology Block, senior standing.
This seminar examines the processes that generate ecological patterns in North Atlantic coastal ecosystems with a focus on the ecology of salt marshes, tidal rivers, sandy beaches, and rocky shores, and the human impact on these systems. The course centers on student-led discussions of readings from scientific literature.

BIOL 4999H Senior Capstone Seminar: Principles of Aquaculture 3 Credits
Attributes: BICP Biology Major Capstone Course
Prerequisites: BIOL 1173, one course from the Aquaculture Block, senior standing.
This seminar introduces students to the rapidly-growing science of aquaculture or fish farming. Using a comprehensive approach, the course includes discussions of the following topics: historical development, culture and rearing techniques, diseases, regulations, and permitting and marketing of aquatic plants and animals. Course format: seminar in which students read, analyze, and present scientific and technical papers from the primary literature. Field trips to nearby aquaculture facilities may be included.

BIOL 4999I Senior Capstone Seminar: Topics in Evolutionary Biology 3 Credits
Attributes: BICP Biology Major Capstone Course
Prerequisites: BIOL 1173, one course from the Evolutionary Block, senior standing.
Evolution is the theme that unites all fields of biology. The broad objective of this course is to encourage students to integrate all the knowledge they have acquired as a biology major to critically interpret and analyze questions from an evolutionary perspective. In this seminar, we will read and discuss the current literature on major evolutionary topics, which have revolutionized the way in which we think about genomics, sex and reproduction, and our own human beginnings. We will also address important contemporary but controversial topics such as evolutionary medicine and evolutionary psychology. The course centers on student led discussions, presentations and literature critiques.

BIOL 4999J Senior Capstone Seminar: Pathophysiology of Bone and Cartilage 3 Credits
Attributes: BICP Biology Major Capstone Course
Prerequisites: BIOL 1173, one course from the Physiology Block, senior standing.
This seminar will focus on the biochemistry and physiology of human bone and cartilage. Emphasis will be placed on the normal development and healing of these tissues along with an introduction to common skeletal tissue disorders such as osteoporosis and arthritis. Students will be expected to analyze and present scientific literature while integrating the material with basic knowledge acquired from previous courses.

BIOL 4999K Senior Capstone Seminar: Ichthyology 3 Credits
Attributes: BICP Biology Major Capstone Course
Prerequisites: BIOL 1173, one course from the Physiology Block, senior standing.
This seminar will explore the diversity of fishes, the largest group of vertebrates. Topics for discussion will include feeding, locomotion, metabolism, and sensory systems of fishes. Students will analyze and present scientific literature and write a grant proposal.
BIOL 4999M Senior Capstone Seminar: Conservation Biology  3 Credits

Attributes: BICP Biology Major Capstone Course, EVME Environmental Studies Major Elective, EVNS Environmental Studies: Natural Science, EVPE Environmental Studies Elective

Prerequisites: BIOL 1173, one course from the Ecology Block, senior standing.

Conservation biology is focused on scientific investigation of the maintenance, loss, and restoration of biodiversity. It relies on biological principles (from disciplines such as population genetics, biogeography, and community ecology) applied in the context of human-modified environments. In this seminar, students will read and discuss the primary literature in this field and gain an appreciation of the linkages of conservation problems across biological scales (genes to ecosystems) and geographical scales (local to global). Students will also prepare a review of research on a current conservation issue, and will practice with conservation planning and management tools.

Faculty

Professors

Braun
Klug
Phelan, Chair and Director, School of Natural and Behavioral Sciences and Mathematics
Walker

Associate Professors

Andersen
Biardi, Director, Environmental Studies
Byun, Graduate School Advisor
Fernandez
Gerry
Harriott, Education Advisor
Osier
Sauer, G

Assistant Professors

Church, Director, Health Studies Minor; Health Professions Advisor
Counsell
Maswood (visiting)

Instructors of the Practice

DeCristofaro
Earls
Rodriguez

Lecturers

Clark
Cunningham
Date
Dutta
Fine, B.
George
Hudson
Muthukumarana
Stoehr
Zavras

Professors Emeriti

Brousseau
Hodgkinson
Poincelot