BIOLOGY

The Biology Department’s innovative and interdisciplinary curricula combine a rigorous grounding in the foundational principles of biological science at all scales of organization from molecules to ecosystems with the opportunity for students to specialize in areas of their own choosing. The program reflects the complexity and diversity of the living world and emphasizes the unifying principles of biological science: evolution, transformations of energy and matter, structure and function, information flow exchange and storage and the higher level complexity inherent in multi-component systems. *

Graduates of our program will be conversant in the cellular and molecular basis of life, the design and functioning of individual organisms and the ecological interactions of organisms. They will respect the primacy of evidence and appreciate its role in the historical development and advancement of a discipline. Graduates will be able to analyze evidence in a critical fashion through exposure to data analysis in literature and in laboratory coursework. Finally, graduates will be cognizant of the possible social impact of our ever increasing understanding of biological science and will be prepared to wrestle with the difficult ethical conflicts resulting from such advancement.

Students may choose from one of four different curriculum tracks to support these academic objectives and their future career plans: Traditional, Molecular and Cellular, Ecology and Conservation or Neuroscience. All four tracks are based on a four course foundational series: Concepts in Biology I: Molecules to Cells; Concepts in Biology II: Cells to Organisms; Organisms to Populations and Populations to Ecosystems. Accompanying the lecture portion of the foundational courses are lab courses that incorporate multi-week open-ended investigations that reinforce the concepts under study and emphasize the process of science and scientific writing. The Traditional program emphasizes a broad training in biology by requiring one upper-division elective in each of three areas corresponding to different levels of biological organization. The Molecular and Cellular Biology concentration emphasizes coursework in molecular and cellular areas of biology and related disciplines and is ideal for students preparing for graduate or professional training in the biomedical sciences or employment in the pharmaceutical and biotechnology industries. The Ecology and Conservation Biology track is designed to prepare students for graduate training and/or careers in ecology, conservation biology or other environmentally focused specialties. Students pursuing the Neuroscience track will have the opportunity to integrate coursework in neurobiology with coursework in psychology. The Neuroscience track is excellent preparation for graduate and professional training in the biomedical sciences and careers in the health professions. The Molecular and Cellular Biology, Ecology and Conservation Biology and Neuroscience focused paths through the major also require hands-on learning in the form of supervised research and/or internship and these experiences are also strongly encouraged for students pursuing the Traditional program. Admission to the Molecular and Cellular Biology, Ecology and Conservation Biology and Neuroscience concentrations is by application only.

* Vision and Change in Undergraduate Biology Education, A Call to Action. 2010. American Association for the Advancement of Science, Washington DC

Faculty

KIRK A. BARTHOLOMEW, PH.D.
Associate Professor

MARK A. BEEKEY, PH.D.
Associate Professor
Suzanne M. Deschênes, Ph.D.
Associate Professor

Michele A. Guidone, Ph.D.
Lecturer

Mark I. Jareb, Ph.D.
Associate Professor, Chair

Marian Leal, M.S.
Instructor

Jennifer H. Mattei, Ph.D.
Professor

Christopher F. MojciK, M.D/Ph.D.
Lecturer

Barbara J. Pierce, Ph.D.
Associate Professor

John P. Rapaglia, Ph.D.
Assistant Professor

Nicole M. Roy, Ph.D.
Associate Professor

Latina M. Steele, Ph.D.
Lecturer

Geoffrey F. Stopper, Ph.D.
Assistant Professor

Thomas A. Terleph, Ph.D.
Associate Professor

Biology Laboratories
The University supports the biology program with six teaching laboratories fully equipped to instruct students in all areas of biological science. In addition, all faculty at the level of assistant professor and above have dedicated research space and equipment appropriate to conduct research in their areas of specialization. Dedicated multi-user areas are also available for conducting research in a variety of areas and include: a climate-controlled greenhouse, an analytical instrumentation room for environmental analysis, a marine research tank room, a fluorescence microscopy and imaging facility and dedicated spaces for molecular biology research instrumentation. The department maintains and consistently updates the specialized equipment required to both teach and do research in the biological sciences, amongst our more recent acquisitions are: a suite of equipment for sub-meter GPS surveys and data collection, real-time PCR instrumentation, automated data capture and analysis software for experimentation in animal behavior and two instruments for sophisticated analysis of contaminants in environmental samples: a combined gas chromatography/mass spectrometry instrument for organic chemical analysis and an inductively coupled plasma emission spectrometer for inorganic contaminants.

Major in Biology
The B.S. degree in Biology requires completion of 36 to 42 credits in biology and 29 to 40 credits in supporting courses depending on the curriculum track students choose. Many of these courses also fulfill the requirements of the university’s Elective Core.

Required Courses for All Concentrations

Bi 111 Concepts in Biology I
Bi 112 Concepts in Biology II
Bi 113 Concepts in Biology I Laboratory
Bi 114 Concepts in Biology II Laboratory
Bi 201 Genetics & Evolution: Organisms to Populations
Bi 202 Ecology: Populations to Ecosystems
Bi 203 Genetics & Evolution: Organisms to Populations Laboratory
Required Supporting Courses for All Concentrations

CH 151  General Chemistry I  
CH 152  General Chemistry II  
CH 153  General Chemistry Laboratory I  
CH 154  General Chemistry Laboratory II  
CH 221  Organic Chemistry I  
CH 223  Organic Chemistry Laboratory I  
MA 131  Statistics for Decision Making  
or  
MA 132  Biostatistics  
PY 1XX  Level Physics Course with Laboratory  
MA 140  Precalculus or above (MA 151 Calculus I is recommended)  

ADDITIONAL REQUIRED COURSES FOR THE TRADITIONAL CONCENTRATION

Students must select five additional Biology courses comprising at least one course from the Environmental organismal and Molecular areas. Two of the five courses must be at the 300 level. Three of the 5 courses must include labs (one at the 300 level). Three credits of research (BI 390) or internship (BI 360) are encouraged. For the most up to date listing of courses and special topics, please consult the listing maintained on the Biology Department’s website.

Environmental Area

BI 210  Plant Biology  
BI 230  Microbiology  
BI 240  Invertebrate Biology  
BI 245  Vertebrate Biology  
BI 255  Animal Behavior  
BI 260  Marine Biology  
BI 265  Conservation Biology  

Organismal Area

BI 205  Essentials of Neuroscience  
BI 210  Plant Biology  
BI 212  Developmental Biology  
BI 230  Microbiology  
BI 240  Invertebrate Biology  
BI 245  Vertebrate Biology  
BI 255  Animal Behavior  
BI 260  Marine Biology  
BI 305  Behavioral Neurobiology  
BI 312  Systems Physiology  
BI 325  Immunology  
BI 345  Neurobiology  

Molecular Area

BI 212  Developmental Biology  
BI 230  Microbiology  
BI 235  Principles of Biotechnology  
BI 311  Cell Biology  
BI 325  Immunology  
BI 335  Topics in Genetics  
BI 345  Neurobiology  
BI 355  Molecular Biology  

ADDITIONAL REQUIRED SUPPORTING COURSES FOR THE TRADITIONAL CONCENTRATION

Students must take an additional 9 to 12 credits in the natural sciences or in other disciplines with departmental approval. Courses must be at 200-level or above with the following exceptions: FYBI 125, BI 128/129, PY112/114 and MA courses above MA 151. BI 206/208 does not meet this requirement, but BI 207/209 does.

ADDITIONAL REQUIRED COURSES FOR THE MOLECULAR AND CELLULAR BIOLOGY CONCENTRATION

BI 311  Cell Biology  
BI 355  Molecular Biology  
BI 360  Internship (3 credits)
or

BI 390 Supervised Research (3 credits)

Two additional electives (1 with lab) must be chosen from courses classified in the Molecular Area (see above and Biology Department website)

ADDITIONAL REQUIRED SUPPORTING COURSES FOR THE MOLECULAR AND CELLULAR BIOLOGY CONCENTRATION

MA 151 Calculus I (strongly suggested—fulfills the MA 140 or above requirement)

Students must also take an additional 12 to 16 credits in the natural sciences or in other disciplines with departmental approval. Courses must be at 200-level or above with the following exceptions: FYBI 125, BI 128/129, PY112/114 and MA courses above MA 151. BI 206/208 does not meet this requirement, but BI 207/209 does.

ADDITIONAL REQUIRED COURSES FOR THE ECOLOGY AND CONSERVATION BIOLOGY CONCENTRATION

BI 265 Conservation Biology
BI 3XX Ecology Elective with Lab
BI 360 Internship (3 credits)

or

BI 390 Supervised Research (3 credits)

Three additional electives (1 with lab) must be chosen from courses classified in the Organismal or Environmental Area (see above and Biology Department website)

ADDITIONAL REQUIRED SUPPORTING COURSES FOR THE ECOLOGY AND CONSERVATION BIOLOGY CONCENTRATION

MA 151 Calculus I (strongly suggested—fulfills the MA 140 or above requirement)

Students must also take an additional 6 to 8 credits in the natural sciences or in other disciplines with departmental approval. Courses must be at 200-level or above with the following exceptions: FYBI 125, BI 128/129, PY112/114 and MA courses above MA 151. BI 206/208 does not meet this requirement, but BI 207/209 does.

ADDITIONAL REQUIRED COURSES FOR THE NEUROSCIENCE CONCENTRATION

BI 205 Essentials of Neuroscience
BI 255 Animal Behavior

or

BI 305 Behavioral Neurobiology
BI 345 Neurobiology
BI 360 Internship (3 credits)

or

BI 390 Supervised Research (3 credits)

One additional course in Biology at the 200 or 300 level with lab

ADDITIONAL REQUIRED SUPPORTING COURSES FOR THE NEUROSCIENCE CONCENTRATION

PS 110 Introduction to Psychology

Two psychology electives selected from the following list:

PS 335 Human and Animal Learning
PS 351 Brain and Behavior
PS 352 Hormones and Behavior
PS 353 Psychopharmacology
PS 380 Advanced Psychological Research
PS 389 Advanced Special Topics
PS Elec. One additional Psychology Elective at the 200 level or above

Students must also take an additional 6 to 8 credits in the natural sciences or in other disciplines with departmental approval. Courses must be at 200-level or above with the following exceptions: FYBI 125, BI 128/129, PY112/114 and MA courses above MA 151. BI 206/208 does not meet this requirement, but BI 207/209 does.
Combined Bachelor of Science in Biology and Master of Science in Environmental Systems Analysis and Management

Undergraduate students majoring in biology or chemistry are able to apply for admission to the Environmental Systems Analysis and Management graduate program in their junior year and begin taking graduate courses during their senior year while at the same time completing a Bachelor of Science degree. This 4 plus 1 option allows completion of a combined Bachelor and Master’s of Science in 5 years. If you would like more information on this accelerated track, please contact the Environmental Systems Analysis and Management Program Director or the Chair of the Biology Department. Completion of this combined degree in 5 years requires summer coursework and careful planning is essential to meet all program requirements.

Minor In Biology

The minor in Biology requires the completion of the following 23-24 credits:

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<tr>
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<td>CH 153</td>
<td>General Chemistry</td>
</tr>
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<td>BI Elec.</td>
<td>One additional biology course at the 200-level or above with the following exceptions: FYBI 125, BI 128/129 chosen in consultation with a Biology advisor. BI 206/208 does not meet this requirement, but BI 207/209 does.</td>
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Associate in Arts General Studies

EMPHASIS REQUIREMENTS (24 CREDITS)

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</tr>
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</table>
Biology Common Core Course
BICC 103  The Human Community and Scientific Discovery

Course Descriptions
† Elective Core Course

BICC 103 The Human Community and Scientific Discovery
3 CR
This is the third of four courses in The Human Journey, Sacred Heart University’s Common Core Curriculum. This course focuses on the scientific approach and its uses and limits in addressing the four fundamental core questions of human meaning and value. The practice of scientific inquiry with respect to political, social and cultural factors will also be examined, particularly in the context of the Catholic intellectual tradition. Potential topics to be discussed include learning about your own ancient genetic lineage, evolution, genetic testing, environmental pollution, global climate change and disease prevention.

†BI 102 Heredity and Society
3 CR
BI 102 is a genetics course examining the evidence for proposing the existence of genes, the molecular nature of genes and the ethical implications of recent advances in genetic research. Three hours of lecture per week.
Non-science majors.

†BI 103 The Human Body
3 CR
Focuses on human physiology and the role humans play in the health and maintenance of their bodies. Topics include human organization, processing and transporting, integration and coordination and reproduction. Three hours of lecture per week.
Non-science majors.

†BI 104 Coastal Ecology
3 CR
This course investigates the interrelationship between coastal environments and the organisms living in these environments. It also looks at related societal implications. Non-science majors.

†BI 110 Primate Conservation & Behavior
3 CR
This course introduces students to the study of primate behavior in zoos. Students will gain general skills to explore field methods for behavioral observation and data collection in a captive setting. In addition, we will consider how we might use captive behavioral data to help conserve threatened and endangered primate species. Students will have the unusual opportunity to conduct field studies at LEO Zoological Conservation Center in Greenwich.

†BI 111 Concepts in Biology I: Molecules to Cells
3 CR
BI 111 is the first foundational course in biology and provides an introduction to the molecular concepts that form the basis of cellular life. Concepts in Biology I covers the basic principles of: evolution, biochemistry, cell structure and function, signal transduction, cell division, transmission genetics, the central dogma of molecular biology and control of gene expression. Two 50 minute lectures and one 75 minute discussion/week.
Corequisite: BI 113

†BI 112 Concepts in Biology II: Cells to Organisms
3 CR
BI 112 is the second foundational course in biology. The course focuses on the cellular and organismal levels in the hierarchy of biological organization. Concepts in Biology II covers adaptations of plant and animal life in an evolutionary context and includes
discussion of: development, body and tissue organization, homeostasis, energy yielding metabolism, nutrition, digestion, circulation, nutrient transport and gas exchange. Two 50 minute lectures and one 75 minute discussion/week.

Prerequisite: BI 111/113; Corequisite: BI 114.

**BI 113 Concepts in Biology I Laboratory**
1 CR
The laboratory associated with Concepts in Biology I focuses on multi-week exercises that reinforce critical concepts on the molecular and cellular levels of biological organization. The laboratory incorporates student designed experiments, extensive journal format scientific writing and emphasizes science as a process. One 3 hour laboratory/week.
Corequisite: BI 111

**BI 114 Concepts in Biology II Laboratory**
1 CR
The laboratory associated with Concepts in Biology II focuses on introduction of techniques for observing organismal physiology and behavior that reinforce critical concepts on the cellular and organismal levels of biological organization. The laboratory incorporates an open-ended multi-week student designed experiment, extensive journal format scientific writing and emphasizes science as a process. One 3 hour laboratory/week.
Corequisite: BI 112

**BI 126 Nursing Anatomy and Physiology I**
3 CR
Lecture on the investigation of cell structure and function, tissues, skeletal, muscular and nervous systems. Nursing students only.
Three hours of lecture and one hour of discussion.
Corequisite: BI 127

**BI 127 Nursing Anatomy and Physiology I Laboratory**
1 CR
Laboratory involves investigation of cell structure and function, tissues, skeletal, muscular and nervous systems. Three hours of laboratory.
Corequisite: BI 126

**BI 128 Nursing Anatomy and Physiology II**
3 CR
Lecture involves the investigation of the endocrine, cardiovascular, lymphatic, respiratory, digestive, urinary and reproductive systems. Nursing students only. Three hours of lecture and one hour of discussion.
Prerequisites: BI 126 and BI 127; Corequisite: BI 129.

**BI 129 Nursing Anatomy and Physiology II Laboratory**
1 CR
Laboratory involves the investigation of the endocrine, cardiovascular, lymphatic, respiratory, digestive, urinary and reproductive systems. Three hours of laboratory.
Corequisite: BI 128

†**BI 150 Biology of Poisons**
3 CR
This course presents the principles of toxicology within a human context, discusses how toxicology affects everyday life and investigates the broader issues for public health and disease prevention.
Non-science majors.

†**BI 152 Environment and Sustainability**
3 CR
Students will learn about environmental science, exploring how human activity changes our natural environment. The importance of clean air, land and water will also be discussed.
Non-science majors.

**BI 161 Introduction to Microbiology**
3 CR
A course focused on the study of microorganisms with emphasis on morphology; cultivation, genetics of bacteria, viruses and fungi and infectious diseases caused by these microbes. Nursing students only. Three hours of lecture per week.
Corequisite: BI 162

**BI 162 Introduction to Microbiology Laboratory**
1 CR
Laboratory work stresses aseptic technique and the microscopic, nutritional and biochemical characteristics of bacteria. One three-hour laboratory period per week.
Corequisite: BI 161

**†BI 170 Plants of Connecticut**
3 CR
BI 170 is a laboratory and field-oriented course emphasizing identification of local plant life, plant structure and functions, life histories and ecological relationships.
Non-science majors.

**†BI 171 Connecticut Wildlife**
3 CR
BI 171 is a laboratory and field-oriented core course emphasizing wildlife and habitat diversity in the American Northeast, especially Connecticut. The central theme is adaptation. Topics include predation, migration, reproduction and species identification. Five hours per week.
Non-science majors

**†BI 172 Winter Wildlife**
3 CR
BI 172 is a laboratory and field-oriented core course emphasizing winter adaptations of wildlife in the American Northeast, especially Connecticut. Topics include migration, species identification, tracking and feeding ecology. Five hours per week.
Non-science majors.

**BI 190 Seminar in the Health Professions**
1 CR
Seminar will meet weekly for discussions and other activities associated with planning for a future in the relevant health professions. Discussion topics include advice on course selections, timing of registration for courses in relation to exams such as the MCAT/DAT/GRE, balance between pre-health studies and other academic and extracurricular goals, etc. Also included will be forums with invited speakers such as alumni, admission directors and extracurricular program coordinators. Freshman and sophomore pre-health profession students only. Minimum 2.5 GPA. Pass/fail only.

**BI 191 Advanced Seminar on Health Professions**
1 CR
Seminar will meet weekly for discussions and other activities associated with planning for and applying to schools in the relevant health professions. Discussion topics include advice on selecting schools for applications, application preparation, writing personal statements, advice on preparation for professional exams such as the MCAT/DAT/GRE, etc. Also included will be forums with invited speakers such as alumni, admission directors and extracurricular program coordinators.
Junior and senior pre-health profession students only. Minimum 3.0 GPA or instructor permission. Pass/fail only.

**BI 201 Genetics & Evolution: Organisms to Populations**
3 CR
Organisms to Populations is the third in the series of courses that serve as the foundation of the biology major. The focus of this course is on the evolutionary forces that lead to the biologically fascinating trade-offs between
growth, survival and reproduction. Topics covered include: reproductive biology, transmission and population genetics, mechanisms of evolution and an exploration of adaptation and life history characteristics in a diversity of organisms.
Prerequisite: C or Better in BI 111/112/113/114; Pre- or Corequisite: MA 131,132 or 133; Corequisite: BI 203

**BI 202 Ecology: Populations to Ecosystems**  
3 CR  
Populations to Ecosystems is the final course in the biology major foundational series of courses. Students will discover the unity and interdependence of the living and non-living components of the environment while exploring the limitless diversity of life on earth through the lens of ecological theory. Topics include: Population dynamics, species interactions, abundance and diversity, nutrient cycling, succession and stability.
Prerequisite: C or Better in BI 111/112/113/114; Prerequisite: MA 131,132 or 133; Corequisite: BI 204

**BI 203 Genetics & Evolution: Organisms to Populations Laboratory**  
1 CR  
Organisms to Populations Laboratory is the mandatory corequisite for BI 201. The interactive laboratory course will concentrate on multi-week exercises that reinforce essential course concepts. Student designed experiments, the process of science and oral and written scientific communication are focal points of the course design.
Corequisite: BI 201

**BI 204 Ecology: Populations to Ecosystems Laboratory**  
1 CR  
Populations to Ecosystems Laboratory is the mandatory corequisite for BI 202. The interactive laboratory course will concentrate on multi-week exercises that reinforce essential course concepts. Student designed experiments, the process of science and oral and written scientific communication are focal points of the course design.
Corequisite: BI 202

**BI 205 Essentials of Neuroscience**  
3 CR  
This course is an introduction to neuroscience, a discipline in which the biological and psychological sciences are integrated. This broad overview addresses topics ranging from the cellular physiology of neurons to issues of human language, cognition and mental illness.
Prerequisite: BI 111/113, PS 101

**BI 206 Human Anatomy and Physiology I**  
3 CR  
Lecture on the investigation of the tissues, skeletal, muscular and nervous systems. This section is for students interested in athletic training, exercise science, physical therapy, occupational therapy or physician assistant programs. Three hours of lecture per week.
Prerequisites: BI 111/ 113; Corequisite: BI 208

**BI 207 Human Anatomy and Physiology II**  
3 CR  
Lecture involves the investigation of endocrine, cardiovascular, lymphatic, respiratory, digestive, urinary and reproductive systems. Three hours of lecture per week. This section is for students interested in athletic training, exercise science, physical therapy, occupational therapy, human movement or physician assistant programs. Three hours of lecture.
Prerequisites: BI 206/208; Corequisite: BI 209

**BI 208 Human Anatomy and Physiology I Laboratory**  
1 CR  
Laboratory involves investigation of the tissues, skeletal, muscular and nervous systems. Three hours of laboratory.
Corequisite: BI 206
BI 209 Human Anatomy and Physiology II Laboratory
1 CR
Laboratory involves the investigation of endocrine, cardiovascular, lymphatic, respiratory, digestive, urinary and reproductive systems. Three hours of laboratory.
Corequisite: BI 207

BI 210/211 Plant Biology
4 CR
Three diverse topics in plant biology are introduced: plant evolution and diversity, plant ecology and the linked topics of ethnobotany and economic botany. Laboratory work concentrates on field methodology, plant identification and digital data collection. Three hours of lecture and three hours of laboratory per week.
Prerequisites: BI 112/114, BI 201/203

BI 212 Developmental Biology
4 CR
Lecture examines cellular and molecular aspects of animal development from gametogenesis to morphogenesis and pattern formation. Laboratory work includes investigations on fertilization, cellular differentiation, regeneration and the development of vertebrate organ systems. Three hours of lecture and three hours of laboratory per week.
Prerequisites: C or better in BI 111/113, BI 112/114 and CH 151/153

BI 230 Microbiology
4 CR
Microbial diversity and the evolution, physiology, genetics and ecology of microbes are addressed. Specific topics include: epidemiology and infectious disease and the use of microorganisms in industry and research. Laboratory work focuses on modern molecular methods of experimental microbiology and bacterial identification, including a semester-long research project.
Three hours of lecture and three hours of laboratory per week.
Prerequisites: BI 111/113, BI 112/114 and CH 151/153

BI 235 Principles of Biotechnology
4 CR
This course focuses on the fundamental biotechnology techniques (e.g., nucleic acid analysis and genomics, bioinformatics, cell culture and proteomics) used in modern industrial research laboratories through the application of a semester-long project.
Prerequisite: C or better in BI 201/203 and MA131, 132 or 133; Prerequisite or Corequisite: CH 221/223

BI 240/241 Invertebrate Biology
4 CR
BI 240 examines the evolution and ecology of invertebrates including: phylogenetic relationships, life history, physiology and morphological adaptations. Laboratory component includes dissections and field trips to Long Island Sound. Three hours of lecture and three hours of laboratory per week.
Prerequisites: C or better in BI 202/204

BI 245/246 Vertebrate Biology
4 CR
BI 245 examines the evolution and ecology of the vertebrates including taxonomy and life history as well as the anatomy and physiology of extant and extinct vertebrates. Three hours of lecture and three hours of laboratory per week.
Prerequisites: C or better in BI 112/114

BI 255 Animal Behavior
4 CR
An introduction to how animals of all different types use behaviors as strategies for interacting with the environment. Behaviors studied include communication, habitat selection, migration, mate choice,
breeding and parental care. Development and physiological control of behaviors are also examined. Three hours of lecture and one laboratory/field session per week.
Prerequisites: BI 112/114, MA 131

**BI 260 Marine Biology**  
4 CR  
BI 260 examines the structure and function of marine habitats at the organismal, population, community and ecosystem levels. Laboratory includes field investigation of different types of estuarine and coastal habitats and design of basic and applied marine ecological investigations. Three hours of lecture and one laboratory/field session per week.  
Prerequisites: C or better in BI 202/204, MA131.

**BI 265 Conservation Biology**  
4 CR  
The focus of this course is on the science of conservation biology in the context of environmental policy, socioeconomic demands and environmental ethics.  
Prerequisite: BI 202/204

**BI 299 Special Topics in Biology**  
3–4 CR  
Special Topics are new or occasional courses that may or may not become part of the department’s permanent offerings. Prerequisites are established by the department as appropriate for the specific course. Course title is shown on the student’s transcript. Consult the current course schedule for available topics and prerequisites.

**BI 305 Behavioral Neurobiology**  
3 CR  
This course explores the neural basis of behaviors that animals perform in natural settings. The mechanisms studied underlie specialized behaviors such as the detection of prey, attraction of mates orientation and other adaptive behaviors. The animal model systems described demonstrate how neural substrates of behavior can be highly specialized to solve problems encountered in an animal’s particular environmental niche. These model systems also provide insights into the organization of similar sensory and motor systems in humans. Three hours of lecture.  
Prerequisites: BI 112/114, BI205 or permission of the instructor

**BI 311/313 Cell Biology**  
4 CR  
Covers advanced topics in eukaryotic cell biology with emphasis on cell identity, protein transport and cellular physiology. Laboratory work includes cell culture, immuno-cytochemistry and other biological analyses. Three hours lecture and three hours of lab per week.  
Prerequisites: BI 201/203, CH 152/154

**BI 312/314 Systems Physiology**  
4 CR  
BI 312 focuses on investigation of the physiology of vertebrate systems. Topics include cardiovascular, respiratory, neural, muscular, digestive, endocrine, reproductive and excretory physiology. Laboratory instruction includes practical investigation and research projects into the physiology of vertebrates.  
Prerequisites: BI 201/203, CH 152/154

**BI 325 Immunology**  
3 CR  
BI 325 examines the mammalian immune response including characteristics of antigens, antibodies and antigen-antibody interactions. Three hours of lecture per week.  
Prerequisite: BI 201/203

**BI 335 Topics in Genetics**  
3 CR  
This seminar course will both expand and deepen students’ knowledge of genetics
while exploring hot topics such as gene therapy, DNA as a digital information storage molecule, complex genetic disorders, DNA circuits, synthetic genomes, genome wide association studies, metabolomics, DNA barcoding, genome-based medicine, DNA-based treatments, RNAi, epigenetics, conservation genetics and controversial genethics topics such as gene doping, etc.

Prerequisites: C or better in BI 201/203, 3.2 cumulative GPA.

**BI 345 Neurobiology**
4 CR
Covers cell biology of neurons, electrical and biochemical signaling, motor control, sensation and perception, learning and memory and brain anatomy. Laboratory instruction includes practical investigations and survey research projects into the above topics and related illnesses.
Prerequisites: BI 112/114, CH 152/154

**BI 355 Molecular Biology**
4 CR
Provides foundations of molecular biology and recombinant DNA technology, analysis of relevant primary journal articles, hands-on training in recombinant DNA techniques and exposure to the use of computers in DNA sequence analysis and scientific communication.
Prerequisites: BI 201/203, CH 152/154

**BI 360 Internship**
3–6 CR
Internships in Biology focus on gaining applied experience through study of a biological topic or an interdisciplinary project that provides majors with an opportunity to gain real-world experience not specifically available in Sacred Heart University’s Biology curriculum. Students complete an internship portfolio under the direction of an appropriate professional in consultation with a biology faculty advisor.

**BI 390 Supervised Research**
3 CR
Individual research projects in the basic areas of Biology under the supervision of faculty.
Prerequisites: A 3.0 GPA and permission of the supervising faculty member.

**BI 398 Senior Seminar Preparation**
1 CR
This course is designed for students to begin working on their Senior Thesis.
Prerequisites: BI 201/203 and BI 202/204

**BI 399 Senior Seminar**
2 CR
Senior Seminar is the capstone course for the Biology major. The course focuses on review of current research and literature on specialized fields of current interest in biological science. An independent project resulting in a research paper on a current question of scientific, public policy or ethical focus and a final oral presentation on a selected topic is required.
Prerequisites: Senior status and permission of advisor.