DEPARTMENT OF BIOLOGY

College of the Sciences and Mathematics

(See also Pre-Medical Program [http://catalog.wcupa.edu/undergraduate/sciences-mathematics/pre-medical-program/])

175 Schmucker Science North
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Department of Biology [http://www.wcupa.edu/biology/]

Giovanni Casotti (gcasotti@wcupa.edu), Chairperson
Josh Auld (jauld@wcupa.edu), Assistant Chairperson

The major in biology centers on a core of courses that emphasizes broad unifying principles. Available electives provide enriching experiences in many areas of biology.

The Department of Biology offers six concentrations within the B.S. degree:

• The **B.S. in Biology - Integrative Concentration** can be individually tailored to provide the skills that students need to achieve their career goals. This program also provides the basic preparation needed for entry into graduate or professional schools, including physical therapy programs.

• The **B.S. in Biology - Cell and Molecular Concentration** offers an opportunity for interested students to obtain a strong background in both biology and chemistry. Emphasis on lab-oriented courses prepares the student to pursue a career in laboratory research in cell and molecular biology at industrial, medical, academic, and government facilities. This program also prepares the student for admission to medical, dental, veterinary, graduate, and professional schools.

• The **B.S. in Biology - Ecology and Conservation Concentration** provides an opportunity for interested students to obtain a strong background in field biology and the conservation of natural systems. The required core curriculum and concentration electives provide opportunities for careers as biologists in state and federal environmental agencies, industry, and environmental consulting firms, as well as graduate work in ecology and conservation. Internships are strongly recommended as part of the program. Course work emphasizes skills obtained in biology, chemistry, and mathematics. Additional course work from other departments may be recommended to fulfill particular career objectives.

• The **B.S. in Biology - Marine Science Concentration** provides the opportunity for interested students to obtain a strong educational background in marine biology and other topics in a field that stretches from marine organisms to biotechnology and even oceanography interests from the coastal waters to deep oceans. The required core curriculum and electives will allow students the opportunity to draw on educational resources at West Chester University and marine field stations, such as the Wallops Island Marine Science Consortium in Virginia. Course work emphasizes techniques in biological sciences, oceanography, chemistry, physics, and mathematics. Field and laboratory courses form a strong foundation of this program, and students are encouraged to engage in directed research projects or internships.

• The **B.S. in Biology - Medical Laboratory Science Concentration** offers students the opportunity to enter the field of laboratory medicine with emphasis on the techniques and instrumentation used to evaluate disease processes. This concentration allows students to complete the necessary general education and departmental requirements in three years. The fourth year is spent in a hospital internship training program at one of the several affiliated hospitals, and students receive 26 credits for the internship year (BIO 407 and BIO 408, Hospital Internship in Medical Laboratory Science). To qualify for the internship, students must have a 2.75 GPA and be accepted by an accredited hospital medical technology program. Students completing the internship will receive a B.S. in Biology - Medical Laboratory Science Concentration and the training necessary to take the national certification exam. Affiliated hospitals include Pennsylvania Hospital, Lancaster General Hospital, and St. Christopher’s Hospital for Children.

• The **B.S. in Biology - Microbiology Concentration** prepares students for careers in research laboratories, industrial and academic research, and government service in the areas of bacteriology, immunology, virology, mycology, microbial ecology, and parasitology. The program provides extensive laboratory experience with the techniques that are most useful and important to modern microbiological science. This program also provides the basic preparation needed for entry into graduate or professional schools.

**Programs**

**Majors**

• B.S. in Biology - Cell and Molecular Concentration [http://catalog.wcupa.edu/undergraduate/sciences-mathematics/biology/biology-bs-cell-molecular-concentration/]


• Accelerated B.S. in Biology - Ecology and Conservation Concentration to M.S. in Biology (Thesis Option) [http://catalog.wcupa.edu/undergraduate/sciences-mathematics/biology/biology-bs-ecology-conservation-concentration/]

• B.S. in Biology - Integrative Biology Concentration [http://catalog.wcupa.edu/undergraduate/sciences-mathematics/biology/biology-bs-integrative-concentration/]

• Accelerated B.S. in Biology - Integrative Biology Concentration to M.S. in Biology (Thesis Option) [http://catalog.wcupa.edu/undergraduate/sciences-mathematics/biology/biology-bs-integrative-concentration/]

• B.S. in Biology - Marine Science Concentration [http://catalog.wcupa.edu/undergraduate/sciences-mathematics/biology/biology-bs-marine-science-concentration/]

• B.S. in Biology - Medical Laboratory Science Concentration [http://catalog.wcupa.edu/undergraduate/sciences-mathematics/biology/biology-bs-medical-laboratory-science-concentration/]

• B.S. in Biology - Microbiology Concentration [http://catalog.wcupa.edu/undergraduate/sciences-mathematics/biology/biology-bs-microbiology-concentration/]

**Minor**

• Biology [http://catalog.wcupa.edu/undergraduate/sciences-mathematics/biology/biology-minor/]

**Graduate Opportunities**

See the graduate catalog for more information on the Biology programs. [http://catalog.wcupa.edu/graduate/sciences-mathematics/biology/]

**Policies**

• See undergraduate admissions information. [http://catalog.wcupa.edu/general-information/admissions-enrollment/undergraduate-admissions/]

• See academic policies. [http://catalog.wcupa.edu/undergraduate/academic-policies-procedures/]

All undergraduate students are held to the academic policies and procedures outlined in the undergraduate catalog. Students are encouraged to review departmental handbooks for program tips, suggested course sequences, and explanations of procedures. When applicable, additional policies for specific department programs may be listed below.
Internal and External Transfer Students Policy
For an internal transfer into any biology degree program, a student must:
1. Be in good academic standing (2.00 GPA or better);
2. Have already passed BIO 100 with an A- or better, or BIO 110 with a C- or better; and
3. Complete the application for change of major.
For newly admitted transfer students, a student must
1. Meet University standards for admission to West Chester University;
2. Have a grade of C- (70%) or better if they have taken a BIO 110 equivalent; and
3. Interview with a department representative.
NOTE: In order to receive a degree in biology from West Chester University, a transfer student must successfully complete a minimum of 50 percent of the required biology credits in the West Chester University Department of Biology.

Advanced Placement Policy
A score of three or better on the Biology Advanced Placement Exam will transfer as credit for BIO 110, General Biology.

Accelerated Program Policy
Refer to the Accelerated Programs page (http://catalog.wcupa.edu/undergraduate/accelerated-program/) for more information.

Admission Requirements for the Accelerated B.S. in Biology - Integrative Concentration to the M.S. in Biology
To be considered for the accelerated program and enroll in BIO 608 (Thesis Research I), students must have attained (completed) 75 credits with a minimum of 18 biology credits. Students must have a minimum cumulative GPA of 3.00 including a minimum GPA of 3.00 for biology courses. BIO 608 requires departmental permission to enroll; students must arrange a committee meeting prior to enrolling in BIO 608 (e.g., during their third year). The accelerated program in biology is only open to thesis students. Any student wishing to switch out of the thesis option will be required to complete all requirements of the B.S. degree. Once admitted to the graduate program, graduate policies apply, including minimum GPA (3.00).

Faculty
Professors
Josh R. Auld (jauld@wcupa.edu) (2011)  
Assistant Chairperson, Biology
B.S., Duquesne University; Ph.D., University of Pittsburgh
Sharon Began (shbegan@wcupa.edu) (1992)  
B.S., Kutztown University; M.S., East Tennessee State University; Ph.D., Southern Illinois University at Carbondale
Stefanie Anne Boettger (sboettger@wcupa.edu) (2008)  
B.S., Aberdeen University (Scotland); Ph.D., University of Alabama at Birmingham
Giovanni Casotti (gcasotti@wcupa.edu) (1996)  
Chairperson, Biology
B.S., Honors, Ph.D., Murdoch University (Australia)
Frank E. Fish (ffish@wcupa.edu) (1980)  
B.A., State University of New York at Oswego; M.S., Ph.D., Michigan State University
Oné R. Pagán (opagan@wcupa.edu) (2005)  
B.S., M.S., University of Puerto Rico; Ph.D., Cornell University

Assistant Professors
Sean W Buskirk (sbuskirk@wcupa.edu) (2019)  
B.S., Pennsylvania State University; Ph.D., University of Georgia
Benjamin S Chambers (bchambers@wcupa.edu) (2020)  
B.S., The Pennsylvania State University; Ph.D., University of Pennsylvania
Jennifer Chandler (jchandler@wcupa.edu) (2017)  
B.A., Transylvania University; B.S., Northern Kentucky University; Ph.D., West Virginia University
Erin Gestl (egestl@wcupa.edu) (2007)  
B.S., Ph.D., Pennsylvania State University
Jennifer L. Maresh (jmaresh@wcupa.edu) (2016)  
B.S., West Chester University; M.S., Duke University; Ph.D., University of California, Santa Cruz
Michael V Rosario (mrosario@wcupa.edu) (2018)  
B.A., University of California, Berkeley; M.S., University of Massachusetts, Amherst; Ph.D., Duke University
Jessica N. Sowa (jsowa@wcupa.edu) (2019)  
B.S., University of Rochester; Ph.D., Baylor College of Medicine
Eric S. Sweet (esweet@wcupa.edu) (2016)  
B.S., Virginia Tech; Ph.D., Rutgers University

Associate Professors
Teresa Donzé-Reiner (tdonze@wcupa.edu) (2015)  
Director, Pre-Medical Program
Graduate Coordinator, Pre-Medical Program
B.S., University of Nebraska; Ph.D., Molecular Biology and Microbiology University of Nebraska-Lincoln
John M. Pisciotto (jpisciotto@wcupa.edu) (2012)  
B.A., Eckerd College; M.S., University of South Florida; Ph.D., Johns Hopkins University
Jessica Sullivan-Brown (jsullivan@wcupa.edu) (2014)  
B.S., James Madison University; Ph.D., Princeton University

Courses
BIO
BIO 100. Basic Biological Science. 3 Credits.  
LEC (2), LAB (2)
Gen Ed Attribute: Science Distributive Requirement.  
Typically offered in Fall, Spring & Summer.

BIO 110. General Biology I. 4 Credits.  
LEC (3), LAB (3)
The concepts general to all living organisms such as cell structure and function, genetics, evolution, and ecology. This course is designed for majors in biology and related scientific areas.  
Gen Ed Attribute: Science Distributive Requirement.  
Distance education offering may be available.  
Typically offered in Fall, Spring & Summer.
BIO 111. General Biology II. 4 Credits.
LEC (3), LAB (3)
Focuses on evolutionary history of life, biodiversity, and structure and function of plants and animals, and examines each in the context of global change. This course is the second in a series of core general biology courses designed for biology majors.
Pre / Co requisites: BIO 111 requires a prerequisite of BIO 110.
Typically offered in Fall & Spring.

BIO 204. Introductory Microbiology. 4 Credits.
LEC (3), LAB (2)
The biology of medically important microorganisms, their structure, taxonomy, physiology, control, and host-parasite interactions. May not be taken as a biology major elective.
Pre / Co requisites: BIO 204 requires prerequisites of BIO 100 or BIO 110.
Typically offered in Fall, Spring & Summer.

BIO 210. Genetics. 3 Credits.
Nature of genetic material and its qualitative and quantitative variation: recombination; interaction of gene products; regulation of genetic material; and its role in evolution.
Pre / Co requisites: BIO 210 requires prerequisites of BIO 110 or BIO 115.
Distance education offering may be available.
Typically offered in Fall, Spring & Summer.

BIO 210L. Genetics Lab. 1 Credit.
This course will be used to explore and expand on some of the concepts that are covered in BIO 210. The lab will give students additional exposure to the concepts, experimental approaches, and techniques of genetics. Students will develop basic genetics laboratory skills as well and further develop their problem-solving and critical-thinking skills.
Pre / Co requisites: BIO 210L requires a prerequisite or corequisite of BIO 210.
Distance education offering may be available.
Typically offered in Fall, Spring & Summer.

BIO 211. Cell Biology. 4 Credits.
LEC (2), LAB (3)
An introduction to cellular and molecular biology with emphasis on cell morphology, biochemistry, and cell physiology.
Pre / Co requisites: BIO 211 requires a prerequisite of BIO 110 and a corequisite of CHE 231.
Gen Ed Attribute: Writing Emphasis.
Typically offered in Fall & Spring.

BIO 214. General Microbiology. 4 Credits.
LEC (3), LAB (3)
The biology of microorganisms, their structure, physiology, and control; the nature and dynamics of disease and disease control; principles of food, industrial, and environmental microbiology. The laboratory will deal with microbiological techniques, isolation and identification of microbes, and water and food analysis. This course is for biology majors.
Pre / Co requisites: BIO 214 requires prerequisite of BIO 110.
Typically offered in Fall, Spring & Summer.

BIO 215. General Botany. 3 Credits.
LEC (2), LAB (3)
A survey of plant and plant-like organisms from bacteria to and including the angiosperms with emphasis on anatomy, physiology, reproduction, and economic importance.
Pre / Co requisites: BIO 215 requires prerequisite of BIO 110.
Typically offered in Fall & Spring.

BIO 217. General Zoology. 3 Credits.
LEC (2), LAB (3)
Principles of animal biology. Form and function of vertebrate and invertebrate animal types.
Pre / Co requisites: BIO 217 requires prerequisite of BIO 110.
Typically offered in Fall & Spring.

BIO 259. Human Anatomy and Physiology I. 4 Credits.
LEC (3), LAB (2)
An introduction to human structure and function. Skeletal, muscular, and nervous systems are emphasized. Laboratory involves study of human development and gross anatomy of the skeletal, muscular, and nervous systems. May not be taken as a biology major elective.
Pre / Co requisites: BIO 259 requires a prerequisite of BIO 100 or BIO 110.
Typically offered in Fall, Spring & Summer.

BIO 265. Human Anatomy and Physiology II. 4 Credits.
LEC (3), LAB (2)
Continuation of BIO 259. Endocrine, circulatory, respiratory, immune, digestive, and genitourinary systems emphasized. May not be taken as a biology major elective.
Pre / Co requisites: BIO 265 requires prerequisite of BIO 259.
Typically offered in Fall, Spring & Summer.

BIO 270. Ecology. 3 Credits.
LEC (2), LAB (3)
Relationships between living organisms and their environment.
Pre / Co requisites: BIO 270 requires prerequisite of BIO 110.
Typically offered in Fall & Spring.

BIO 310. Biostatistical Applications. 3 Credits.
LEC (2), LAB (3)
The design, statistical analysis, graphical display and presentation of biological research.
Pre / Co requisites: BIO 310 requires prerequisites of BIO 110 and MAT 121 or MAT 125.
Typically offered in Fall & Spring.

BIO 311. Contemporary Issues in Biology Teaching. 3 Credits.
LEC (2), LAB (3)
Covers the nature of science, the scientific method and the nature of scientific research.
Pre / Co requisites: BIO 311 requires prerequisites of BIO 110 and MAT 121 or MAT 125.
Typically offered in Fall & Spring.

BIO 312. Marine Botany. 3 Credits.
LEC (2), LAB (3)
This course will introduce students to identifying and classifying microscopic and macroscopic algae and seagrasses from marine and estuarine habitats. Fieldwork along the East coast of the U.S. will focus on the identification and ecology of its unique marine macroflora. Topics to be covered include: seaweed and seagrass structure, taxonomy and classification, reproduction and life histories, distribution and ecology, human impacts on marine plants, and the impacts of marine plants on human affairs, collection and preservation of marine plants, and production of herbarium specimen.
Pre / Co requisites: BIO 312 requires prerequisite BIO 215 or permission of instructor.
Typically offered in Fall.

BIO 313. Marine Biology. 3 Credits.
The course is intended to provide a general introduction to the biology of marine organisms. Lectures will focus on the diversity, ecology, and adaptations of organisms living in the marine environment.
Pre / Co requisites: BIO 313 requires prerequisites of BIO 215 and BIO 217.
Typically offered in Spring.
BIO 333. Molecular Biology Techniques. 2 Credits.
An introduction to laboratory techniques for molecular biology including restriction enzyme digests, gel electrophoresis, gene cloning in E. coli, RNA and DNA isolation, and polymerase chain reaction.
Pre / Co requisites: BIO 333 requires prerequisites of BIO 210 and BIO 204 or BIO 214 and CHE 231.
Typically offered in Fall & Spring.

BIO 334. Microbial Genetics. 4 Credits.
A course on the genetics of bacteria, their viruses, plasmids, and transposable elements. Applications of microbial genetics in genetic engineering and biotechnology.
Pre / Co requisites: BIO 334 requires prerequisites of BIO 110 and BIO 214 and BIO 210 and CHE 231.
Typically offered in Fall.

BIO 357. Comparative Vertebrate Anatomy. 4 Credits.
Comparative study of the principal organ systems of vertebrates as to their structure, function, and evolutionary relationships.
Pre / Co requisites: BIO 357 requires prerequisite of BIO 217.
Typically offered in Fall.

BIO 367. Physiology of Drug Interactions. 3 Credits.
An introduction to the mechanism of action of prototype drugs. The physiological alterations produced by various drugs as well as interactions between drug classes will be emphasized.
Pre / Co requisites: BIO 367 requires prerequisites of BIO 269 or BIO 468 or BIO 469.
Typically offered in Spring.

BIO 377. Entomology. 3 Credits.
The structure, function, classification, economic importance, and biological significance of insects.
Pre / Co requisites: BIO 377 requires prerequisite of BIO 110 or BIO 217.
Typically offered in Fall.

BIO 387. Invertebrate Zoology. 3 Credits.
This course investigates the biology of the invertebrates, an enormously disparate group of organisms with a vast array of morphologies, physiologies and life histories. It emphasizes common features among different groups of invertebrates paying particular attention to physiology, development, grades of construction, ecology, systematic, and behavior. Besides the traditional laboratory and lecture format, students will participate in field trips and perform presentations that touch some aspect of invertebrate zoology.
Pre / Co requisites: BIO 387 requires prerequisite of BIO 217 or permission of instructor.
Typically offered in Spring.

BIO 407. Hospital Internship in Medical Laboratory Science, Fall. 13 Credits.
A two-semester, work-study appointment with an affiliated hospital. The satisfactory completion of this internship is accepted as the senior year's work by West Chester University. This hospital internship will prepare the student to take the National Exam for Medical Laboratory Scientists. Students who have completed 65 credit hours in the B.S. biology general concentration should apply for their internship in the summer following their sophomore year. Students must have an overall GPA of 2.75 and approval from the Department of Biology and the affiliated hospital.
Pre / Co requisites: BIO 407 requires a prerequisite of BIO 407 and a minimum cumulative GPA of 2.75.
Consent: Permission of the Department required to add.
Typically offered in Fall & Spring.

BIO 408. Hospital Internship in Medical Laboratory Science, Spring. 13 Credits.
A two-semester, work-study appointment with an affiliated hospital. The satisfactory completion of this internship is accepted as the senior year's work by West Chester University. This hospital internship will prepare the student to take the National Exam for Medical Laboratory Scientists. Students who have completed 65 credit hours in the B.S. biology general concentration should apply for their internship in the summer following their sophomore year. Students must have an overall GPA of 2.75 and approval from the Department of Biology and the affiliated hospital.
Pre / Co requisites: BIO 408 requires a prerequisite of BIO 407 and a minimum cumulative GPA of 2.75.
Consent: Permission of the Department required to add.
Typically offered in Spring.

BIO 409. Internship in Biological Sciences. 3-16 Credits.
A one-semester, work-study appointment with a commercial, industrial, or governmental agency. Students will be supervised jointly by a professional scientist of the agency and a Department of Biology faculty member. A maximum of eight combined credits from BIO 409 and BIO 491 may be applied to total biology credits.
Pre / Co requisites: BIO 409 requires prerequisites: Biology major; senior standing; GPA of 2.5 overall; 2.50 in biology and approval of biology curriculum committee.
Consent: Permission of the Department required to add.
Typically offered in Fall, Spring & Summer.
Repeatable for Credit.

BIO 412. Organic Evolution. 3 Credits.
An introduction to the general concepts, processes, and mechanisms of Evolutionary Biology from molecular, organismal, and population perspectives.
Pre / Co requisites: BIO 412 requires a prerequisite of BIO 210.
Distance education offering may be available.
Typically offered in Spring.

BIO 414. Applied and Industrial Microbiology. 3 Credits.
This course traces both the historical and current applications of microbiology in industry and society. Topics covered during lectures include building and equipment design, microbiological safety, fermentation, waste treatment, compost, and food production. The course also features guest lectures from several practicing microbiologists involved in industry.
Pre / Co requisites: BIO 414 requires prerequisite of BIO 214.
Typically offered in Fall.

BIO 415. Tropical Ecology and Conservation. 3 Credits.
The ecology of biomes comprising the tropics. Emphasis will be placed on contemporary conservation issues in tropical areas.
Pre / Co requisites: BIO 415 requires prerequisites of BIO 110, BIO 215, BIO 217, and BIO 270.
Typically offered in Spring.

BIO 421. Cellular and Molecular Biology. 4 Credits.
A lecture and laboratory course that studies the molecular basis of cellular life. Eukaryotic cell structure and function will be emphasized.
Pre / Co requisites: BIO 421 requires prerequisites of BIO 211 and BIO 333 and CHE 232.
Typically offered in Spring.

BIO 422. Cancer Biology. 3 Credits.
A comprehensive, lecture-based course that covers the genetic, molecular, histological, and therapeutic aspects of cancer biology. The course is designed around the emerging hallmarks of cancer and the enabling characteristics of cancer as a disease.
Pre / Co requisites: BIO 422 requires prerequisites of BIO 214, BIO 211, and BIO 210.
Typically offered in Fall.

BIO 428. Animal Histology. 3 Credits.
A study of the microscopic structure and function of vertebrate tissues and organs.
Pre / Co requisites: BIO 428 requires prerequisites of BIO 110 and BIO 217.
Typically offered in Fall.

BIO 431. Molecular Genetics. 3 Credits.
A second course in genetics, covering the molecular biology of genetic events. Emphasis will be on the molecular details of basic genetic processes, such as DNA replication and transcription, RNA translation and protein synthesis, the genetic code, molecular mechanisms of gene regulation, and an introduction to biotechnology.
Pre / Co requisites: BIO 431 requires prerequisites of BIO 210 and CHE 232.
Typically offered in Fall & Spring.
BIO 435. Course Topics in Biology. 1-3 Credits.
Courses in this series are of timely interest to the student. Topics may include biological terminology, laboratory techniques, mycology, etc. Open only to junior and senior science majors.
Distance education offering may be available.
Typically offered in Spring.
Repeatable for Credit.

BIO 436. Course Topics in Biology. 1-3 Credits.
Courses in this series are of timely interest to the student. Topics may include biological terminology, laboratory techniques, mycology, etc. Open only to junior and senior science majors.
Repeatable for Credit.

BIO 438. Course Topics in Biology. 1-3 Credits.
Courses in this series are of timely interest to the student. Topics may include biological terminology, laboratory techniques, mycology, etc. Open only to junior and senior science majors.
Repeatable for Credit.

BIO 440. Human Genetics. 3 Credits.
A detailed survey of the principles of human heredity. Examines the impact of genetics on current issues in human medicine, pharmacology, evolution, and sociology, and evaluates ethical issues surrounding these topics.
Pre / Co requisites: BIO 440 requires a prerequisite of BIO 210.
Typically offered in Spring.

BIO 443. Introduction to Gene Expression Methodology. 3 Credits.
Theory and practical application of RNA methodologies used in gene expression.
Pre / Co requisites: BIO 443 requires a prerequisite of BIO 333.
Typically offered in Spring.

BIO 448. Animal Development. 4 Credits.
LEC (3), LAB (3)
Introduction to principles of animal development with laboratory study of vertebrate embryos.
Pre / Co requisites: BIO 448 requires prerequisites of BIO 110 and BIO 217 and BIO 210 and BIO 211.
Typically offered in Spring.

BIO 452. Parasitology. 3 Credits.
Biology of the principal parasites of man and domestic animals. Emphasis is on life cycles of common parasites, identification of diagnostic forms, and understanding the diseases associated with parasites of major economic and medical importance.
Pre / Co requisites: BIO 452 requires prerequisites of BIO 204 or BIO 214 and BIO 217.
Typically offered in Fall.

BIO 453. Marine Mammals. 3 Credits.
An integrated examination of marine mammals. Emphasis will be on the evolution of the group and the unique functional morphology, behavior and physiology of cetaceans, pinnipeds and sirenians.
Pre / Co requisites: BIO 453 requires prerequisite of BIO 217 and 12 credits of BIO Major Courses.
Typically offered in Spring.

BIO 454. Mycology. 3 Credits.
An introductory course including a general study of the biology of fungi and a survey of the field of medical mycology.
Pre / Co requisites: BIO 454 requires prerequisites of BIO 110 and BIO 214.
Typically offered in Spring.

BIO 456. Virology. 3 Credits.
Molecular biology of bacterial, plant, and animal viruses; virus classification, ultrastructure, mechanisms of replication, and effects of virus infection on host cell.
Pre / Co requisites: BIO 456 requires prerequisites of BIO 214 and BIO 210 and CHE 232.
Typically offered in Spring.

BIO 457. Functional Animal Morphology. 3 Credits.
A study of the structure, form, and function of morphological adaptations in animals as examined through a mechanical, ecological, and evolutionary perspective.
Pre / Co requisites: BIO 457 requires a prerequisite or corequisite of BIO 217.
Typically offered in Spring.

BIO 463. Conservation Biology. 3 Credits.
The application of basic biological and ecological principles for the preservation of biological diversity. Emphasis will be on understanding the threats to biodiversity, the values of biodiversity, and preservation strategies including ecological risk assessment and the management of endangered species, habitats, and ecosystems.
Pre / Co requisites: BIO 473 requires prerequisites of BIO 110 and BIO 215 or BIO 217 and BIO 270.
Typically offered in Spring.
BIO 474. Microbial Ecology. 4 Credits.
LEC (3), LAB (3)
Theory and application of modern microbial ecology. Lectures will focus on topics such as microbial communities, interactions with other organisms, biogeochemistry, and biotechnology.
Pre / Co requisites: BIO 474 requires prerequisites of BIO 110 and BIO 214 and BIO 270 and CHE 103 and CHE 104.
Typically offered in Fall.

BIO 475. Plant Communities. 3 Credits.
LEC (2), LAB (3)
A survey of ecological, morphological, and physiological strategies of plants from seed through adult stages. The integration of these strategies to explain the major plant communities of North America will be covered.
Pre / Co requisites: BIO 475 requires prerequisite of BIO 215.
Typically offered in Fall.

BIO 476. Freshwater Ecology. 3 Credits.
LEC (2), LAB (3)
The environmental and biological characteristics of freshwater. Emphasis is placed on field methods, water quality evaluation based on the interpretation of comprehensive datasets, and management strategies for lakes, ponds and streams.
Pre / Co requisites: BIO 476 requires prerequisites of BIO 270 and CHE 104.
Typically offered in Fall.

BIO 478. Plant Evolution. 3 Credits.
Application of contemporary phylogenetic theory to explain the genesis of plant biodiversity. Origins of critical plant adaptations are explored with regard to time of origin, environmental conditions and ancestry.
Pre / Co requisites: BIO 478 requires prerequisite: BIO 215 or permission of instructor.
Distance education offering may be available.
Typically offered in Spring & Summer.

BIO 480. Light Microscopy and the Living Cell. 3 Credits.
A one-semester lecture and lab course covering the theory and practical techniques of all types of light microscopy and their uses in investigating living cells. Also includes techniques such as microinjection, cell electrophysiology, and others. Strong emphasis on 'hands-on' work with equipment.
Pre / Co requisites: BIO 480 requires prerequisites of BIO 110 and BIO 215 or BIO 217.
Typically offered in Spring.

BIO 484. Epidemiology. 3 Credits.
A general study of the epidemiology of both infectious and noninfectious diseases, including industrial and environmentally related health problems.
Pre / Co requisites: BIO 484 requires prerequisite of BIO 214.
Typically offered in Fall.

BIO 485. Systematic Botany. 3 Credits.
LEC (2), LAB (3)
Principles of evolution as illustrated by the principles of plant taxonomy. Modern concepts of biosystematics. Practical experience in plant identification.
Pre / Co requisites: BIO 485 requires prerequisite of BIO 215.
Distance education offering may be available.
Typically offered in Fall.

BIO 490. Biology Seminar. 3 Credits.
SEM (1), LEC (2)
Reports on special topics and current developments in the biological sciences.
Pre / Co requisites: BIO 490 requires prerequisites of 18 credits of BIO out of 90 credits of course work.
Gen Ed Attribute: Speaking Emphasis.
Typically offered in Fall, Spring & Summer.

BIO 491. Special Problems in Biology. 1-3 Credits.
Tutorial course primarily for advanced undergraduate biology majors capable of independent study and research on a problem approved by the supervising instructor. A maximum of eight combined credits from BIO 409 and BIO 491 may be applied to biology electives.
Pre / Co requisites: BIO 491 requires a prerequisite of an overall GPA of 2.50 and a BIO GPA of 2.50.
Consent: Permission of the Department required to add.
Typically offered in Fall, Spring & Summer.
Repeatable for Credit.

SCB
SCB 102. Humans and the Environment. 3 Credits.
The effects of human population on earth's resources are studied against a background of physical, biological, and health sciences. Note: Students completing SCB 102 may not take ESS 102 or ENV 102 for credit. May not be taken as biology major elective.
Gen Ed Attribute: Interdisciplinary Requirement.
Typically offered in Fall & Spring.
Cross listed courses SCB 102, ENV 102, ESS 102.

SCB 210. The Origin of Life and the Universe. 3 Credits.
A course that presents the theory and evidence for the first three minutes of the universe and formation of the stars, galaxies, planets, organic molecules, and the genetic basis of organic evolution. May not be taken as a biology major elective.
Gen Ed Attribute: Interdisciplinary Requirement.
Typically offered in Fall.

SCB 210. The Origin of Life and the Universe. 3 Credits.