

## **BIOLOGY DEPARTMENT COURSE DESCRIPTIONS**

**BIOL 1/The Biological Basis of Human Sexuality (4):** An introduction to human sexuality, broadly defined from a biological point of view. General topics include consideration of genetic, gonadal, hormonal, phenotypic, and brain sex. Discusses sexual arousal, human sexual response cycles, contraceptive techniques, pregnancy, birth, and sexually transmitted diseases, as well as the biological contributions to sexual behavior. Includes a study of the relationship of the reproductive system to other systems of the body. Does not meet requirements for major or minor in biology. Meets: Four hours class. Offered annually.

**BIOL 2/Biology of the Mind (4):** An introduction to the biological basis for the mental processes by which we think, perceive, learn, and remember. General topics include anatomical organization of brain function, how cells in the brain communicate with each other, and the interplay between nature versus nurture in neural development. Does not meet requirements for major or minor in biology. Offered annually.

**BIOL 3/Environmental Biology (4):** An introductory study of ecology and environmental quality. Includes a survey of the impact of people on the environment and suggestions for meeting our future biological and technological needs in environmentally compatible ways. Does not meet requirements for major or minor in biology. Meets: Three hours class. Offered annually.

**BIOL 4/Microbes in Health and Disease (4) :** An introduction to the microbial world with emphasis on the importance of microbes in human survival and well-being. Topics include microbes and ecosystems, biotechnology/industrial microbiology, emerging infectious diseases, microbes as weapons of bioterror and warfare, and microorganisms as research tools. Site visits to nearby pharmaceutical, water purification, and sewage treatment plants. Meets: Three hours class. Offering to be determined.

**BIOL 5/DNA and Biotechnology Today (4):** A course for non-science majors in which students study the structure and function of DNA as a background to understanding hereditary traits and genetic diseases. Current events are used as a context for study. Topics include the Human Genome Project, molecular forensics, bioremediation using DNA technology, and gene therapy. Format of class includes lectures, student presentations, and hands-on activities during the designated class time. Does not meet requirements for major or minor in biology. Meets: Four hours class. Offered annually.

**BIOL 7/Ecology and Evolution (4):** An exploration of evolutionary and ecological processes and consequences, with close examination of population dynamics, population genetics, principles of heredity, the evolution of adaptations, community interactions, ecosystems, and biodiversity. Laboratory includes field-based investigations of upland and wetland ecosystems as well as simulations and laboratory experiments. Meets: Three hours class, three hours laboratory. Offered fall semester annually.

**Biol 7L/Laboratory in Ecology and Evolution (1)** Lab-only option for Biology 7, available only to students scoring 4 or 5 on AP Biology exam **AND passing exam at Drew** exempting students from lecture component of the course. Meets: Three hours laboratory. Offered fall semester annually.

**Biol 9/Diversity of Life: Animals, Plants, and Microbes (4):** A survey of the animals, plants, fungi, protista, and bacteria of Planet Earth, with comparative analysis of adaptations for survival, reproduction, development, and metabolism. Laboratory emphasizes experimental methods of science as well as morphology and physiology of the major phyla. Meets: Three hours class, three hours laboratory. Offered spring semester annually.

**Biol 9L/Laboratory in Diversity of Life: Animals, Plants, and Microbes (1):** Lab-only option for Biology 9, available only to students scoring 4 or 5 on AP Biology exam **AND passing exam at Drew** exempting from lecture component of the course. Meets: Three hours laboratory. Offered spring semester annually.

**BIOL 22/Molecular and Cellular Biology (4):** An introduction to composition, structure, and function of prokaryotic and eukaryotic cells, using themes of energy and reproduction. Topics include DNA replication, transcription, and translation, mutations, gene regulation, membrane function, cellular communication, motility, absorption, and secretion. Laboratory includes current research techniques such as cell culture nucleic acid characterization, cloning, and restriction mapping. Meets: Three hours class, three hours laboratory. Prerequisite: BIOL 7 , BIOL 9, and CHEM 7. Offered fall semester annually.

**BIOL 24/Vertebrate Anatomy and Physiology (4):** An examination of the structure and function of various physiological systems, such as circulation, respiration, and reproduction. How organs and organ systems evolved, how they function at a biochemical and biophysical level, how they are regulated, and how the functions of multiple systems are interconnected and coordinated within the whole organism. Laboratory will include the exploration of the dynamic function and regulation of human physiological systems and the study of anatomy through dissection of animal specimens. Meets: Three hours class, three hours laboratory. Prerequisite: BIOL 9, BIOL 22, and CHEM 7. Offered spring semester annually.

**BIOL 102/Microbiology (4):**

A comprehensive introduction to the nature and diversity of microorganisms and the roles they play in health, disease, and the ecosystem. Covers bacteria, viruses, protozoa, and fungi. This course examines the ecological, structural, cellular, and molecular features of microbes and explores how some of these features affect host/microbe interactions. Laboratory work incorporates methods of bacterial isolation and identification, including microscopy, use of selective and differential media, biochemical and serological tests, and rapid ID methods. Meets: Three hours class, three hours laboratory. Prerequisite: BIOL 9. BIOL 22, and CHEM 25. Offered fall semester annually.

**BIOL 120/Cell and Molecular Neurobiology (4):** The structure and function of neurons, the basic building blocks of the nervous system, are investigated. The course builds to an understanding of how neuronal cell function determines higher brain processes, such as sensation and memory. The laboratory employs living neurons' growth in culture to explore topics such as growth of neurites, cell signaling pathways, and neural degeneration. Meets: Three hours class, three hours laboratory. Prerequisites: BIOL 7, 9, and 22; and CHEM 7. Offered annually.

**BIOL 121/Systems Neurobiology (4):** The neurons of the nervous system are organized into systems that can be defined on the basis of function, anatomy or neurochemistry. This course explores the development of these systems, coordination of the activity within each system, and clinical disorders arising from malfunctions. The laboratory uses current neuroanatomical, pharmacological and neurochemical techniques to explore structure and function. Meets: Three hours class, three hours laboratory. Prerequisites: BIOL 9, BIOL 22, and CHEM 7. Offered annually.

**BIOL 124/Neurobiology of Learning and Memory (2):** The study of neurobiological mechanisms underlying learning and memory. Current theories of cognition are examined from a developmental, molecular, cellular and systems approach. Specific intracellular changes observed in neurons from both invertebrate and vertebrate models of learning and memory are evaluated. Anatomical correlates of thought are investigated as well as neuro-pharmacological approaches to the study of learning and memory. Meets: Two hours class. Prerequisite: BIOL 2 or 22. Offering to be determined.

**BIOL 127/Diseases of the Brain (4):** An in-depth study of neurologic diseases with a particular emphasis on Alzheimer's disease. Case studies of affected patients are used to understand the relationship between the physical changes and the behavioral impairments in these diseases. Biological mechanisms to explain the pathological and clinical manifestations of the diseases are investigated. Current therapies and ongoing scientific research into novel treatments are evaluated. Meets: Three hours class, one hour supplemental work. Prerequisite: BIOL 2 or 22. Offered annually

**BIOL 130/Histology (4):** A study of normal microscopic anatomy of tissues, organs, and organ systems, with emphasis on structure-function relationships. Fulfills laboratory requirement for major. Meets: Two hours class, six hours laboratory. Prerequisites: BIOL 7, BIOL 9 and BIOL 22. Offering to be determined

**BIOL 134/Endocrinology (4):** A study of the structure and function of mammalian hormone systems. After a general discussion of the major classes of hormones, an in-depth exploration of individual endocrine systems involved in regulating sexual development, body fluid balance, the stress response, and other physiological processes. Topics will include the cellular and molecular mechanisms mediating hormone action, the central and peripheral control of endocrine systems, and clinical correlates of endocrine dysfunction. Prerequisite: BIOL 7, BIOL 22, and CHEM 25. Offering to be determined.

**Biol 138/Advanced Cellular Biology (3):** Advanced study of cell components and functions. Topics include the role of eukaryotic chromosome structure in gene function, control of macromolecule movement between cell compartments, intracellular vesicle trafficking, intracellular communication pathways and networks, how the cytoskeleton produces the forces that change cell shape and organization, and the mechanisms by which cells interact in a multicellular organism. Regular oral presentations and a review paper. Meets: Three hours class. Prerequisite: BIOL 22 and CHEM 26, or permission of the instructor. Corequisite: BIOL 139 if offered during the same semester. Offering to be determined.

**Biol 139/Advanced Laboratory in Cellular Biology (1 or 2):** A laboratory class, offered alone or in conjunction with BIOL 138, that includes experimental work investigating how cellular structure and function are analyzed. Exercises include isolation of subcellular organelles, cytochemical and immunochemical staining of subcellular structures, conditions and drugs that affect the cytoskeleton, and the study of components involved in cell adhesion and membrane fluidity. Fulfills laboratory requirement for major. Meets: three hours laboratory. Prerequisite: BIOL 22. Corequisite: BIOL 138 if offered during the same semester. Offering to be determined.

**BIOL 140/Vertebrate Morphogenesis (4):** Vertebrate anatomy and embryology integrated into a single sequence relating adult morphology to embryological development and adaptation. Stresses basic principles of vertebrate organization, functional considerations of morphology, homologies among vertebrate structures, and evolutionary relations of vertebrate groups. Laboratory work includes comparative studies of various vertebrate types and field trips to the Bronx Zoo and American Museum of Natural History. Fulfills laboratory requirement for major. Meets: Three hours class, three hours laboratory. Prerequisite: BIOL 7 and 9, or permission of instructor. Offered fall semester annually.

**BIOL 142/Developmental Biology (4):** Examination of the principles of development and mechanisms involved in the growth, shaping, and differentiation of organisms. Topics include gene regulation in multicellular organisms, cytoplasmic determination, interactions with extracellular matrix, organ morphogenesis, and mechanisms regulating the pattern of biological structures. In the laboratory, traditional and modern biological techniques and procedures are applied to the study of development. Meets three hours class, three hours laboratory. Offering to be determined.

**BIOL 152/Virology (4):** A survey of animal viruses with emphasis on human pathogens and mechanisms of viral pathogenesis. Course content includes topics such as the physical and chemical properties of viruses, viral cultivation, assay and analysis, and multiplication of both DNA and RNA viruses within the animal cell. Meets: Three hours class. Prerequisite: BIOL 7, 9, 22; and CHEM 25. Offering to be determined.

**BIOL 154/Immunology (3):** An introduction to the principles of immunology. Stresses the nature of antigens, antibodies, and antigen-antibody interactions; humoral and cellular immune responses governing antibody production, hypersensitivities, transplantation, tolerance, autoimmunity, and neoplasia. Includes discussions on immunogenetics, immunoregulation, and the concept of immune networks. Meets: Three hours class. Prerequisite: BIOL 7, 9, 22; and CHEM 25. Offered spring semester annually.

**BIOL 155/Laboratory in Immunology (1):** Laboratory option serving BIOL 154. Experimental work in fundamentals of immunology; involves use of live animals. Exercises include immunization and bleeding techniques, gel diffusion tests, immunoelectrophoresis, immunofluorescence, Jerne plaque assay, ELISA, and skin transplantation in rodents. Fulfills laboratory requirement for major. Corequisite or prerequisite: BIOL 154. Meets: Three hours laboratory. Offered spring semester annually.

**BIOL 156/Molecular Genetics (4):** A course concerned with the structure, synthesis, and function of nucleic acids, proteins, and other cell components, using primary literature as well as current texts.

Includes prokaryotic and eukaryotic genetics and mechanisms for rearrangement and exchange of genetic material (mutations, conjugation, transformation, transduction, transposition, and gene-splicing). Experimental work, advanced laboratory techniques, and independent projects. Fulfills laboratory requirement for major. Meets: Three hours class, three hours laboratory. Prerequisite: BIOL 7, 9, and 22; and CHEM 26 (co-or pre-requisite); or permission of instructor. Offered annually.

**BIOL 162/Ornithology (4):** An advanced course for biology majors interested in the biology of birds. Topics include: anatomy, physiology, distribution and systematics, with emphasis on avian ecology, behavior, and evolution. Through integrated laboratories, field trips, and discussions of the primary literature, students learn the identification of birds, functional morphology, and research techniques such as experimental design, behavioral observation, and statistical analyses. Two weekend field trips. Fulfills laboratory requirement for major. Meets: Three hours class, three hours laboratory. Prerequisite: BIOL 7 and 9. Offered fall semester in odd-numbered years.

**BIOL 166/Evolutionary Genetics (4):** An exploration of major concepts in evolutionary biology. Topics include population genetics, quantitative genetics, natural selection, molecular evolution, speciation, systematics, and paleobiology. Although the primary emphasis will be on theoretical concepts, students will be introduced to the methods used to test evolutionary hypotheses in both lecture and lab. Fulfills laboratory requirement for major. Meets: Three hours class, three hours laboratory. Prerequisite: BIOL 7, 9, and 22; or permission of instructor. Offered spring semester in even-numbered years.

**BIOL 167/Animal Behavior (4) :** An investigation of the behavior of animals from an evolutionary perspective. Topics to be covered include foraging, vigilance, social behavior, mating strategies, animal communication, and more. Lectures and discussions will focus on theoretical principles supported by empirical examples from organisms such as dung beetles, striped plateau lizards, song sparrows, and various primate species. Laboratories will be focused on experimental design and learning the techniques of conducting animal behavior research. Fulfills laboratory requirement for major. Meets: three hours class, three hours laboratory. Prerequisite: BIOL 7 and 9, or permission of instructor. Offered spring semester in odd-numbered years.

**BIOL 169/Conservation Biology (4):** An exploration of the major principles of conservation biology – the study of maintaining biological diversity. We will examine the foundations of conservation biology, its biological concepts (principles and theories), and the applications of such concepts to preserving biodiversity. This course emphasizes the application of evolutionary and ecological theory to the preservation of threatened species, but also considers economic, political and philosophical perspectives. Classroom activities will facilitate understanding of the principles of conservation biology, and field trips will provide direct exposure to the practice of conservation biology. Appropriate for students in biology and environmental studies. Meets: Three hours class. Prerequisite: BIOL 7 or 9, or permission of instructor. Offered fall semester 2006.

**BIOL 171/Plant Morphology and Identification (2 or 4):** A survey of the taxonomy and structure of living plant groups, with emphasis on field identification of live material. Fulfills laboratory requirement for major. Meets: Three hours class, three hours laboratory when offered for 4 credits; one hour class and three hours laboratory when offered for two credits. Prerequisite: BIOL 9. Offered spring semester in even-numbered years.

**BIOL 173/Forest Ecology (4):** The study of the structure, composition, and dynamics of forest communities. Topics include succession, paleoecology, biotic interactions, and threats to forest integrity. Laboratory emphasizes methods of vegetation sampling and analysis of ecological data, through intensive study of the campus forest preserve and through field trips to diverse forest types. Fulfills laboratory requirement for the major. Meets: Three hours class, three hours laboratory. Prerequisite: BIOL 7. Offered fall semester annually or bi-annually 2006.

**BIOL 177/Advanced Environmental Science (4):** An in-depth study of natural resources (energy, air, water, wildlife, forests, wilderness) and an analysis of environmental issues (including deforestation, nuclear energy, air and water pollution, soil erosion, extinction, global warming). Topics are explored through readings, films, literature research, and student writings, including a major research project on an

environmental problem. Meets: Three hours lecture, one hour supplemental video series. Prerequisite: BIOL 7. Biol 177 and Biol 3 may not both be taken for credit. Offered annually.

**BIOL 178/Biogeography (3):** The study of the distribution of organisms on earth. Topics include global vegetation zones today and in the past; geological and climatic influences on species distributions; plate tectonics; island biogeography; dispersal by plants and animals; and human impact on species distributions and on extinction patterns. Meets: Three hours class. Prerequisite: BIOL 7. Corequisite: BIOL 179 if offered during the same semester. Offering to be determined.

**BIOL 179/Laboratory in Biogeography (1-2):** Intensive field study of a variety of ecosystems, such as the Pine Barrens and the Appalachian Ridge-and-Valley region. Laboratories investigate mapped data on species distributions, climate, and topography. Includes some extended and weekend field trips. Fulfills laboratory requirement for major. Meets: Three hours laboratory when offered for one credit, in conjunction with Biol 178.; three hours laboratory and one hour class when offered without Biol 178 for two credits.. Prerequisite: BIOL 7. Corequisite: BIOL 178, when offered during the same semester. Offering to be determined.

**BIOL 182/Oceanography (4):** A study of marine biology and oceanography. Emphasizes biological oceanography, but also discusses and explores important aspects of physical, chemical, and geological oceanography using extra-classroom supplemental materials. Includes considerations of resource use and marine pollution. Meets: Three hours class, one hour supplemental materials. Prerequisite: BIOL 7. Offering to be determined.

**BIOL 183/Marine Ecology I: Tropical Habitats (4):** Weekly lecture, laboratory, and pool work at Drew followed by intensive week in the field during spring recess at a site in the Caribbean. Snorkeling-based observations of ecological relationships among reef fish and invertebrates. Also includes the ecology of reefs, sea grass beds, rocky shore, and mangrove habitats. (Extra costs borne by the student are transportation and room and board at off-campus site.) Fulfills laboratory requirement for major. Enrollment limit: 12. Prerequisite: BIOL 7 and BIOL 9. Offered spring semester in even-numbered years

**BIOL 184/Marine Ecology II: Temperate Habitats (4):** Weekly class/laboratory session followed by intensive two-week, field portion conducted late in May at the marine laboratories at Woods Hole, Massachusetts, and at the Isles of Shoals, Maine. Collection and study of marine organisms in a variety of habitats, including experience with field collecting methods and techniques of ecological evaluation. (Extra costs borne by the student are transportation and room and board at off-campus site.). Fulfills laboratory requirement for major. Enrollment limit: 12. Prerequisites: BIOL 7 and BIOL 9.

**BIOL 186/Freshwater Ecology (4):** An exploration of physical, chemical, and especially biological components of freshwater ecosystems. Considers lotic (moving water) systems, but emphasizes lentic (standing water) ecosystems. Laboratory concentrates on field and follow-up techniques for collecting and evaluating ecological information. Field work is centered on ponds within the campus arboretum, with field trips to other local freshwater habitats included. Fulfills laboratory requirement for major. Meets: Three hours class, three hours laboratory. Prerequisite: BIOL 7 and BIOL 9. Offered fall semester in 2006.

**BIOL 190/Seminar in Biology (2):** In-depth investigation of selected topics in biology. Topics vary; see course listings for each semester. Discussions, analysis of primary scientific literature, student presentations, and written research papers. Course may be repeated for credit as topic changes. Meets: Two hours class. Prerequisite: Varies with topic of seminar. Offering to be determined.

**BIOL 192/Topics in Biology (2-4):** Topics courses that enrich the regular biology curriculum are offered as opportunities arise. Number of credits and prerequisites vary with the course topic. Offering to be determined.

**BIOL 195/Independent Study in Biology: Literature Research (2):** An in-depth study through literature research and written literature review on a topic in biology selected by individual student in

conjunction with a faculty member, who will supervise the research. A 35-minute weekly research seminar meeting is required, where students present work in progress and receive logistical guidance. Course may be repeated. Signature of instructor required for registration. Prerequisite: minimum GPA of 2.00 in the major Offered every semester.

**BIOL 196/Research in Biology (2 or 4):** An opportunity for upper-level students to design and execute an independent project in biology, including laboratory or field research, under the supervision of biology, neurosciences, or RISE faculty. A 35-minute weekly research seminar meeting is required, where students present work in progress and receive logistical guidance. Interested students should meet with a faculty member to plan the project and establish the amount of credit before registration. Students normally enroll for two credits, especially when beginning a new project. Amount of credit determined by the research advisor Students conducting honors research in biology should register for this course at the four-credit level rather than registering for HON 109 and 110.. Two semesters of BIOL 196 satisfy one laboratory course requirement toward the biology major. May be repeated for credit, but at most eight credits of BIOL 195 and 196 may be counted toward requirements for the biology major. Signature of instructor required for registration. Prerequisite: BIOL 7, 9, and 22, and a minimum GPA of 2.00 in the major Offered every semester.