

## Description of Courses

**BIOL 110. Human Biology (1).** The anatomy and basic normal functions of the human body with consideration of development, genetics, immunology, endocrinology, and related molecular, cellular, and ecological concepts. Laboratory work requires dissection. For science and non-science students. Three two-hour lecture-laboratory periods per week. (4U) *Offered each fall. Offered spring 2012.*

**BIOL 111. Zoology (1).** A survey of the animal kingdom emphasizing evolutionary relationships, structure and function, representative forms, adaptations, ecology, and behavior of invertebrates and vertebrates. Laboratory work requires dissection. For science and non-science students. Three two-hour lecture-laboratory periods per week. (4U) *Offered each spring.*

**BIOL 121. Botany (1).** The structure and function of plants emphasizing adaptations to the environment. The primary focus is on the ecology, evolution, reproduction, anatomy, physiology, and growth and development of flowering plants. For science and non-science students. Three two-hour lecture-laboratory periods per week. (4U) *Offered each fall.*

**BIOL 141. Microbiology (1).** The structure, genetics, physiology, and culture of microorganisms with emphasis on bacteria and viruses. The course stresses scientific principles and experimental methods in the context of disease and the environment. For science students. Three two-hour lecture-laboratory periods per week. (4U) *Offered each fall. Prerequisite: high school chemistry.*

**BIOL 151. Marine Biology (1).** A survey of marine organisms from microbes to mammals. The course emphasizes ecology, evolution, anatomy, reproduction, behavior, and physiology of marine organisms, and reviews marine ecosystems from intertidal to deep sea. Laboratory work requires dissection. For science and non-science students. Three two-hour lecture-laboratory periods per week. (4U) *Offered each spring.*

**BIOL 201. Biological Issues (1).** This course examines the operation and limits of scientific

inquiry by focusing on several contemporary biological issues such as emerging infectious diseases, population growth and the “Green Revolution,” genetic engineering, and teratogens. The basic biology of these issues is studied, and each issue is examined from an interdisciplinary perspective. The issue focus teaches students about important biological phenomena, about the epistemology of science, and about the critical examination of biologically based social controversies. For non-biology students. Three two-hour lecture-laboratory periods per week. May be repeated for credit if topic is different. (4U) *Offered each spring. Prerequisite: one college-level laboratory science course.*

**BIOL 206. Environmental Biology (1).** An exploration of the interactions among organisms with one another and with the abiotic environment. General principles of ecology are examined and applied to contemporary environmental issues at the local, regional, and global scales. Three lecture-discussion class periods and one laboratory period per week. (4U) *Prerequisite: one college-level laboratory science course.*

**BIOL 210. Paleobiology (1).** *See Geology 210 (Paleontology) for course description.*

**BIOL 215. Emerging Diseases (1).** An exploration of the relationships between microorganisms, environment, and diseases. General principles of genetics and evolution, as well as historical and political factors, are examined in an effort to explain the emergence of new diseases. Laboratory experiences include basic microbiology, data analysis, simulations, and survey research. Three lecture-discussion class periods and one laboratory period per week or three two-hour lecture-laboratory periods per week. (4U) *Offered each spring. Prerequisite: one college-level biology course.*

**BIOL 217. Evolution (1).** An exploration of descent with modification and the evolutionary history of life on earth. The history and philosophy of evolutionary theory, the genetic basis of microevolution, contemporary hypotheses of speciation, and phylogenetic systematics comprise the major course material. Three lecture-discussion class periods and one laboratory period per week. Occasional Saturday field trips required.

(4U) Offered spring 2012. Prerequisite is one of the following: Biology 289 or Anthropology 120, 324, or Geology 210 or consent of instructor.

**BIOL 237. Cell Biology (1).** A comprehensive analysis of cell structure and function and the molecular mechanisms that regulate cellular physiology, with a focus on eukaryotic cell biology. Topics include: origin and evolution of cells; cellular organelles; structure, synthesis, and regulation of biomolecules; membrane structure and transport; the cytoskeleton; the extracellular matrix and cell adhesion; cell motility; cell signaling; cell division and cell cycle regulation; cancer; cell stress, aging, and death. Discussions include contemporary and socially relevant topics such as stem cell and cloning research; the cell biology of diseases; the cellular targets of biological and chemical toxins and pharmaceutical drugs. Three lecture-discussion class periods and one laboratory period per week. (4U) Offered each fall. Prerequisite: one college-level biology course or consent of the instructor.

**BIOL 247. Biometrics (1).** The application of statistical methods to the solution of biological problems. Experimental design, sampling methods, and statistical analysis of data using both parametric and nonparametric methods are introduced. Computer-supported statistical packages are used in laboratory exercises. Three two-hour lecture-laboratory periods per week. Offered each semester. Prerequisite: one college-level biology course or consent of instructor.

**BIOL 248. Cellular and Developmental Biology (1).** Cells are the fundamental units of life. Cellular mechanisms of motility, cytoarchitectural dynamics, pattern formation, morphogenesis, information transfer and gene regulation, permeability, thermal regulation, and differences among animal, bacterial, fungal, plant, and protozoan cells will be explored. Laboratory projects emphasize synthesis of experimental, theoretical, and modeling approaches to cellular and developmental biology; digital video microscopy and quantitative image analysis; building a scientific apparatus; and generating original research. Two discussion-lecture-laboratory periods and one laboratory period per week. (4U) Offered spring 2013. Prerequisite: one college

level biology or chemistry course, or consent of instructor. Recommended: one college-level mathematics course.

**BIOL 260. Biochemistry of Metabolism (1).** See Chemistry 260 for course description.

**BIOL 265. Immunology (1).** Development and function of the immune system in normal immunity and immune system diseases. This course examines immune responses to viruses, bacteria, and parasites and clinically relevant topics including allergy and inflammation, vaccines and molecular medicine, autoimmunity, immune deficiencies, and cancer immunotherapy. Class discussions examine immunological topics in scientific research, clinical case presentations and diagnoses, and the impact of immunology on public health and society. Three lecture-discussion class periods and one laboratory period per week. (4U) Offered spring 2013. Prerequisite: any one of the following: Biology 237, 248, 260, 289, 300, 340, 345, 357, Chemistry 260, 300, or consent of instructor.

**BIOL 289. Genetics (1).** Mendelian, population, quantitative, and molecular genetics are developed through a problem-solving approach. Social controversies surrounding such items as genetic counseling, domestic breeding of crops, genetic engineering, mutagenic substances in our environment, and natural selection will be discussed. Three lecture-discussion class periods and one laboratory period per week. Offered each fall. Prerequisite: Biology 247 or consent of instructor.

**BIOL 291. Proseminar (1/2, 1).** Topics vary. Designed to pursue topics of special interest such as conservation biology, stream ecology and geology, cell biology, and sexual reproduction of mammals. May be repeated for credit if topic is different. Offered occasionally. Prerequisite: established individually for each offering, usually based on the background developed in other departmental courses.

**BIOL 300. DNA and Protein Biochemistry (1).** See Chemistry 300 for course description.

**BIOL 337. Population Biology (1).** An investigation of the factors that determine the size of a population, its distribution, and the kinds of individuals that it comprises. Population genetics, population ecology, ecological genetics, and evolutionary ecology are introduced using observational, experimental, and theoretical

analysis. Laboratory exercises stress examination of natural populations in the field. Three lecture-discussion class periods and one laboratory period per week. *Offered fall 2012. Prerequisite: Biology 247 and 289, or consent of instructor.*

**BIOL 340. Neurobiology (1).** Analysis of neurophysiology and functional neuroanatomy. Topics covered include nerve cell signaling, sensory and motor systems, and higher brain processes. Laboratory exercises focus on anatomy and physiological measurements of neural conduction. Students improve their understanding of a specific topic of neurobiology by working in small groups to conduct and present a research project. Laboratory work requires dissection. Three lecture-discussion class periods and one laboratory period per week. *Offered even years, fall semester. Prerequisite: Biology 247, Chemistry 117, and at least 1 of the following courses: Biology 237, 248, 260, 265, 289, 300, 345, 357, Chemistry 260, 300, or consent of instructor.*

**BIOL 343. Animal Behavior (1).** The study of the development, causation, function, and evolution of behavior from a biological perspective. The behavior of animals is viewed from theoretical and empirical perspectives, and observational and experimental methods are employed in field and laboratory exercises to test hypotheses for how and why animals behave as they do. Three lecture-discussion class periods and one laboratory period per week. *Offered odd years, fall semester. Prerequisite from one of the following: one college-level biology course or one 200-level course in anthropology or psychology, or consent of instructor. Recommended: Biology 247, or Anthropology 240, or Psychology 200, or any other statistics course.*

**BIOL 345. Molecular Biology (1).** An exploration of prokaryotic and eukaryotic molecular biology. Topics include molecular and subcellular organization of genes, chromatin, chromosomes, and genomes; structure, synthesis, and function of nucleic acids and proteins; regulation of gene expression and signal transduction/cell signaling; biotechnology and recombinant DNA technology; and sequence analysis in genomics and proteomics. The laboratory emphasizes project-oriented independent laboratory investigations using techniques for: gene cloning; polymerase chain

reaction (PCR); DNA sequence analysis; recombinant protein production, purification, and characterization; covalent modifications of proteins and nucleic acids; and analysis of gene expression. Three lecture-discussion class periods and one laboratory period per week. *Offered spring 2012. Prerequisite is any of the following: Biology 237, 248, 260, 265, 289, 300, 340, 357, Chemistry 260, 300, or consent of instructor.*

**BIOL 357. Human Anatomy and Physiology (1).** An investigation of anatomical and physiological concepts, such as structure-function relationships and homeostasis, in the human body. While the primary focus of this course is the regulation of human physiological systems in the normal and diseases states, animal models are used for comparative analysis. Students are required to prepare oral and written presentations, as well as conduct and present a small group research project. Laboratory work requires dissection. Three lecture-discussion class periods and one laboratory period per week. *Offered each spring. Prerequisite: Biology 247, Chemistry 117, and at least 1 of the following courses: Biology 237, 248, 260, 265, 289, 300, 345, Chemistry 260, 300, or consent of instructor.*

**BIOL 372. Ecology (1).** Ecology is the study of interactions among organisms and interactions between organisms and the nonliving environment. Ecologists study these interactions to understand the patterns of organism abundance and distribution of organisms that occur in different ecosystems. In this course, students examine these interactions at the population, community, ecosystem, and landscape levels through classroom, field, and laboratory activities. Contemporary questions about sustainability, biological diversity, and global change will be examined at each of these levels using quantitative methods. Three lecture-discussion class periods and one laboratory period per week. *Offered spring 2013. Prerequisite: one college-level biology course and a statistics course (Biology 247, Mathematics 106, Anthropology 240, Psychology 150, or Sociology 305), or consent of instructor.*

**BIOL 385. Biology Capstone: Advanced Topics (½, 1).** This course explores an area of biology deeply through careful reading and analysis of the research literature and/or primary investigation. This course includes oral

presentations, writing, and peer review, and culminates in the writing of a critical review or research manuscript. Upcoming offerings of this course may include bioinformatics, cancer biology, game theory in animal behavior, human pathophysiology, and urban ecology. May be repeated for credit if the topic is different.

*Prerequisite: junior or senior standing, Biology 247, and at least 2 additional biology courses numbered 201 or higher or consent of instructor. Additional courses may be required based on the topic of the course.*

**BIOL 387. Biology Capstone: Senior**

**Manuscript (½, 1).** In this course, students engage in scholarly research, prepare a primary research or critical review manuscript for submission to the departmental journal, *The Beloit Biologist*, engage in peer review, revise their manuscripts in response to critiques, present their research results publicly, and participate in professional development activities. This course is required to be considered for honors in biology.

*Proposals for enrollment are due on July 15 and are subject to approval by departmental faculty. Offered each fall semester or by special approval. Prerequisite: junior or senior standing, Biology 247, 289, and at least 3 additional biology courses numbered 201 or higher, and an accepted proposal.*

**BIOL 391. Directed Readings in Biology (½, 1).** Individual study under faculty supervision.

*Prerequisite: sophomore standing. Consent of faculty supervisor and chair of biology department.*

**BIOL 392. Independent Research in Biology (½, 1).** Research project conducted by a student with supervision by a faculty member.

*Prerequisite: sophomore standing. Consent of faculty supervisor and chair of biology department.*

**BIOL 395. Teaching Assistant (½).** Work with faculty in classroom and laboratory instruction.

*Graded credit/no credit. Prerequisite: sophomore standing. Consent of faculty supervisor and department chair.*

**BIOL 396. Teaching Assistant Research (½).**

Course, laboratory, and curriculum development projects with faculty. *Prerequisite: sophomore standing. Consent of faculty supervisor and department chair.*

**BIOL 398. Professional Experience (Non-Credit).**

An opportunity to acknowledge on a student's permanent transcript experience as a

teaching assistant, in the preparation or design of laboratory materials, or as a research assistant.

*Prerequisite: consent of faculty supervisor. Consent of faculty supervisor and chair of biology department.*