

BIOLOGY (BIOL)

Courses

BIOL 105 ENVIRONMENTAL BIOLOGY (3)

Introduction of the relationships between humans and the environment. Fundamentals of ecology, hydrology, demography, energy, and nutrient cycling will be covered, as well as the human impact on the use of the Earth's land, water and air resources. An emphasis is placed on five key themes: Human Population; Sustainability; Global Perspective; Urban World; and Values and Knowledge. Core: Biological & Physical Sciences.

BIOL 117 HONORS BIOLOGY: THE SCIENCE OF LIFE (4)

A broad-based, investigative course designed to introduce important issues in the biological sciences to the non-scientist. Major topics include human genetics, evolution, ecology, and environmental issues. Three hours of lecture and two hours of laboratory per week. Not for students intending to pursue additional coursework in Biology nor for students from the College of Health Professions who require BIOL 221/ BIOL 221L & BIOL 222/ BIOL 222L and/or BIOL 315. Not for credit toward Biology major or minor. Not open to those who successfully completed BIOL 115, BIOL 120/ BIOL 120L, BIOL 201 or BIOL 200/ BIOL 200L. Prerequisite: admission to the Honors College. Core: Biological & Physical Sciences. Lab/Class fee will be assessed.

BIOL 120 PRINCIPLES OF BIOLOGY [LECTURE] (3)

Biological principles common to plants and animals. Topics include scientific investigation, genetics, evolution, ecology and ethical issues in contemporary biology. Not for credit toward Biology major or minor. Not open to those who have successfully completed BIOL 115, BIOL 201 or BIOL 200/ BIOL 200L. Students who have successfully completed the honors version of this course (BIOL 117) will not receive additional credit for this course. Corequisite: BIOL 120L. Core: Biological and Physical Sciences.

BIOL 120L PRINCIPLES OF BIOLOGY [LAB] (1)

Biological principles common to plants and animals. Topics include scientific investigation, genetics, evolution and ecology. Not for credit toward Biology major or minor. Not open to those who have successfully completed BIOL 110, 115, 201 or BIOL 200/ BIOL 200L. Corequisite: BIOL 120 (lecture). Successful completion of both satisfies. Core: Lab and Non-Lab Sciences. Lab/Class fee will be assessed.

BIOL 191 INTRODUCTORY BIOLOGY FOR HEALTH PROFESSIONS [LECTURE] (3)

Basic principles of biology including process of scientific investigation, cells, macromolecules, metabolism, DNA, genetics, evolution, and ecology. Intended for College of Health Professions majors who will take additional biology courses. Not for Biology major/minor credit. Not open to those who successfully completed BIOL 201, BIOL 200 or BIOL 200L. Core credit not given for both BIOL 191/ BIOL 191L and BIOL 120/ BIOL 120L. College of Health Professions major credit given to those who complete either BIOL 190 or BIOL 191 and BIOL 191L. Students who have successfully completed the honors version of this course (BIOL 192) will not receive additional credit for this course. Corequisite: BIOL 191L. Prerequisite: limited to specific majors in CHP. Core: Lab & Non-Lab Sciences.

BIOL 191L INTRODUCTORY BIOLOGY FOR HEALTH PROFESSIONS [LAB] (1)

Basic principles of biology including process of scientific investigation, cells, macromolecules, metabolism, DNA, genetics, evolution, and ecology. Average of three laboratory hours per week. Intended for College of Health Professions majors who will take additional biology courses. Not for Biology major/minor credit. Not open to those who successfully completed BIOL 200/ BIOL 200L or BIOL 201. Core credit not given for both BIOL 191/ BIOL 191L and BIOL 120/ BIOL 120L. College of Health Professions major credit given to those who complete either BIOL 190 or BIOL 191/ BIOL 191L. Corequisite: BIOL 191. Prerequisite: CHP major. Core: Biological & Physical Sciences. Lab/Class fee will be assessed.

BIOL 192 HONORS INTRODUCTORY BIOLOGY FOR THE HEALTH PROFESSIONS (4)

Basic principles of biology including process of scientific investigation, cells, macromolecules, metabolism, DNA, genetics, evolution, and ecology. Intended for College of Health Professions majors who will take additional biology courses. Not for Biology major/minor credit. Students who have successfully completed the non-honors version of this course will not receive additional credit for this course. Not open to those who successfully completed BIOL 201 or BIOL 200/ BIOL 200L. Core: Biological & Physical Sciences. Honors College course. Lab/Class fee will be assessed.

BIOL 200 BIOLOGY I: INTRODUCTION TO CELLULAR BIOLOGY AND GENETICS [LECTURE] (3)

An introduction to biology, including biologically important molecules, cell and tissue structure, respiration, photosynthesis, mitosis, meiosis and genetics. Course designed for Biology and related science majors; taking this course to fulfill Core credit generally not advised (see BIOL 120/ BIOL 120L as alternative). Core credit not given for both BIOL 200/ BIOL 200L and BIOL 120/ BIOL 120L. Students who have successfully completed the honors version of this course (BIOL 203) will not receive additional credit for this course. Corequisite: BIOL 200L. Prerequisites: qualifying score on the Math Placement exam into MATH 115 or higher, or successful completion of MATH 102. Core: Lab and Non-Lab Sciences.

BIOL 200L BIOLOGY I: INTRODUCTION TO CELLULAR BIOLOGY AND GENETICS [LAB] (1)

An introduction to biology, including biologically important molecules, cell and tissue structure, respiration, photosynthesis, mitosis, meiosis and genetics. Average of three laboratory hours per week. Course designed for Biology and related science majors; taking this course to fulfill Core credit generally not advised (see BIOL 120/ BIOL 120L as alternative). Core credit not given for both BIOL 200/ BIOL 200L and BIOL 120/ BIOL 120L. Core: Lab and Non-Lab Sciences. Corequisite: BIOL 200. Prerequisites: qualifying score on the Math Placement exam into MATH 115 or higher, or successful completion of MATH 102. Lab/Class fee will be assessed.

BIOL 203 HONORS BIOLOGY I: CELLULAR BIOLOGY AND GENETICS (4)

An introduction to biology, including biologically important molecules, cell and tissue structure, respiration, photosynthesis, mitosis, meiosis and genetics. Average of three laboratory hours per week. Major credit not given for BIOL 201 or BIOL 200/BIOL 200L. Honors College Course. Students who have successfully completed the non-honors version of this course will not receive additional credit for this course. Prerequisites: qualifying score on the Math Placement exam into MATH 115 or higher, or successful completion of MATH 102. Core: Lab and Non-Lab Sciences.

BIOL 204 EDUCATIONAL AND CAREER PLANNING FOR THE BIOLOGIST (1)

Exploration of undergraduate educational opportunities, graduate and professional education, career options, and career preparation in the Biological Sciences. Prerequisites: major status, 12 earned units, and BIOL 200.

BIOL 205 GENERAL BOTANY (4)

Plant structure, development, reproduction and diversity of life forms by interrelating hormones, physiological processes and environmental relationships with respect to the whole plant. Emphasis on flowering plants. Average of three laboratory or discussion hours per week.

Prerequisites: BIOL 200/ BIOL 200L (BIOL 201), BIOL 206/ BIOL 206L (BIOL 202). Lab/Class fee will be assessed.

BIOL 206 BIOLOGY II: INTRODUCTION TO ECOLOGY AND EVOLUTION [LECTURE] (3)

Population dynamics, community patterns and processes, origin and diversity of species, natural selection, speciation, and population genetics. Course designed for BIOL and related science majors; taking this course to fulfill GenEd credit generally not advised (see BIOL 120 and BIOL 120L as alternative). Corequisite: BIOL 206L (lab). Prerequisite: BIOL 200/ BIOL 200L (BIOL 201). Core: Lab & Non-Lab Sciences.

BIOL 206L BIOLOGY II: INTRODUCTION TO ECOLOGY AND EVOLUTION [LAB] (1)

Gathering biological data; developing testable hypotheses and quantitative analysis of biological data. Three laboratory hours per week. Course designed for BIOL and related science majors; taking this course to fulfill GenEd credit generally not advised (see BIOL 120 and BIOL 120L as alternative). Corequisite: BIOL 206 (lecture). Prerequisite: BIOL 200/ BIOL 200L (BIOL 201). Core: Lab & Non-Lab Sciences.

BIOL 207 GENERAL ZOOLOGY (4)

Major animal phyla. A comparative approach to the structure, function, development and ecology of the animal kingdom. Average of three laboratory hours per week. Prerequisite: BIOL 206/ BIOL 206L (BIOL 202). Lab/Class fee will be assessed.

BIOL 208 BIODIVERSITY (3)

Phylogenetics and the evolution of major groups of organisms: brief survey of representatives of phyla from the three domains; development and the evolution of form; case studies on form and function; the biodiversity crisis. Three lecture hours a week. Prerequisites: BIOL 200/ BIOL 200L (BIOL 201) and BIOL 206/ BIOL 206L (BIOL 202).

BIOL 210 MEDICAL TERMINOLOGY (3)

An interactive online study of the language of medicine including word parts, compound word construction, and medical terms used to describe the major body systems as used in medical records, documents, and discussions among medical professionals. Intended for students planning to apply to graduate school in some area of biomedicine, e.g. physician assistant school; medical, dental, or veterinary school; or a graduate program in a biomedical research field. At the completion of this course, students are expected to correctly use medical terms in both written and oral communication. Prerequisite: BIOL 191/ BIOL 191L (BIOL 190) or BIOL 200/ BIOL 200L (BIOL 201).

BIOL 215 ESSENTIALS OF MICROBIOLOGY (4)

Pathogenesis of bacteria and viruses, their interactions with the human body, and methods of treatment and prevention. Three hours of laboratory per week. Recommended for Health Science majors. Not for Biology major credit. Prerequisites: BIOL 191/BIOL 191L or BIOL 192/ BIOL 192L or BIOL 200/BIOL 200L [BIOL 190 or BIOL 201] and CHEM 121/ CHEM 121L or CHEM 131/CHEM 131L [CHEM 110] or CHEM 115 [CHEM 105]. Lab/Class fee will be assessed.

BIOL 220 ESSENTIALS OF HUMAN ANATOMY AND PHYSIOLOGY (4)

Provides an overview of human anatomy and physiology through the study of the structure and function of the human body. Human organ systems: integumentary, skeletal, nervous, muscular, endocrine, immune, cardiovascular, respiratory, digestive, urinary and reproductive systems will be examined. This course is open only to students in the Health Education and Promotion major. This course is not equivalent to BIOL 221/ BIOL 221L or BIOL 222/ BIOL 222L and cannot replace one or both of these courses. Prerequisites: BIOL 191/ BIOL 191L, or BIOL 200/ BIOL 200L or equivalent; major in FWLP or HLTH. Lab/class fee will be assessed.

BIOL 221 HUMAN ANATOMY & PHYSIOLOGY I [LECTURE] (3)

Cell biology, histology skeletal, muscular, and nervous systems. Course enrollment is limited to two attempts including audits and withdrawals. Exceptions to this limit may be requested by contacting the Course Coordinator. Corequisite: BIOL 221L (lab). Prerequisite: BIOL 191/ BIOL 191L (BIOL 190) or BIOL 200/ BIOL 200L (BIOL 201).

BIOL 221L HUMAN ANATOMY & PHYSIOLOGY I [LAB] (1)

Cell biology, histology skeletal, muscular, and nervous systems. Average of three laboratory hours per week. Course enrollment is limited to two attempts including audits and withdrawals. Exceptions to this limit may be requested by contacting the Course Coordinator. Corequisite: BIOL 221 (lecture). Prerequisites: BIOL 191/ BIOL 191L (BIOL 190), BIOL 192, or BIOL 200/ BIOL 200L (BIOL 201). Lab/class fee will be assessed.

BIOL 222 HUMAN ANATOMY & PHYSIOLOGY II [LECTURE] (3)

Cardiovascular, respiratory, digestive, excretory, endocrine and reproductive systems. Course enrollment is limited to two attempts including audits and withdrawals. Exceptions to this limit may be requested by contacting the Course Coordinator. Corequisite: BIOL 222L (lab). Prerequisite: BIOL 221/ BIOL 221L.

BIOL 222L HUMAN ANATOMY & PHYSIOLOGY II [LAB] (1)

Cardiovascular, respiratory, digestive, excretory, endocrine and reproductive systems. Average of three laboratory hours per week. Course enrollment is limited to two attempts including audits and withdrawals. Exceptions to this limit may be requested by contacting the Course Coordinator. Corequisite: BIOL 222 (lecture). Prerequisite: BIOL 221 / BIOL 221L. Lab/Class fee will be assessed.

BIOL 301 FIELD AND NATURAL SCIENCE (3)

Physical and biological components of various environments and their interrelationships with each other and humans. Emphasis on field studies observation with the application of findings to classroom teaching and learning in the elementary and middle school classroom. Intended for Middle School education majors and environmental science and studies majors in the informal environmental education track only. Not for credit towards BIOL major or minor. Prerequisites: BIOL 117, or BIOL 120/BIOL 120L (BIOL 115), or BIOL 191/BIOL 191L (BIOL 190), or BIOL 192, or BIOL 200/BIOL 200L (BIOL 201), or BIOL 206/ BIOL 206L (BIOL 202), or BIOL 203; major status. Lab/Class fee will be assessed.

BIOL 303 LIFE SCIENCES (3)

Living organisms in the environment, emphasizing modes of scientific inquiry and the utilization of living organisms in the classroom. Not for credit toward the Biology major or minor. Prerequisites: BIOL 120/ BIOL 120L (BIOL 115), BIOL 191/ BIOL 191L (BIOL 190) or BIOL 200/ BIOL 200L (BIOL 201); majors in ELED, EESE, ECSE. Lab/Class fee will be assessed.

BIOL 304 NATURAL HISTORY INTERPRETATION AND PUBLIC ENVIRONMENTAL EDUCATION (3)

Overview of public education in the biological sciences at local organizations such as zoos, parks, and aquaria. Emphasis is placed on basic ecological concepts and how these concepts are presented to the general public, especially those of school age. Field experience at a local nature center outside of class time is required. Biology majors choosing the secondary school biology and general science teaching concentration or the organismal biology and ecology concentration may enroll for biology major credit. Prerequisites: Consent of instructor.

BIOL 305 ELECTRON MICROSCOPY (4)

Theory, preparation, and application of the electron microscope, including light microscopy. Average of three laboratory hours per week. Prerequisites: 12 credits of biology, PHYS 211, PHYS 212 recommended, and consent of instructor.

BIOL 306 HUMAN ECOLOGY AND SUSTAINABILITY (3)

Relationships and sustainability of human society and natural ecosystems. Relevant scientific, socioeconomic and ethical issues will be examined in such current events as climate change, energy policy and urban planning. Cannot be taken for Biology major credit. Prerequisites: BIOL 105, BIOL 115, BIOL 191/ BIOL 191L (BIOL 190), BIOL 200/ BIOL 200L (BIOL 201), BIOL 206/ BIOL 206L (BIOL 202) or CHEM 104. Core: Ethical Issues & Perspectives.

BIOL 309 GENETICS (4)

Problem-based genetics: Mendelian genetics, genetic linkage and mapping, nucleic acid structure, replication and function, protein synthesis and the genetic code, gene expression and regulation, mutation, repair, and recombination, recombinant DNA technology, and population genetics. Includes average of two recitation hours per week. Prerequisites: BIOL 200/ BIOL 200L (BIOL 201); BIOL 206/ BIOL 206L (BIOL 202) and CHEM 131/ CHEM 131L.

BIOL 310 CONSERVATION BIOLOGY (4)

Application of ecological theory to conservation of biological diversity. Exploration of past and present processes leading to and maintaining diversity and how such processes are impacted by human disturbance. Average of three laboratory hours per week. Prerequisites: BIOL 206/ BIOL 206L (BIOL 202), BIOL 205 or BIOL 207 or BIOL 208, and CHEM 131/ CHEM 131L.

BIOL 318 MICROBIOLOGY (4)

Biology of microorganisms with emphasis on bacteria. Microbial morphology, physiology and genetics and the role of microorganisms in natural processes and disease. Laboratory includes methods of observing, isolating, and identifying bacteria. Average of three laboratory hours per week. Either this course or BIOL 315, but not both, may count toward Biology major or M.S. degree in Biology. Prerequisites: BIOL 309 and CHEM 132/ CHEM 132L. Lab/Class fee will be assessed.

BIOL 325 ANIMAL PHYSIOLOGY (4)

Animal structure and function from molecular to organismic levels. Emphasizing comparative strategies and adaptations of various animal groups in their environments; response of integrated systems to changes in the physical and chemical environment; environmental physiology. Prerequisites: BIOL 207 or BIOL 208, BIOL 309 and CHEM 132/ CHEM 132L (CHEM 111). Lab/Class fee will be assessed.

BIOL 327 DANGEROUS DISEASES (3)

Microorganisms and their roles in diseases. Human impact on the environment relating to emerging disease; biotechnological techniques; ethical issues. Not for credit toward Biology major, minor, or MS in Biology. Prerequisites: BIOL 110, 112, 115, 190 or BIOL 201.

BIOL 334 HUMANS, SCIENCE AND THE CHESAPEAKE BAY (3)

Conflicts between human use of the Chesapeake Bay watershed, Bay water quality and effects on Bay natural resources; emphasis on understanding the dynamics of this ecosystem and the role science plays in political decisions affecting the Bay. Prerequisites: BIOL 205 or BIOL 207 or BIOL 208 and BIOL 206/ BIOL 206L (BIOL 202).

BIOL 342 HUMAN ANATOMY AND PHYSIOLOGY I FOR BIOLOGY MAJORS (4)

Application based approach to learning with emphasis placed on development of quantitative skills, critical thinking, data analysis and concept integration. Topics will include cell biology, histology, skeletal, muscular, and nervous systems. Three laboratory/recitation hours per week. Prerequisites: BIOL 309; major standing, sophomore/junior/senior standing. Lab/class fee will be assessed.

BIOL 343 HUMAN ANATOMY AND PHYSIOLOGY II FOR BIOLOGY MAJORS (4)

Application based approach to learning with emphasis placed on development of quantitative skills, critical thinking, data analysis and concept integration. Topics will include cardiovascular, respiratory, digestive, excretory, endocrine and reproductive systems. Three laboratory/recitation hours per week. Prerequisite: BIOL 342. Lab/class fee will be assessed.

BIOL 347 MARINE BIOLOGY (3)

Major features of the marine environment emphasizing biological aspects and specific adaptations of marine organisms. Prerequisites: BIOL 205 or BIOL 207 or BIOL 208 and CHEM 131/ CHEM 131L.

BIOL 353 INVERTEBRATE ZOOLOGY (4)

Examination of the evolutionary history and phylogenetic relationships of the animals, including the origin of the animals and their place among eukaryotic life. This will include study of structure and function, general ecology and life history strategies of selected invertebrate animal groups. Laboratory emphasizes learning techniques for sampling various invertebrate taxa in natural settings. Average of three laboratory hours per week. Prerequisite: BIOL 206/ BIOL 206L (BIOL 202). Lab/Class fee will be assessed.

BIOL 355 ANIMAL PARASITOLOGY (3)

Major groups of animal parasites and their vectors. Emphasis will be placed on pathogenesis of medically relevant organisms. Lecture discussions will incorporate an examination of relevant primary literature. Prerequisite: BIOL 309.

BIOL 360 HISTOLOGY (4)

Tissues of the vertebrate body. Prerequisites: BIOL 343 or BIOL 325. Lab/Class fee will be assessed.

BIOL 365 HUMAN PATHOPHYSIOLOGY (3)

Designed to look at the most prevalent diseases in the U.S. population, studying their pathophysiology at the molecular, cellular, and organismal level. Disease etiology, symptoms, diagnostic procedures, and treatments will be discussed. Current research topics focus on new diagnostic techniques, including cellular imaging, as well as new treatments, including stem cell therapy. Prerequisites: BIOL 222/ BIOL 222L or BIOL 325 or BIOL 343, and BIOL 309.

BIOL 367 ENDOCRINOLOGY (3)

Endocrine mechanisms regulating homeostasis and functional integrity of animals with emphasis on vertebrates. Prerequisites: BIOL 309 or BIOL 325, BIOL 343 and CHEM 132/ CHEM 132L (CHEM 111).

BIOL 371 ANIMAL BEHAVIOR (4)

Introduction to modern study of behavior including the development and control of behavior as well as the evolution and adaptive value of behavior. Two recitation hours per week. Prerequisites: BIOL 207 or BIOL 208; BIOL 206/ BIOL 206L (BIOL 202) recommended.

BIOL 381 WRITING IN THE BIOLOGICAL SCIENCES (3)

Practicum on writing in the scientific style appropriate for biology. Includes detailed analysis and critical written summation of primary research literature in biology. Not for major or minor credit or M.S. degree in Biology. Requires grade of C or better to fulfill Core or requirement. Prerequisites: ENGL 102 or ENGL 190 or equivalent, 60 completed units including a minimum of 16 units completed in biology, or permission of the instructor. Core: Advanced Writing Seminar.

BIOL 382 ENVIRONMENTAL EDUCATION AND SERVICE LEARNING IN THE TROPICS (3)

Designed for majors in Science or Education with an interest in Environmental Education; course work will take place in Costa Rica; emphasis on tropical forest ecology concepts applicable to PreK-12 environmental education and management of tropical natural resources. Cross-listed as ENV 382. Prerequisites: minimum Junior status and consent of the instructor.

BIOL 389 CURRENT DEVELOPMENTS IN BIOLOGY (3)

Current directions of research in a major area of the biological sciences. Sufficient background will be studied for the appreciation of the significance of these developments. Prerequisite: consent of department.

BIOL 402 GENERAL ECOLOGY (4)

Effects of the abiotic environment on distribution and abundance of organisms; organization of biological communities; ecosystems and global change; application of ecological principles to natural resource management. Some daylong trips required. Prerequisites: BIOL 206/ BIOL 206L (BIOL 202); and BIOL 205, BIOL 207, or BIOL 208; CHEM 131/ CHEM 131L (CHEM 111). Lab/Class fee will be assessed.

BIOL 403 ADV GENETICS (3)

Emphasis on the molecular basis of gene action. Discussion of current work and methods related to the problem of gene structure, function, and mutation including the translation and regulation of genetic information. Prerequisite: BIOL 309.

BIOL 405 MOLECULAR ECOLOGY, EVOLUTION AND CONSERVATION (4)

Examination of applications of modern molecular techniques in ecology, evolution, behavior, and conservation biology. Emphasis will be on how application of these techniques provides greater insight in these areas of study. Includes average of two recitation hours per week. Prerequisite: BIOL 309.

BIOL 406 LIMNOLOGY (4)

Ecology of streams and lakes: physical, chemical, and biological factors that affect communities of freshwater organisms; laboratory and field experience in methods used to analyze aquatic systems. Prerequisites: BIOL 205, BIOL 207 or BIOL 208; and CHEM 132/ CHEM 132L (CHEM 111). Lab/Class fee will be assessed.

BIOL 408 CELL BIOLOGY (4)

The molecular and morphological organization of the cell in relationship to cellular activities with emphasis on eukaryotic cells. Includes average of two recitation hours per week. Prerequisites: BIOL 309; CHEM 132/ CHEM 132L is recommended.

BIOL 409 MOLECULAR BIOLOGY (4)

Molecular basis of genetic inheritance and gene expression. DNA and RNA structure, DNA replication, sources and mechanisms of mutation and repair. Genome structure and organization in viruses, prokaryotes, and eukaryotes. Includes average of two recitation hours per week. Prerequisites: BIOL 309; CHEM 132/CHEM 132L is recommended.

BIOL 410 MOLECULAR BIOLOGY LABORATORY (3)

Modern molecular genetic research techniques. The theoretical and practical considerations of the organisms and enzymes used in molecular biology, gene cloning strategies, DNA sequencing and analysis, analysis of genome structure and gene expression, gene subcloning, and transgenic organisms. Prerequisite: BIOL 309. Lab/Class fee will be assessed.

BIOL 411 CANCER BIOLOGY (3)

Current concepts and knowledge of cancer, including cancer research and treatment. Will utilize lecture, review of journal articles to examine both the clinical and molecular aspects underlying cancer development with the aim of understanding how changes in the normal growth and division processes lead to tumorigenesis. Topics of discussion include cancer development and progression, oncogenes and tumor suppressor genes, effects of chemicals and radiation, cell cycle control, cell signaling, apoptosis, angiogenesis, cell migration/metastasis, cancer prevention, and the immune response to cancer. Prerequisite: BIOL 309.

BIOL 412 CELL BIOLOGY LABORATORY (3)

Current laboratory techniques used for the study of cell structure and function. Theoretical and practical considerations for the growth and maintenance of eukaryotic cells and the analysis of gene expression, protein interactions, cell signaling and cell-cell contacts. Prerequisite: BIOL 309. Lab/Class fee will be assessed.

BIOL 413 EVOLUTION (3)

Concepts of biological evolution, the history of the development of these concepts, and current topics in revolutionary biology. Prerequisites: BIOL 205, BIOL 207 or BIOL 208, and BIOL 309.

BIOL 415 BIOTECHNOLOGY (3)

Application of molecular biology in the areas of agriculture, medicine, and ecology/environmental biology. Government regulations, ethical implications and patent issues will also be addressed. Prerequisite: BIOL 309.

BIOL 418 GENETIC ANALYSIS IN MEDICINE (3)

A research-based course focused on using de-identified genetic, environmental, bio-specimen, and electronic health record data to investigate relationships between molecular biology/genetics and human health, especially in populations usually underrepresented in biomedical studies. Students will design their experimental question by researching how molecular and environmental differences could potentially inform medical outcomes. They will select a cohort and variables necessary to test their particular hypothesis and perform their analysis using an appropriate statistical software package. This course will include basic statistical programming, data cleaning, and statistical analysis. Prerequisites: BIOL 309 and (MATH 231, MATH 237, or PSYC 212).

BIOL 419 ENVIRONMENTAL MICROBIOLOGY (3)

Biology and ecology of microorganisms in natural and anthropogenic environments. Culture-based and molecular methods for detection, evaluation, and manipulation of microorganisms and their metabolism. Prerequisites: BIOL 309, CHEM 132/ CHEM 132L, and BIOL 318.

BIOL 420 MICROBIOLOGY OF INFECTIOUS DISEASE (3)

Cell and molecular biology of microorganisms that cause life-threatening disease. Topics include in-depth explorations of bacteria, protozoa, helminths, viruses, and fungi that infect humans, plants, and animals. Prerequisite: BIOL 309.

BIOL 421 IMMUNOLOGY (4)

Cells and organs of the immune system, antibody-antigen interactions, immunoglobulin gene organization, B-cell maturation and activation, Major Histocompatibility Complex, cytokines, complement, inflammation, hypersensitivity, vaccines, autoimmunity, and immunodeficiencies. Includes average of two recitation hours per week for problem-solving and demonstrations. Prerequisites: BIOL 309; BIOL 408 or BIOL 409 is recommended.

BIOL 425 DISSECTION OF THE UPPER EXTREMITY (2)

Gross anatomical dissection of the human upper extremity including the muscles, nerves and blood vessels which supply the appendage. Special emphasis will be placed on development of techniques which assure careful and accurate dissection. Offered only in minimester. Prerequisites: BIOL 221/ BIOL 221L (BIOL 213) and consent of instructor. Lab/Class fee will be assessed.

BIOL 427 NEUROMUSCULAR MECHANISMS OF THE UPPER BODY (2)

Gross anatomy of the human upper extremity and cranial nerves. Upper extremity emphasis includes muscle action, innervation, and major spinal cord pathways. Olfactory, optic, auditory, and vestibular functions of cranial nerves are stressed. One lecture and two laboratory periods per week. Prerequisites: BIOL 221/ BIOL 221L or BIOL 342 and consent of the instructor. Lab/Class fee will be assessed.

BIOL 428 VIROLOGY (3)

Cell and molecular biology of viruses. General virology, including pathogenesis and mortality, interaction with the immune system, and some medically relevant viruses. Prerequisite: BIOL 318 or BIOL 408 or BIOL 409 or BIOL 410 or BIOL 412.

BIOL 432 VASCULAR PLANT TAXONOMY (4)

A study of the history and principles of vascular plant systematics with laboratory time devoted to collection and identification of plants in the local flora. An average of three laboratory hours per week. Prerequisite: BIOL 205 or BIOL 208 or consent of the instructor. Lab/Class fee will be assessed.

BIOL 435 PLANT ECOLOGY (4)

Environmental factors and processes which control plant distribution, plant communities, and vegetational biomes of North America. An average of 3 laboratory hours per week with 2 required 3-day weekend field trips and a Saturday field trip emphasizing examples from Maryland and the Mid-Atlantic states. Prerequisites: BIOL 206/ BIOL 206L (BIOL 202) and BIOL 205 or BIOL 208. Lab/Class fee will be assessed.

BIOL 436 PLANT PHYSIOLOGY (3)

Life functions of plants as related to structure at all levels: cells, organs, and the complete organism. Consideration of the interaction of environmental and genetic factors on plant metabolism. Prerequisites: BIOL 205 or BIOL 208; BIOL 309; CHEM 330 recommended.

BIOL 444 WILDLIFE MANAGEMENT (3)

Comprehensive introduction to the management, ecology, and behavior of wildlife species. Although regional species will often be used as examples, the course will emphasize principles that can be applied on a world-wide basis. Prerequisites: BIOL 206/ BIOL 206L (BIOL 202); BIOL 309 and BIOL 402 recommended.

BIOL 446 TROPICAL ECOLOGY AND CONSERVATION (3)

Evolution and ecology of tropical ecosystems. Mechanisms that maintain tropical diversity, species interactions, anthropogenic impacts, and conservation strategies. Prerequisites: BIOL 206/BIOL 206L (BIOL 202); either BIOL 205 or BIOL 207 or BIOL 208.

BIOL 447 TROPICAL FIELD ECOLOGY (4)

Field course set in the tropical rainforest. Includes exploration of different tropical ecosystems and training in techniques to carry out independent field research projects. Prerequisites: BIOL 206/ BIOL 206L (BIOL 202) and (BIOL 205, BIOL 207, or BIOL 208).

BIOL 450 ECOLOGICAL BIOCHEMISTRY (3)

Examining diversity of natural products involved in biochemical interactions between plants, animals (including insects, humans, and other herbivores) and microbial flora. Effects that changes in the chemistry of these compounds have on function in ecological systems. Not open to students who have taken CHEM 450. Prerequisites: CHEM 333/ CHEM 333L (CHEM 330) or CHEM 334 & CHEM 336 (CHEM 331), and BIOL 200/ BIOL 200L (BIOL 201) or BIOL 206/ BIOL 206L (BIOL 202).

BIOL 452 WETLAND ECOLOGY (4)

Wetland ecology and wetland management, with special focus on wetlands of the Mid-Atlantic region. Emphasis is on biological, physical, chemical, and ecological aspects of wetlands. Course also deals with valuation, classification, delineation and management of wetlands for biotic resources and water management. Average of three laboratory hours per week. Two mandatory Saturday field trips. Prerequisites: BIOL 206/BIOL 206L (BIOL 202); and BIOL 205 or BIOL 207 or BIOL 208. Lab/Class fee will be assessed.

BIOL 455 FISH BIOLOGY (4)

Evolutionary history, functional biology, ecology, and conservation of fishes. Weekend field trips required. Prerequisites: BIOL 207 or BIOL 208 and CHEM 132/ CHEM 132L; BIOL 325 is recommended. Lab/Class fee will be assessed.

BIOL 456 ORNITHOLOGY (4)

Evolutionary history, morphology, physiology, behavior and ecology of birds. One day-long weekend field trip and several early morning weekday field trips required. Prerequisites: BIOL 206/ BIOL 206L (BIOL 202) and BIOL 207 or BIOL 208. Lab/Class fee will be assessed.

BIOL 458 MAMMALOLOGY (4)

Evolution, comparative morphology, systematics, and distribution of mammals. Representative life histories are considered. Average of three laboratory hours per week. Prerequisite: BIOL 207 or BIOL 208. Lab/Class fee will be assessed.

BIOL 461 ENTOMOLOGY (4)

Emphasis on entomology as an interdisciplinary science by including reviews of the major subdivisions within the discipline, including systematics, ecology, behavior, comparative biology and control. Laboratory emphasizes field work for collection of insects and identification and recognition of insect orders and common families. Average of three laboratory hours per week. Prerequisite: BIOL 206/ BIOL 206L (BIOL 202). Lab/Class fee will be assessed.

BIOL 463 DEVELOPMENTAL BIOLOGY (4)

Embryonic development of animals, including differentiation, morphogenesis, pattern formation, and organogenesis. Emphasis on cellular and molecular mechanisms governing these processes. Average of two recitation hours per week. Prerequisites: BIOL 309 and either BIOL 325 or BIOL 343.

BIOL 467 HERPETOLOGY (4)

Systematic survey of the modern reptiles and amphibians. Emphasis is placed on the evolution of morphological and behavioral traits which have enabled the reptiles and amphibians to successfully exploit their individual habitats. Laboratory includes systematic classification, student seminars and field work. Average of three laboratory hours per week. Prerequisite: BIOL 207 or BIOL 208. Lab/Class fee will be assessed.

BIOL 470 ADVANCED PHYSIOLOGY (4)

Physiological topics discussed at the molecular, cellular, organ, organ system, and whole organism levels. Emphasis on integrating knowledge gained in prerequisite physiology courses and recent discoveries. The recitation component will emphasize the scientific method, data interpretation, and quantitative skills. Topics may include: osmoregulation, gas exchange, general and specific metabolism, thermoregulation, locomotion and regulation via the neural and endocrine systems. Students who have successfully completed BIOL 465 or BIOL 469 will not receive additional credit for BIOL 470. Includes average of two recitation hours per week. Prerequisites: BIOL 343 or BIOL 325, CHEM 132/ CHEM 132L, senior status; CHEM 332 and BIOL 207 or BIOL 208 are recommended.

BIOL 471 ADVANCED PHYSIOLOGY LABORATORY (2)

Hands-on investigation of physiological principles at the cellular, organ, organ system and whole organism levels. Course meets for 4 hours once per week. Prerequisite: BIOL 470 (may be taken concurrently). Lab/Class fee will be assessed.

BIOL 472 ORGANISMAL FORM AND FUNCTION LABORATORY (3)

Using locally collected invertebrate organisms this course will examine the details of animal movement (running, jumping, flying, feeding) with high-speed cameras. Students will develop their own research questions based upon species collected, and will be guided through data collection, analyses and presentation. Course will include some lectures on organismal form, function and performance, paper discussions, field trips to local sites, and will consist of in class time dedicated to data collection, analysis, and presentation. Prerequisites: BIOL 200 / BIOL 200L (or equivalent) and BIOL 206/ BIOL 206L (BIOL 202). Lab/class fee will be assessed.

BIOL 473 ECOLOGICAL FIELD METHODS LABORATORY (3)

Focuses on inquiry-based ecological field research. Students develop critical thinking skills, ask research questions, and collaborate to carry out inquiry-based research. This process includes discovery, hypotheses forming, learning field techniques, data collection, statistical analyzes, and preparing a scientific poster. Prerequisite: BIOL 206/ BIOL 206L (BIOL 202). Lab/class fee will be assessed.

BIOL 474 MOLECULAR TECHNIQUES IN ECOLOGY, EVOLUTION, AND CONSERVATION (3)

Designed to introduce students to research in the field of conservation genetics. More specifically, students will participate in an ongoing research project using bioinformatic and/or laboratory and data analysis techniques. The goal is to generate data that will facilitate the management of a threatened species. Undergraduate researchers will engage in structured inquiry, in that they will investigate an instructor-presented question with a prescribed procedure but the project outcome is unknown. Prerequisite: BIOL 309. Lab/class fee will be assessed.

BIOL 475 GENETICS LABORATORY (3)

Laboratory and computer-based applications of Mendelian, Molecular, and Population Genetics. Prerequisite: BIOL 309. Lab/Class fee will be assessed.

BIOL 481 DIRECTED READINGS BIOLOGY (1-3)

Independent reading in an area selected by the student in consultation with the instructor. May not be applied toward the Biology major or Biology minor, or M.S. degree in biology. May be repeated for a maximum of 3 credits. Prerequisite: a minimum of 10 credits in biology and prior written consent of instructor.

BIOL 483 WORKSHOP IN BIOLOGY (3)

Intensive study of a specific topic or technique in the biological sciences. Topic varies with instructor. May be repeated once provided a different topic is covered. Prerequisites: one biology course and consent of department. Lab/class fee will be assessed.

BIOL 484 SEMINAR IN ECOLOGY, EVOLUTION, CONSERVATION AND BEHAVIOR (1)

Discussion and analysis of current research in ecology, evolution, conservation biology, and animal behavior. May be repeated for a maximum of 2 units. Prerequisites: 12 credit hours in Biology, including BIOL 206/ BIOL 206L (BIOL 202), or consent of instructor.

BIOL 485 SEMINAR IN APPLIED BIOTECHNOLOGY (1)

Current research articles in cell biology and microbiology are reviewed. May be repeated for a maximum of 2 units. Prerequisites: 12 hours in biology, including one of the following: BIOL 325, BIOL 318, BIOL 408 or BIOL 409; and BIOL 309.

BIOL 490 INDEPENDENT RESEARCH (1-3)

Active student participation in original investigation / research project with a faculty mentor. Not for Major or Minor credit. May be repeated for a maximum of 9 units. Prerequisite: Consent of the instructor. Graded S/U.

BIOL 491 ELECTIVE IN INDEPENDENT RESEARCH (3)

Active student participation in original investigation / research project with a faculty mentor. Project culminates in public oral or poster presentation or equivalent. Repeatable for up to 6 units, 3 of which may be used as the equivalent of a 3-unit Biology elective. Prerequisite: consent of instructor.

BIOL 493 INTERNSHIP IN BIOLOGY (3)

Practical application of biology in businesses, industries, and public and private agencies. Not for major or minor credit. May be repeated once for credit to a maximum of 6 units. Prerequisites: 2.75 GPA, junior or senior standing, major in Biology, and consent of the biology internship coordinator. A minimum of 11 units in Biology completed at Towson University is recommended. Special permit and co-op fee required. Graded S/U.

BIOL 494 TRAVEL STUDY (1-3)

A detailed investigation of field-oriented problems in biology away from the Towson University campus. Locations and topics to be selected by the department and instructors sponsoring the program. May be repeated for a maximum of 3 units. Prerequisites: BIOL 117, BIOL 120/ BIOL 120L, BIOL 191/ BIOL 191L (BIOL 190), BIOL 200/ BIOL 200L (BIOL 201) or equivalent and consent of instructor.

BIOL 499 HONORS SENIOR THESIS IN BIOLOGY (3)

Writing of an honors thesis based on individual research done under the direction of a faculty member. Public presentation and defense of thesis required. May not be used toward a Biology Minor or M.S. degree in Biology. Honors College. Prerequisites: BIOL 491 and consent of instructor.