

BIOLOGY (BIOL) COURSES

BIOL 201. Principles of Biology. (4 Credits)

A study of the concepts generally applicable to living systems, including topics of cell structure and function, heredity, evolution, ecology, and a survey of kingdoms of living organisms. Three lectures, three hours laboratory. Not recommended for students interested in the health professions and not open to Biology majors.

Tags: SP

BIOL 241. Organization of Life: Genetics and Cell Biology. (4 Credits)

This course is a study of the basic organizational structure of living organisms, beginning with the chemical basis of life and its relationship to the higher levels of cellular organization. This course includes a systematic analysis of the roles of nucleic acids, proteins and lipids in the higher levels of biological organization. The mediation of life processes by gene expression, cell metabolism and signal transduction are considered in the context of prokaryotic populations and more complex multicellular organisms. Three lectures, three hours laboratory. Offered every Fall.

Tags: SP

BIOL 242. Diversity of Life: An Introduction to Zoology and Botany. (4 Credits)

This course introduces the biology and diversity of select groups of prokaryotes, fungi, protists, plants and animals. Topics include taxonomic diversity, structure, and introductory physiology at the organ and tissue level. An introduction to plant biology studies the structure, function, and development of plants as organisms and the diversity of algae, fungi, and plants. Three lectures, three hours laboratory. Offered every Spring (main campus) and every Summer (Wheaton College Science Station in South Dakota).

BIOL 243. Processes of Life: Ecology and Evolution. (4 Credits)

This course introduces the conceptual and theoretical foundations of ecology, animal behavior, and evolution. Students will be introduced to population and ecosystem processes as well as longer term processes of change, including evolution. Evaluation of theories of species dynamics will be viewed in a Christian perspective. Three lectures, three hours laboratory. Offered every Fall (main campus) and every Summer (Wheaton College Science Station in South Dakota). Prerequisite: BIOL 241 or BIOL 242.

BIOL 252. Modeling the Systems of Life. (4 Credits)

Combines seminar and investigative laboratory approaches to focus on the processes of science. Organisms useful for investigation of specific biological questions will be utilized to illustrate the concept of model systems. The course will include reading and discussing primary literature and reviews, and designing and conducting experiments. Two lectures, six hours laboratory. Offered every Fall and every Spring. Prerequisites: BIOL 241 and 242.

BIOL 303. Contemporary Issues in Biology. (2 Credits)

Contemporary issues in genetics, evolution, and ecology. May be applied toward the legacy general education nature requirement but not toward the Biology major. Prerequisite: 4 hr lab course in the legacy general education Studies in Nature cluster. Consult current year's course offerings. Counts as upper division science requirement for legacy general education only.

BIOL 311. Reproductive Biotechnology. (4 Credits)

This course provides an overview of various biomedical techniques that relate directly to the beginnings of human life and/or to reproductive choices or decisions. The techniques considered include various methods of birth control, different forms of assisted reproduction techniques, genetic testing, genetic engineering, and stem cell research and therapy. The course covers the basic biology of these techniques and also considers them from social, theological and ethical perspectives. May not be applied towards the Biology major. Prerequisite: one Scientific Practice (SP) course.

Tags: SIP

BIOL 312. Contemporary Environmental Issues. (4 Credits)

An exploration of environmental issues considering the scientific details of environmental processes and problems, the social context of people depending on the environment and human responsibility to live sustainably and care for creation. Prerequisite: one SP course.

Tags: SIP

BIOL 314. Issues in Environmental Science. (2 Credits)

An interdisciplinary approach to environmental problems emphasizing humanity's role and responsibility in the stewardship of biological resources. Prerequisite: 4 hr lab course in the legacy Studies in Nature cluster. May be applied toward the legacy general education nature requirement but not toward the Biology major. Counts as upper division science requirement under legacy general education only.

BIOL 315. Special Topics in Biology for General Education. (2 Credits)

Courses and seminars on special topics offered for legacy general education credit at the discretion of the department, including genetics, biotechnology, environmental issues, and bioethics. One two-hour or four-hour course may apply toward the legacy general education nature requirement. Students may register, with instructor's approval, for one additional hour in a two-hour or four-hour general education biology course to meet state teacher licensure requirements. Not open to Biology majors. Prerequisite: one legacy general education science laboratory course. Counts as upper division science requirement under legacy general education only. (1-4)

BIOL 317. Biomedical Ethics. (2 Credits)

Legacy diversity designation. (lin) See PHIL 317.

BIOL 318. Global Health. (4 Credits)

An interdisciplinary approach to understanding the global patterns of health and disease. Students in this course will describe and analyze how ecology, social class, race and gender impact the global burden of disease. Students will also consider how our Christian call to love our neighbor impacts our response to the disparities seen in the global burden of disease. Prerequisite: one Scientific Practice (SP) course.

Tags: GP, SIP

BIOL 319. Introduction to Environmental Ethics. (2 Credits)

An interdisciplinary consideration of ethical issues in the environmental sciences. May be applied toward the legacy general education nature requirement and the Biology major. Prerequisites: one legacy general education science laboratory course. Counts as upper division science requirement under legacy general education only.

BIOL 321. Human Physiology. (4 Credits)

An examination of the major systems of the human body (neural, sensory, muscular, cardiovascular, respiratory, renal, gastrointestinal, and reproductive). Interdependence of these systems will be emphasized. Three lectures, three hours laboratory. Alternate years. Prerequisites BIOL 241 and 242, CHEM 232.

BIOL 331. Anatomy & Physiology I. (4 Credits)

Examination of human musculoskeletal, nervous, endocrine, and cardiovascular systems with an emphasis on their structure, function, and integration. Three lectures, three hours laboratory. Prerequisites: BIOL 241 and 242; CHEM 232. Offered every Fall.

BIOL 332. Anatomy & Physiology II. (4 Credits)

Continuation of BIOL 331. Structure, function, and integration of structure and function within the human lymphatic, immune, respiratory, digestive, renal, and reproductive systems. Integration of systems is emphasized. Three lectures, three hours laboratory. Prerequisite: BIOL 331. Offered every Spring.

BIOL 336. Neurobiology. (4 Credits)

A neuroscience course with three major units: the basics of neuroanatomy, neurophysiology, neuroimaging, and the stress response; several key cellular and systems-level circuits within the brain that regulate metabolism, immunity, pain, memory, sleep, and interoception; and behaviors (nutrition, exercise, meditation and prayer) that promote brain health. Class sessions will include lectures, discussions, and student presentations of current research. Prerequisites: BIOL 241 and BIOL 242. AHS 271 or BIOL 252, and AHS 351 or BIOL 331 are recommended.

BIOL 341. Plant Physiology. (4 Credits)

Basic principles of plant physiology including photosynthesis, mineral nutrition, water economy, respiration, nitrogen and lipid metabolism, development, growth, and plant growth substances. Three lectures, three hours laboratory. Prerequisites: BIOL 241 and 242 and CHEM 232. Alternate years in Fall.

BIOL 343. Plant Taxonomy. (4 Credits)

Includes systems of classification, distinguishing characteristics of groups, observation, and classification of vascular plants of the Black Hills and environs. Offered during the summer at the Wheaton College Science Station in South Dakota. Prerequisite: BIOL 242.

BIOL 344. Economic Botany. (4 Credits)

Principles of plant biology (plant anatomy, biochemistry, physiology, genetics, taxonomy, and ecology) that relate to uses of plants for food, fodder, drugs and other chemicals, lumber, and other uses. Three lectures, three hours laboratory. Prerequisites: BIOL 241 and 242. Alternate years in Fall.

BIOL 352. Parasitology. (2 Credits)

Includes classification and identification of major groups of endo- and ecto-parasites. Life-cycles and ecology of parasite transmission will be emphasized. Three lectures. Alternate years. Prerequisite: BIOL 242.

BIOL 356. Genetics. (4 Credits)

Molecular, cytogenetic, classical, and population concepts of plant, animal, and human genetics. Three lectures, three hours laboratory. Prerequisites: BIOL 241, 242, and 252. Offered every Spring.

BIOL 362. Cell and Developmental Biology. (4 Credits)

An overview of cell structure and function and the mechanisms of biological development. Topics include cellular membranes, signal transduction, the cell surface and extracellular matrix, organelles, the cytoskeleton, the cell cycle and cancer, and cellular differentiation. Understanding of these concepts will provide the basis of study of the development of form and function during embryogenesis. Consideration of the mechanisms of development will include the basic morphological and biochemical changes which occur, as well as the molecular and cellular interactions leading to these changes. Three lectures, three hours of laboratory. Prerequisites: BIOL 241, 242. Alternate years.

BIOL 364. Microbiology & Immunology. (4 Credits)

Study of the biology of microorganisms emphasizing aspects unique to prokaryotes. Topics include microbial cell structure, metabolism, physiology, genetics, and ecology. In addition, the course will include a study of bacterial and viral infectious agents and of the humoral and cellular mechanisms by which vertebrates respond to them. Laboratory exercises include techniques for detecting, isolating, cultivating, quantitating, and identifying bacteria. Three lectures, three hours laboratory. Prerequisites: BIOL 241, CHEM 232; CHEM 241 or CHEM 342 are preferred. Offered every Fall.

BIOL 365. Marine Biology. (4 Credits)

Study of the biology of marine organisms in the context of the geological and physical features of the ocean. Lectures, field trips, and learning snorkeling skills on campus are followed by a field trip to the Caribbean over spring break to apply these concepts to tropical marine environments. Additional lab fee assessed to cover travel and accommodation costs. Alternate years. Prerequisite: BIOL 242.

BIOL 368. Invertebrate Zoology. (4 Credits)

A study of the systematics, functional morphology, ecology and research with non-vertebrate organisms. Students are introduced to the amazing diversity of terrestrial and aquatic invertebrates. Field trips to local habitats in addition to the Field Museum and Shedd Aquarium are included. The purpose of this course is to introduce the student to often overlooked organisms in the animal kingdom with the goal of cultivating a greater appreciation for this wonderful part of God's Creation. Three hours lecture and three hours lab. Prerequisite: BIOL 242. Alternate years.

BIOL 372. Field Zoology. (3 Credits)

A course emphasizing observation and classification of Black Hills animals, with a concentration on insects, reptiles, birds, and mammals. Offered during the summer at the Wheaton College Science Station in South Dakota. Prerequisite: BIOL 242.

BIOL 375. Introduction to Bioinformatics. (2 Credits)

This course introduces students to bioinformatics tools and analysis methods. Upon completion of the course, students should be more comfortable working with the vast amounts of biomedical and genomic data and online tools that will be relevant to their work in the coming decades. Methods for sequencing DNA and the analysis and comparison of genome data, along with methods for examining the transcriptomic and proteomic profiles, as well as phylogeny, will be discussed. Implications of all of the various types of bioinformatics data for markers of disease, genetic mechanisms, biosystematics, biodiversity, and ethics of biotechnology will be considered. Prerequisite: BIOL 241. Alternate years in Fall.

BIOL 381. Public Health and Nutrition in Developing Areas. (2 Credits)

An interdisciplinary approach to the problems of health and nutrition, with emphasis on Third World countries. Prerequisite: 4 hr lab course in the legacy Studies in Nature cluster. Not open to freshmen. May be applied toward the legacy general education nature requirement but not toward the Biology major. Legacy diversity course. Counts as upper division science requirement under legacy general education only.

BIOL 382. Field Natural History. (4 Credits)

Introduction to basic field and lab methods used in field natural history. Includes the basic nomenclature of flora and fauna in terrestrial, as well as aquatic systems. Basic geologic processes are discussed, and the major rock formations of the Black Hills are identified in the field. The course also provides an overview of the history and philosophy of natural history. Offered during the summer at the Wheaton College Science Station in South Dakota.

BIOL 385. Special Topics In Biology. (2 Credits)

Seminars or courses in special areas offered at discretion of the department.

BIOL 386. Special Topics in Biology. (4 Credits)

Seminars or courses in special areas offered at discretion of the department.

BIOL 421. Basic Applications in Agronomy. (4 Credits)

See ENVR 421.

BIOL 461. General Biochemistry. (4 Credits)

See CHEM 461.

BIOL 494. The Integrated Biologist. (2 Credits)

A senior capstone experience in which Christian perspective and biological understanding are integrated to explore and better understand science, origins, environment, medicine, and ethical obligations.

Prerequisite: senior standing, for Biology majors only. Offered every Fall and every Spring. (lin)

BIOL 495. Biological Research. (2 or 4 Credits)

Laboratory and/or library research conducted with a Wheaton College Biology faculty member or with a biologist at another institution (if pre-approved by the Biology Department). Through laboratory research, students hone skills in using proper lab technique, keeping a laboratory notebook, critical thinking and problem solving, and presenting their findings in oral and/or written format. In library research, students identify and obtain pertinent articles; read, analyze, and critique the articles; and synthesize information presented in the articles. Students must prepare a short research proposal in collaboration with the participating faculty member as a prerequisite for enrolling in the course. Prerequisites: BIOL 241 and BIOL 242.

BIOL 496. Biology Internship. (2 or 4 Credits)

Students gain practical experience during a summer or semester in a biologically-related field. Student work is monitored and assessed by an on-site supervisor and a Biology faculty member. Prerequisites: Biology major with at least junior standing and pre-approval by the Biology Department Chair.

BIOL 497. Biology Research Seminar. (1 Credit)

A weekly seminar featuring presentations and discussions of current research in biology. Most seminars are presented by biologists from other institutions. In the student journal club sessions, students collaborate with faculty in the presentation of recently published articles. Graded Pass/Fail. May be taken up to twice for credit. Can be counted as credit toward the Biology major and is not included in the calculation of the limit of three non-lab courses that can be counted toward the Biology major. One hour per week. Prerequisites: Sophomore or higher standing, Consult current year's course offerings.

BIOL 499. Biology Honors Research and Seminar. (2 Credits)

Laboratory research conducted with a Biology faculty member, and a weekly seminar involving the critique of primary literature and listening to scientific research presentations. Prerequisite: Acceptance to the Biology Honors' Program. (lin)