

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*

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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 two undergraduate degree programs with 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 the student 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.
- **The B.S. in Education - Biology** is a program designed to prepare the student for a career in teaching in secondary schools. Professional certification in biology is awarded to the student who completes the program satisfactorily. Students are strongly advised to seek certification in a related area to enhance their employment potential. Such related areas include general science, health, education, athletic training, and environmental education. This program requires 126 credits for completion. See the Educator Preparation Programs (<http://catalog.wcupa.edu/undergraduate/education-social-work/educator-preparation-programs>) section of this catalog for an explanation of related requirements.

Programs

Majors in Biology

- B.A. in Biology (<http://catalog.wcupa.edu/undergraduate/sciences-mathematics/biology/biology-ba>) (**no longer admitting students**)
- B.S. in Biology - Integrative Biology Concentration (<http://catalog.wcupa.edu/undergraduate/sciences-mathematics/biology/biology-bs-integrative-concentration>)
 - B.S. in Biology - Integrative Biology Concentration to M.S. in Biology (Thesis Option) Accelerated Program (<http://catalog.wcupa.edu/undergraduate/sciences-mathematics/biology/biology-bs-integrative-concentration>)
- B.S. in Biology - Cell and Molecular Concentration (<http://catalog.wcupa.edu/undergraduate/sciences-mathematics/biology/biology-bs-cell-molecular-concentration>)
- B.S. in Biology - Ecology and Conservation Concentration (<http://catalog.wcupa.edu/undergraduate/sciences-mathematics/biology/biology-bs-ecology-conservation-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>)
- B.S. in Education - Biology (<http://catalog.wcupa.edu/undergraduate/sciences-mathematics/biology/education-bs-biology>)

Minor in Biology

- Biology (<http://catalog.wcupa.edu/undergraduate/sciences-mathematics/biology/biology-minor>)

Graduate Opportunities

See the graduate catalog for more information on the Biology program. (<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

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-programs>) for more information.

Admission to the Accelerated B.S. in Biology - Integrative Concentration to 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

- Sharon Began (sbegan@wcupa.edu) (1992)
B.S., Kutztown University; M.S., East Tennessee State University;
Ph.D., Southern Illinois University at Carbondale
- John T. Beneski (jbeneski@wcupa.edu) (1986)
A.A., Southwestern College; B.A., M.A., Humboldt State University;
Ph.D., Washington State University
- Giovanni Casotti (gcasotti@wcupa.edu) (1996)
Chairperson, Biology
B.S., Hons, Ph.D., Murdoch University (Australia)

Xin Fan (xfan@wcupa.edu) (2006)
B.S., Jiangxi College of Medicine; M.S., Kunming Medical College;
Ph.D., University of Pennsylvania

Frank E. Fish (ffish@wcupa.edu) (1980)
B.A., State University of New York at Oswego; M.S., Ph.D., Michigan State University

Gustave N. Mbuy (gmbuy@wcupa.edu) (1985)
B.A., University of California; M.M., Ph.D., University of Cincinnati

Oné R. Pagan (opagan@wcupa.edu) (2005)
B.S., M.S., University of Puerto Rico; Ph.D., Cornell University

Harry Tiebout (htiebout@wcupa.edu) (1992)
B.A., University of Illinois; Ph.D., University of Florida

Gregory Turner (gturner@wcupa.edu) (2004)
B.S., Virginia Commonwealth University; M.A., Hunter College;
M.Ed., Columbia University; Ph.D., Fordham University

Jack Waber (jwaber@wcupa.edu) (1976)
B.A., Hope College (Mich.); Ph.D., University of Hawaii

Associate Professors

Josh R. Auld (jauld@wcupa.edu) (2011)
Assistant Chairperson, Biology
B.S., Duquesne University; Ph.D., University of Pittsburgh

Stefanie Anne Boettger (sboettger@wcupa.edu) (2008)
Graduate Coordinator, Biology
B.S., Aberdeen University (Scotland); Ph.D., University of Alabama at Birmingham

Jessica Schedlbauer (jschedlbau@wcupa.edu) (2010)
B.A., Hartwick College; M.S., University of Maine; Ph.D., University of Idaho/Centro Agronomico Tropical de Investigacion y Ensenanza

Assistant Professors

Teresa Donze-Reiner (tdonze@wcupa.edu) (2016)
B.S., University of Nebraska; Ph.D., Molecular Biology and Microbiology University of Nebraska-Lincoln

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

John M. Pisciotta (jpisciotta@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

Eric S. Sweet (esweet@wcupa.edu) (2016)
B.S. Virginia Tech; Ph.D. Rutgers University

Courses

BIO

BIO 100. Basic Biological Science. 3 Credits.

LEC (2), LAB (2)

Basic principles of biology. Cell theory, metabolism, genetics, development, diversity of life forms, and ecology. Not open to biology majors.

Gen Ed Attribute: Science Distributive Requirement.

Typically offered in Fall, Spring & Summer.

BIO 110. General Biology. 3 Credits.

LEC (2), 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.

Typically offered in Fall, Spring & Summer.

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 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 220. Cell Physiology. 3 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 220 requires prerequisites of BIO 110 and CHE 231.

Typically offered in Fall & Spring.

BIO 230. 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 230 requires prerequisites of BIO 110 and MAT 121.

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.

Typically offered in Fall, Spring & Summer.

BIO 269. Human Anatomy and Physiology II. 4 Credits.

LEC (3), LAB (2)

Continuation of BIO 259. Endocrine, circulatory, respiratory, immune, digestive, and urogenital systems emphasized. May not be taken as a biology major elective.

Pre / Co requisites: BIO 269 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 275. Field Botany. 3 Credits.

LEC (2), LAB (3)

Methods of studying plants in their natural surroundings. Use of keys, botanical manuals, and illustrated floras to identify living specimens.

Pre / Co requisites: BIO 275 requires prerequisite of BIO 100 or BIO 215.

Typically offered in Summer.

BIO 277. Vertebrate Ecology. 3 Credits.

LEC (2), LAB (2)

Vertebrate Ecology. Animal life in the surrounding localities. Identification, behavior, habitats, feeding, and reproduction.

Pre / Co requisites: BIO 277 requires prerequisites of BIO 100 or BIO 217.

Typically offered in Fall.

BIO 307. Pathophysiology. 3 Credits.

An integrated study of the processes involved in the total body systemic complex as it changes from the ordered homeostatic condition to the imbalanced diseased state. The use of disease models, with clinical considerations, strengthens the concepts. May not be taken as a biology major elective.

Pre / Co requisites: BIO 307 requires prerequisites of a C- or better in BIO 259 and BIO 269.

Typically offered in Fall & Spring.

BIO 310. Biostatistical Applications. 3 Credits.

LEC (3), LAB (1)

The design, statistical analysis, graphical display and written presentation of biological research.

Pre / Co requisites: BIO 310 requires prerequisites of BIO 110 and MAT 121.

Gen Ed Attribute: Writing Emphasis.

Typically offered in Spring.

BIO 311. Contemporary Issues in Biology Teaching. 3 Credits.

Curricular trends in biology education, biotechnology, and bioethics are analyzed in a social context through constructive controversy. The nature of science is explored and experiential skills are honed through practical application via a laboratory-oriented, faculty-student mentoring program. May not be taken as a biology elective.

Pre / Co requisites: BIO 311 requires prerequisites of BIO 110, BIO 215, BIO 217, BIO 230, EDF 300, and EDP 250.

Typically offered in Fall.

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 Spring.

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 314. Pathogenic Microbiology. 4 Credits.

LEC (2), LAB (4)

Systematic study of pathogenic bacteria with extensive laboratory experience in handling and identifying these organisms.

Pre / Co requisites: BIO 314 requires a prerequisite of BIO 214.

Typically offered in Spring.

BIO 315. Terrestrial Ecosystem Ecology. 3 Credits.

LEC (2), LAB (3)

Transfer of materials and energy through terrestrial ecosystem with emphasis on carbon, water, and nutrient cycling. Ecosystem responses to climate change are emphasized.

Pre / Co requisites: BIO 315 requires prerequisites of BIO 110, BIO 215, BIO 217, and BIO 270.

Typically offered in Fall.

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 230 and BIO 204 or BIO 214 and CHE 231.

Typically offered in Fall & Spring.

BIO 334. Microbial Genetics. 4 Credits.

LEC (3), LAB (3)

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 230 and CHE 231.

Typically offered in Spring.

BIO 357. Comparative Vertebrate Anatomy. 4 Credits.

LEC (2), LAB (4)

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.

LEC (2), LAB (3)

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.

LEC (2), LAB (1)

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, systematics, 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.

(with BIO 408) 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 ASCP National Exam for Medical Laboratory Scientists. Students who have completed 65 credit hours in the B.S. biology general concentration should apply for this 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 prerequisites of admission into an affiliated hospital MLS program and a minimum GPA of 2.75.

Consent: Permission of the Department required to add.

Typically offered in Fall.

BIO 408. Hospital Internship in Medical Laboratory Science, Spring. 13 Credits.

(and BIO 407) 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.

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 230 and 9 hours of biology.

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.

LEC (3), LAB (3)

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 220 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 220, and BIO 230.

Typically offered in Fall.

BIO 428. Animal Histology. 3 Credits.

LEC (2), LAB (2)

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 230 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.

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 437. 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. Also Examines impact of genetics on current issues in human medicine, pharmacology, evolution and sociology.

Pre / Co requisites: BIO 440 requires a prerequisite of BIO 230.

Gen Ed Attribute: Writing Emphasis.

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 220 and BIO 230.

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 230 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 co-requisite of BIO 217.

BIO 464. Microbial Physiology. 4 Credits.

LEC (2), LAB (3)

Physiology and biochemical variations seen in prokaryotes and lower eukaryotes.

Pre / Co requisites: BIO 464 requires prerequisites of BIO 214 and BIO 230 and CHE 232.

Typically offered in Spring.

BIO 465. Immunology. 4 Credits.

LEC (3), LAB (3)

Immunoglobulin structure and function, nature of antigens, cell-mediated immunity, hypersensitivity, regulation of immunity, and immunological diseases. Laboratory experience in immunological techniques.

Pre / Co requisites: BIO 465 requires prerequisites of BIO 214 and CHE 232.

Typically offered in Fall & Summer.

BIO 466. Plant Physiology. 3 Credits.

LEC (2), LAB (3)

Physiological processes of plants. Photosynthesis, respiration, intermediary metabolism, entrance of solutes into the plant, water metabolism, and growth regulators.

Pre / Co requisites: BIO 466 requires prerequisites of BIO 215 and CHE 231.

Typically offered in Spring.

BIO 467. Endocrinology. 3 Credits.

An integrative look at the physiology of the mammalian endocrine system in the regulation and maintenance of homeostasis. The pathology associated with hormonal imbalance will be included.

Pre / Co requisites: BIO 467 requires prerequisites of C or better in BIO 217 and BIO 220 and a C or better in one 300 or 400 level BIO course.

Typically offered in Fall.

BIO 468. Comparative Vertebrate Physiology. 4 Credits.

LEC (3), LAB (3)

Comparative physiology of fishes, amphibians, reptiles, birds and mammals, with emphasis on organ-based homeostatic regulatory mechanisms.

Pre / Co requisites: BIO 468 requires prerequisites of BIO 217 and BIO 220.

Typically offered in Spring.

BIO 469. Human Physiology. 4 Credits.

LEC (3), LAB (3)

Theoretical and applied principles of the physiology of humans presented from an organ-system approach. Emphasis is placed on homeostatic regulatory mechanisms. May not be taken as a biology major elective.

Pre / Co requisites: BIO 469 requires prerequisites of BIO 220 and BIO 230 and CHE 232.

Typically offered in Fall.

BIO 470. Population Biology. 3 Credits.

LEC (2), LAB (3)

A quantitative, second course in ecology, emphasizing distributional patterns and fluctuations in abundance of natural populations.

Pre / Co requisites: BIO 470 requires prerequisites of BIO 270 and MAT 121 and MAT 143 or MAT 145 or MAT 161.

Typically offered in Fall.

BIO 471. Wetlands. 3 Credits.

LEC (2), LAB (3)

A course designed to provide practical experience in wetlands' classification, delineation, regulation, management, and mitigation practices. The abiotic and biotic characteristics of inland and coastal wetlands are emphasized.

Typically offered in Summer.

BIO 473. 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.

Typically offered in Fall.

BIO 490. Biology Seminar. 3 Credits.

SEM (1.5), LEC (1.5)

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.

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.

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.

An interdisciplinary 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 350. Science Education in Secondary School. 3 Credits.

A methods course emphasizing knowledge of curricular development and skill in planning, involving the design and execution of learning activities for all instructional modes.

Pre / Co requisites: SCB 350 requires prerequisites of EDS 306 and formal admission into teacher education.

Typically offered in Fall & Spring.