

## **COURSE DESCRIPTIONS - Biology**

**BIO 100 Concepts in Biology (4)** Examines mechanisms of evolution, cellular biology, genetics, and ecology with emphasis on scientific thinking and methods, historical developments, current applications, and ethical issues. Laboratory activities emphasize classroom learning. Lab fee required.

**BIO 106 Modern Topics in Biology (3)** Topics of current interest in biological research are discussed by students and faculty. Various areas of biology will be selected on a rotational basis. For non-majors.

**BIO 107 Human Biology (3)** A study of human physiological and anatomical systems as they apply to health, disease, and social interactions.

**BIO 110 Principles in Biology (3)** Examines mechanisms of evolution, cellular biology, genetics, and ecology with emphasis on scientific methods, historical development, current applications, and ethical issues.

**BIO 111 Introductory Lab Techniques in Biology (3)** Hands-on study of the basic techniques of biological experimentation such as microscopy, reagent preparation, chromatography, electrophoresis, spectrophotometry and centrifugation. Lab fee required.

**BIO 112 Environmental Biology (4)** For non-majors. A study of the biological systems comprising the biosphere, and those perturbations which would threaten homeostasis of the systems. Lab fee required.

**BIO 121 Nutrition (3)** A study of nutrition emphasizing food molecules, their metabolic value and daily allowances. The importance of informed nutritional choices and their effects on health will also be examined.

**BIO 227 Human Anatomy and Physiology I (4)** A study of structure and function in the human body including the following systems: integumentary, skeletal, skeletal muscle, nervous and sensory. Prerequisites: CHM 100 or equivalent and BIO 100 or equivalent. Lab fee required.

**BIO 228 Human Anatomy and Physiology II (4)** A study of structure and function in the human body including: respiratory, cardiovascular, excretory, digestive, reproductive, and immune. Lab fee required. Prerequisite: BIO 227 .

**BIO 251 General Biology I (4)** The first biology course for majors, introducing: biological molecules; cell structure/function; genetics; and evolution. Lab activities reinforce lecture concepts, introduce techniques, and model modern scientific inquiry. Lab fee required. Prerequisite: CHM 251

**BIO 252 General Biology II (4)** A study of prokaryotic, protist, fungal, and animal taxonomy and systems from an evolutionary perspective. Lab fee required. Prerequisite: BIO 251

**BIO 263 Environmental Policy (3)** Introduction to development of environmental policy in the US and role of international law. Includes examination of development and implementation of environmental regulations, conservation and municipal management and environmental impacts of regulation. Prerequisite: BIO 252.

**BIO 280 Introduction to Clinical Laboratory Science (3)** Introduce students to the laboratory procedures and subject matter of the clinical laboratory science program. Taught at St. John Mercy Medical Center. Prerequisite: CHM 251, BIO 251 and permission of instructor.

**BIO 300 Genes & Heredity (4)** Lecture and laboratory course covering gene structure and function, Mendelian genetics, population genetics, and gene technology. Only for students pursuing the B.A. degree in Environmental Biology. Lab fee required. Prerequisites: BIO 251, MTH 141 , and CHM 252.

**BIO 304 Cell Biology (4)** Examines cellular and subcellular structure, organization and function with emphasis on relationships between cell structure and the dynamics of the cell. Hands-on laboratory experiments strengthen understanding of these concepts. Prerequisites: BIO 251 and CHM 252. Lab fee required.

BIO 306 Modern Topics in Biology (3) Offered with BIO 106. Requires additional research focus on one topic to be submitted as a paper. Prerequisite: Any 200 level or higher biology course.

BIO 308 Genetics (4) A study of classical and modern genetics, including Mendelian inheritance, the genetic code, gene interactions, gene control, and population genetics. Prerequisite: BIO 304 and MTH 141. Lab fee required.

BIO 313 Immunology (3) Introduces students to the role of blood cells in the defense of the human body. Cells and organs of the immune system, immune effector mechanisms, and the immune system in health and disease will be covered. In the laboratory, molecular diagnostic techniques are emphasized. Prerequisites: BIO 304. Lab fee required.

BIO 320 Plant Biology (4) Lecture and laboratory course examines concepts in cell biology, energy transformation, genetics, evolution, ecology, anatomy, reproduction and taxonomic characteristics of plants. Prerequisite: BIO 251 Lab fee required.

BIO 329 Human Physiology (4) An intensive study of the function and interactions of the systems of the human body. This course will also discuss common disease mechanisms in humans. Prerequisite: BIO 252. Lab fee required.

BIO 330 Comparative Vertebrate Anatomy and Physiology (4) A study of the structure and function of vertebrate organ systems from an evolutionary perspective. Prerequisite: BIO 252 or permission of instructor. Lab fee required.

BIO 332 Plant Physiology (4) In depth examination of plant growth and development, including plant cells, biochemistry, development and environmental physiology. Prerequisite: BIO 320. Lab fee required.

BIO 343 Invertebrate Zoology (4) A lecture and laboratory study of invertebrate animal groups with the exception of insects. Emphasis is placed on the ecology, behavior, physiology, and phylogenetic relationships of the taxa. Prerequisite: BIO 252. Lab fee required.

BIO 345 Identification and Taxonomy of the Local Flora (2) Survey of the flora of St. Charles and surrounding counties with an emphasis on flowering plant taxonomy. Course includes field trips, lecture, and laboratory experience. Lab fee required.

BIO 351 Field Studies in Taxonomy (3-5) Studies on a taxon of student's choice. Work includes collection, identification, and preservation techniques. Prerequisite: BIO 252 and BIO 320. Lab fee required.

BIO 353, Microbiology (4) A course relating major principles in biology to the microbial world. Primary emphasis is on prokaryotes, with consideration of viruses. Both general and health-related applications of microbiology are studied to project microbiology into the clinical setting and emphasize its importance in health care. Laboratory activities will illustrate the procedures used in the isolation and identification of microbes, as well as the principles of asepsis and disinfection. Prerequisite: BIO 252. Lab fee.

BIO 358 Parasitology (3) A lecture and laboratory course on parasites of importance to human health and economics. Emphasizes vectors, reservoirs, hosts, and those ecologic and epidemiologic factors associated with disease transmission and prevention. Prerequisite: BIO 252. Lab fee.

BIO 362 Advanced Environmental Biology (4) Emphasizes analysis of environmental problems. Basic ecological principles are used to examine problems of human interaction with the ecosphere. Prerequisite: BIO 252. Lab fee required.

BIO 364 Evolution (3) An indepth study of evolutionary theory and its implications throughout biology. Topics include: Darwinian Natural Selection; mechanisms of evolutionary change; adaptation; and the history of life on earth. Prerequisite: BIO 300 or BIO 308.

BIO 365 General Ecology (4) A study of ecology, including ecosystem dynamics, models of population growth and distribution, measurement of energy flow and population dynamics. Prerequisite: MTH 141, and BIO 300 or BIO 308. Lab fee required.

BIO 366 Field Biology (3) This course provides students interested in field biology with the necessary background and tools to carry out field research projects. Students learn to analyze and describe populations and communities of organisms, and the environments in which they are found. Students learn to use mathematical and chemical procedures for analyzing data and samples. Prerequisite: MTH 141, and BIO 112 or BIO 252.

BIO 370 Wetlands Ecology (3) Study of wetland ecology, including functional and scale attribute, classification, restoration conservation and management. Students will learn identification of wetland plants and delineation techniques. Prerequisite: BIO 320, BIO 362, or BIO 365.

BIO 390 Special Topics in Biology (3-4) Special topics selected from various areas of biological investigation either of recent or historical origin. Topics differ from year to year. Prerequisite: Based on topic requirements.

BIO 400 Field Research (1-6) May be repeated. Spring Semester. Prerequisite: BIO 366.

BIO 402, Independent Research (1-6) May be repeated. Prerequisite: Permission of instructor.

BIO 416 Biochemistry (4) A lecture and laboratory study of the structure and functions of the various chemical constituents of living matter. Emphasis is placed on the relationship between molecular structure and the functional properties of biomolecules, and the dynamic and self-regulating nature of living processes. Prerequisite: CHM 362 and BIO 304. Lab fee required.

BIO 417 Molecular Biology (4) Covers the fundamental roles of nucleic acids and proteins; the molecular basis of the genetic code; and gene expression with special emphasis on current recombinant DNA & RNA technology. Laboratory experiments will focus on using plasmid vector systems to clone bacterial genes. Prerequisites: BIO 308, and BIO 416. Lab fee required.

BIO 426 Developmental Biology (4) Examines general principles of animals development, including embryology, molecular phenomena of development, and the relationship between development and evolution. Prerequisite: BIO 304. Lab Fee required.

BIO 490 Biology Seminar (1) Required for all biology majors. Prerequisite: Senior status or Permission

BIO 491 Senior Synthesis (3) This course is the capstone course for Biology majors. Students will assimilate information from prior course work through a focus on contemporary research literature in biology. Prerequisite: BIO 490.

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#### Program Course Requirements - Chemistry

CHM 100 Concepts in Chemistry (4) An examination of the principles of chemistry, especially those which find application in the study of biology. Topics to be covered include atomic structure, chemical bonding, intermolecular forces, gas laws, solutions, and chemical energy. Laboratory work is included. Lab fee Required.

CHM 251 General Chemistry I (4) A systematic treatment of the principles of chemistry. Topics include atomic structure, chemical bonding, classification of the elements, physical properties of gases and solution chemistry. CHM 261 should be taken concurrently with this course. Prerequisite: 2 years of high school algebra or MTH 151.

CHM 252 General Chemistry II (4) A continuation of CHM 251. Topics include stoichiometry, solutions, thermodynamics, kinetics, equilibria, and classification of the elements. CHM 262 should be taken concurrently with this course. Laboratory work is included. Prerequisite: CHM 251.

CHM 261 General Chemistry I Laboratory (2) Course consists of one 2-hour laboratory period and one discussion meeting per week. Laboratory includes hands-on experimental procedures of general chemistry phenomena. Discussion focuses on mastery of chemistry concepts through class participation and group work. Must be taken concurrently with CHM 251. Lab fee

CHM 262 General Chemistry II Laboratory (2) Course consists of one 2-hour laboratory period and one discussion meeting per week. Laboratory includes hands-on experimental procedures of general chemistry phenomena. Discussion focuses on mastery of chemistry concepts through class participation and group work. Must be taken concurrently with CHM 252. Lab fee

CHM 361 Organic Chemistry I (4) A systematic study of the nomenclature, structures, properties and reactions of organic compounds with emphasis upon the principles by which chemists predict the properties and reactions of organic compounds. Laboratory work is included. Prerequisite: CHM 252. Lab fee required.

CHM 362 Organic Chemistry II (4) A continuation of CHM 361. The principles of chemical behavior are applied to many types of organic compounds, including those of biological significance. Laboratory work is included. Prerequisite: CHM 361 or permission of instructor. Lab fee required.

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#### Program Course Requirements - Mathematics

MTH 141 Basic Statistics (3) An introduction to the theory and applications of statistics, including probability, descriptive statistics, random variables, expected values, distribution functions, and hypothesis testing. Offered every semester.

MTH 151 College Algebra (3) A first course in college algebra including the following topics: polynomial equations and inequalities, mathematical modeling and problem solving, rational functions, other functions and relations. Students who enjoy math, students who need MTH 151 for their major, students who are going on and taking higher level math courses, and/or students who are majoring in math but need to strengthen their algebra skills are the only students for whom this course is recommended. Prerequisite: Two years of high school algebra. Offered every semester.

MTH 152 Precalculus: Elementary Functions (3) A preparation for calculus covering polynomial and rational functions, exponential and logarithmic functions, trigonometric functions, applications and systems of linear equations. A graphing calculator is required. Prerequisite: Two years of high school algebra or MTH 151. Offered every semester.

MTH 271, Calculus I (5) A first study of real functions and some of their applications. Topics include limits, continuity, differentiation and integration. A graphing calculator is required. Prerequisite: High school algebra and trigonometry OR C or better in MTH 152 and permission of department. Offered fall and spring semester.

MTH 272 Calculus II (5) A continuation of the study of real functions of one variable. Topics include integration, applications of integrations, methods of integration, infinite series, and vectors. A graphing calculator is required. Prerequisite: C or better in MTH 271. Offered fall and spring semester.

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#### Program Course Requirements - Physics

PHY 251, Introductory Physics I (4) An algebra-based treatment of mechanics including kinematics, vectors, Newton's laws, and conservation of energy and linear momentum. Other topics include rotational motion, moments of inertia, rotational energy and angular momentum. This course also treats solids, fluids, waves, sound, and thermodynamics. Lab work is included. This course is available for honors credit. Prerequisite: high school algebra and trigonometry. Lab fee required.

PHY 252, Introductory Physics II (4) An algebra-based treatment of thermodynamics, electricity, and magnetism, including electric fields, Gauss's law, voltage capacitors, inductors, Kirchhoff's laws, AC and DC circuits, and geometric and physical optics. Lab work is included. This course is available for hours credit. Prerequisite: PHY 251. Lab fee required.

PHY 301, General Physics I (4) A calculus-based treatment of mechanics for scientists and engineers, including kinematics, vectors, Newton's laws, and conservation laws for energy, linear momentum, and angular momentum. Other topics include equilibrium and elasticity, gravitation, fluids, simple harmonic oscillations, waves and thermodynamics. Lab work is included. This course is available for honors credit. Prerequisite: MTH 271. Lab fee required .

PHY 302, General Physics II (4) A calculus-based treatment of electromagnetism for scientists and engineers, including electric fields, Gauss's law, scalar potential fields, Maxwell's equations, electromagnetic oscillations, electromagnetic waves, and optics. Lab work is included. This course is available for honors credit. Prerequisite: PHY 301. Lab fee required.

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### Program Course Requirements - Other

ESC 100 Physical Geology with Lab (4) This course focuses on the study of the earth to include its component materials, the physical and chemical changes that takes place internally and surficially, and the historical background of the science. The lab involves identification of minerals and rocks, the determination of various surficial processes and how they are reflected by topographical maps. A field trip is included as a lab exercise. Lab fee.

ESC 200, Introduction to Geographic Information Systems (3) The course introduces basic concepts necessary to an understanding of geographic information systems including its purpose, hardware, software, databases, and applications, ArcView software will be used to display various databases, and students will design and execute cross-disciplinary projects in order to demonstrate the uses of GIS as a spatial analysis and decision-making tool. Prerequisite: COL 170 or equivalent experience with spreadsheets.

ESC 310, Environmental Geology (4) Applies geologic information to the interactions between people and the physical environment, focusing on geologic hazards, resources, environmental health, air pollution, environmental evaluation, and environmental law. Laboratory includes field work. Prerequisite: ESC 100 Lab fee.

ENV 450, Environmental Internship (3-9) During their Junior and Senior years at Lindenwood, qualified students may participate in internship experiences in environmental science. Students are responsible for making arrangements with the internship sponsor and the planned activities before the internship work begins. Internship sponsors may be government agencies, for-profit corporations, or non-profit corporations or agencies. Student interns may be paid for their work, but more often are not. Student interns are required to spend at least 40 hours working on tasks assigned by the Internship Sponsor for every semester credit hour for which they are enrolled. Completion of the internship requires submission of a report or research paper as specified by the instructor. Prerequisite: Junior status and permission of the instructor.