

# BIOLOGY (BIOL)

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## **BIOL:100 Introduction to Botany (4 Credits)**

Identification and biology of common plants of this region. Recommended for teachers of nature study. Not available for credit toward a degree in biology. Laboratory. (Formerly 3100:100)

## **BIOL:101 Introduction to Zoology (4 Credits)**

Identification and biology of common animals of this region. Recommended for teachers of nature study. Not available for credit toward a degree in biology. Laboratory. (Formerly 3100:101)

## **BIOL:103 Natural Science: Biology (4 Credits)**

Designed for non-science majors. Laboratory and class instruction illustrate concepts of living organisms with emphasis on mankind's position in, and influence on, the environment. (Formerly 3100:103)

**Ohio Transfer 36:** Yes

**Gen Ed:** - Natural Science w/LAB

## **BIOL:106 Exploring Biology (3 Credits)**

Exploration of how science works and the cellular organization, genetic inheritance and diversity of living things. Not available for credit toward a degree in biology. (Formerly 3100:106)

**Gen Ed:** - Natural Science

## **BIOL:108 Introduction to Biological Aging (3 Credits)**

Prerequisite: BIOL 103. Survey of normal anatomical and physical changes in aging and associate diseases. (For students in gerontological programs at Wayne College. Not for B.S. biology credit.) (Formerly 3100:108)

**Gen Ed:** - Natural Science

## **BIOL:111 Principles of Biology I (4 Credits)**

Pre/Corequisite: CHEM 151. Molecular, cellular basis of life; energy transformations, metabolism; cell reproduction, genetics, development, immunology, evolution, and origin and diversity of life (through plants). Laboratory. (Formerly 3100:111)

**Ohio Transfer 36:** Yes

**Gen Ed:** - Natural Science w/LAB

## **BIOL:112 Principles of Biology II (4 Credits)**

Prerequisite: BIOL 111 with a grade of C- or better. Animal diversity; nutrients, gas exchange, transport, homeostasis, control in plants and animals; behavior; ecology. (BIOL 111 and BIOL 112 are an integrated course for biology majors.) Laboratory. (Formerly 3100:112)

**Ohio Transfer 36:** Yes

**Gen Ed:** - Natural Science w/LAB

## **BIOL:113 Professional Development for Biology Majors (1 Credit)**

Prerequisite/Corequisite: BIOL 111. This course is for Biology majors in their first year of study to provide useful tools as they pursue a Biology career. Recommended, not required. (Formerly 3100:113)

## **BIOL:130 Principles of Microbiology (3 Credits)**

Basic principles and terminology of microbiology; cultivation and control of microorganisms; relationships of microorganisms; medical microbiology. Laboratory. Not available for credit toward a degree in biology. (Formerly 3100:130)

**Ohio Transfer 36:** Yes

**Gen Ed:** - Natural Science w/LAB

## **BIOL:131 The Biology of Monsters (1 Credit)**

Many movie monsters use exaggerations or extrapolations of real biological concepts. This course uses monsters to teach key biological concepts in a fun and accessible way. A short lecture is followed by a screening of the movie. (Formerly 3100:131)

## **BIOL:180 BS/MD Orientation (1 Credit)**

Orientation to the BS/MD Program. Restricted to students in the BS/MD Program. Graded credit/no credit. Not available for credit toward a biology degree. (Formerly 3100:180)

## **BIOL:190 Health-Care Delivery Systems (1 Credit)**

Health-care principles and practices. Restricted to the student in NEOUCOM, six-year BS/MD program. Graded credit/noncredit. Not available toward credit as major in biological sciences. (Formerly 3100:190)

## **BIOL:191 Health-Care Delivery Systems (1 Credit)**

Health-care principles and practices. Restricted to the student in NEOUCOM, six-year BS/MD program. Graded credit/noncredit. Not available toward credit as major in biological sciences. (Formerly 3100:191)

## **BIOL:200 Human Anatomy & Physiology I (3 Credits)**

Study of structure and function of the human body. Molecular, cellular function, histology, integumentary system, skeletal system, muscular system, nervous system, and the sense organs. Not available for credit toward a degree in biology. (Formerly 3100:200)

**Ohio Transfer 36:** Yes

## **BIOL:201 Human Anatomy & Physiology Laboratory I (1 Credit)**

Laboratory devised to allow hands on experience using models, dissections of various animals, virtual dissection, and physiological exercises. Not available for credit toward a degree in biology. (Formerly 3100:201)

## **BIOL:202 Human Anatomy & Physiology II (3 Credits)**

Prerequisite: BIOL 200. Study of structure and function of the human body. Endocrine system, cardiovascular system, lymphatics, respiratory system, urinary system, digestive system, and reproductive systems. Not available for credit toward a degree in biology. (Formerly 3100:202)

**Ohio Transfer 36:** Yes

**Gen Ed:** - Natural Science

## **BIOL:203 Human Anatomy & Physiology Laboratory II (1 Credit)**

Laboratory devised to allow hands on experience using models, dissections of various animals, virtual dissection, and physiological exercises. Not available for credit toward a degree in biology. (Formerly 3100:203)

## **BIOL:211 General Genetics (3 Credits)**

Prerequisite: Completion of BIOL 112 with a grade of "C-" or better. Principles of heredity, principles of genetics. (Formerly 3100:211)

## **BIOL:212 Genetics Laboratory (1 Credit)**

Prerequisite: BIOL 112 with a grade C- or better, and prerequisite or corequisite: BIOL 211. Laboratory experiments in genetics with emphasis on scientific method; techniques in molecular biology. (Formerly 3100:212)

## **BIOL:217 General Ecology (3 Credits)**

Prerequisite: Completion of BIOL 112 with a grade of "C-" or better. Study of interrelationships between organisms and environment. (Formerly 3100:217)

## **BIOL:225 Biology of AIDS (1 Credit)**

Prerequisite: Permission. Course examines the Human Immunodeficiency Virus and the disease of AIDS. Virus structure, replication, therapy, transmission, epidemiology, disease process and social consequences are studied. Not available for credit toward a degree in biology. (Formerly 3100:225)

**BIOL:238 Biomimicry Foundations (3 Credits)**

An introduction to biomimicry through the analysis of case studies, including those from Northeast Ohio, and a consideration of the major tools and methods. (Formerly 3100:238)

**BIOL:265 Introductory Human Physiology (4 Credits)**

Study of physiological processes in human body, particularly at organ-systems level. Not open to preprofessional majors. Laboratory. Not available for credit toward a degree in biology. (Formerly 3100:265)

**Gen Ed:** - Natural Science w/LAB

**BIOL:290 Health-Care Delivery Systems (1 Credit)**

Health-care principles and practices. A continuation of 190/191 for a second year student in NEOUCOM six-year BS/MD program. Graded credit/noncredit. Not available toward credit as major in biological sciences. (Formerly 3100:290)

**BIOL:291 Health-Care Delivery Systems (1 Credit)**

Health-care principles and practices. A continuation of 190/191 for a second year student in NEOUCOM six-year BS/MD program. Graded credit/noncredit. Not available toward credit as major in biological sciences. (Formerly 3100:291)

**BIOL:295 Special Topics in Biology (1-3 Credits)**

Prerequisite: Permission. Special courses offered occasionally in areas where no formal course exists. Not available for credit toward a degree in biology. (Formerly 3100:295)

**BIOL:311 Cell & Molecular Biology (4 Credits)**

Prerequisites: CHEM 151, CHEM 152, CHEM 153, CHEM 154, and BIOL 211. Study of structure and function of cells, with emphasis on both classical and modern approaches to understanding organelles, energy balance, protein synthesis, and replication. (Formerly 3100:311)

**BIOL:312 Neuroscience in Health and Disease (3 Credits)**

Prerequisite: BIOL 112 with a C or better or BIOL 202 with a C or better or PSYC 320 with a C or better. Discover how neurons communicate and explore how the brain functions under conditions of normal health, as well as conditions of disease. (Formerly 3100:312)

**BIOL:315 Evolutionary Biology Discussion (1 Credit)**

Prerequisite: BIOL 211 with a grade of C- or better. Informal discussions of various aspects of organic evolution of general or special interest. (Formerly 3100:315)

**BIOL:316 Evolutionary Biology (3 Credits)**

Prerequisite: BIOL 112 with a grade of C- or better. Description of core evolutionary concepts and the history of evolutionary thought including natural selection, sexual selection, genetic drift, higher level selection and speciation. (Formerly 3100:316)

**BIOL:318 Biomimicry Design Challenge (3 Credits)**

A studio design course using nature as a model for creating innovative solutions targeting a specific design problem. It combines a brief introduction into biomimetics and is open to students from different disciplines in the arts, sciences, and engineering. (Formerly 3100:318)

**BIOL:331 Microbiology (4 Credits)**

Prerequisites: BIOL 112, BIOL 211, and CHEM 263 (or corequisite). Survey of monera with emphasis on the bacteria: their morphology, cultivation and chemical characteristics. Relationships of microorganisms to humans and their environment. Laboratory. (Formerly 3100:331)

**BIOL:342 Flora & Taxonomy (3 Credits)**

Prerequisite: BIOL 112 with a C- or better. Origins of Ohio flora, ecological and evolutionary relationships. Survey of local flowering plant families, collection and identification of flora. Laboratory and field trips. (Formerly 3100:342)

**BIOL:343 Diversity of Plants (3 Credits)**

Prerequisites: BIOL 112 with a grade of C- or better, and BIOL 217. A broad survey of the traditional plant "branches" of the tree of life. Diversity, structure, and function of fungi, algae, and land plants. (Formerly 3100:343)

**BIOL:344 Diversity of Plant Laboratory (2 Credits)**

Prerequisites: BIOL 112 with a grade of C- or better, and BIOL 217: Corequisite: BIOL 343. A broad laboratory survey of the traditional plant "branches" of the tree of life. Students will have hands-on experience with fungi, algae, and land plants. (Formerly 3100:344)

**BIOL:345 Biology of Vascular Plants (4 Credits)**

Prerequisite: BIOL 112 with a grade of C- or better. A lecture and laboratory course which presents an overview of the anatomy, morphology, development and evolution of vascular plants. (Formerly 3100:345)

**BIOL:363 Foundations of Physiology I (3 Credits)**

Prerequisite: BIOL 112 with a grade of C- or better. Fundamentals of physiology including integrating systems (neurophysiology, sensory processes, and endocrinology), movement, and muscle. For all pre-professional students and Biology majors. (Formerly 3100:363)

**BIOL:364 Foundations of Physiology Laboratory I (2 Credits)**

Prerequisite: BIOL 112 with a grade of C- or better. Corequisite: BIOL 363. Laboratory experiments in animal physiology. (Transport processes, neurophysiology, endocrinology, muscle physiology.) Presentation of results in written scientific format. (Formerly 3100:364)

**BIOL:365 Histology (4 Credits)**

Prerequisite: BIOL 112 with a grade of C- or better. Cellular structure of organs in relation to their functional activity, life history, comparative development. Laboratory. (Formerly 3100:365)

**BIOL:367 Genomics (3 Credits)**

Prerequisites: BIOL 111 and BIOL 112. Study of genomes from all branches of life to develop a deeper understanding of functional genomics, genomic architecture, and impacts (ethical and social) of advances in genomics. (Formerly 3100:367)

**BIOL:401 Human Anatomy for Biology Majors (4 Credits)**

Prerequisite: BIOL 112 with a C- or better. Organizing principles and patterns found in human organs and systems. Laboratory integrates creative, analytical and virtual approaches to translate concept into practical application of anatomy. (Formerly 3100:401)

**BIOL:404 Digital Skills for Biologists (3 Credits)**

This course teaches students with no prior experience the fundamentals of programming, electronics, 3D printing, actuation and robotics for application to biological experiments. (Formerly 3100:404)

**BIOL:406 Principles of Systematics (3 Credits)**

Prerequisites: BIOL 112 with a grade of C- or better, and BIOL 211, and BIOL 316. The science of identifying, naming, and classifying the diversity of life. Topics include: nomenclature, types, techniques of data collection, and methods of phylogenetic reconstruction. (Formerly 3100:406)

**BIOL:418 Field Ecology (4 Credits)**

Prerequisite: BIOL 217 (statistics strongly recommended). Introduction to sampling methods, design of experiments and observations, and computer analysis; some local natural history. Laboratory. (Formerly 3100:418)

**BIOL:421 Tropical Field Biology (4 Credits)**

Prerequisites: Completion of courses BIOL 111 and BIOL 112 with a grade of C- or better, or equivalent. Ecology of coral reefs, tide pools, mangroves, intertidal zones, terrestrial flora and fauna, island biogeography. Taught at a field station in the tropics. Field trips involved; transportation costs. (Formerly 3100:421)

**BIOL:422 Conservation Biology (3 Credits)**

Prerequisite: BIOL 217. Explores the factors affecting survival of biodiversity, and how to develop practical approaches to resolve complicated conservation issues. (Formerly 3100:422)

**BIOL:423 Population Biology (3 Credits)**

Prerequisites: BIOL 211 and BIOL 217. Discussions of animal and plant ecology and evolutionary biology from a species and population level perspective. Includes topics in population ecology and population genetics. (Formerly 3100:423)

**BIOL:426 Wetland Ecology (4 Credits)**

Prerequisite: BIOL 217. Wetland ecology; principles and conservation. Field studies will be conducted at Bath Nature Preserve. Laboratory. (Formerly 3100:426)

**BIOL:427 Freshwater Ecology (4 Credits)**

Prerequisite: BIOL 112 with a grade of C- or better, or by permission. The course explores the diversity of aquatic life and key characteristics of freshwater ecosystems with emphasis on the Laurentian Great Lakes. Includes field trips, laboratory. (Formerly 3100:427)

**BIOL:428 Biology of Behavior (3 Credits)**

Prerequisites: BIOL 211, BIOL 217, and BIOL 316. Biological basis of behavior, ethology, and behavioral ecology. An evolutionary perspective is emphasized. (Formerly 3100:428)

**BIOL:429 Biology of Behavior Laboratory (1 Credit)**

Prerequisite or corequisite: BIOL 428 and permission of instructor. Individualized, directed study to provide the student with first-hand experience in observing, describing and interpreting animal behavior. (Formerly 3100:429)

**BIOL:430 Community/Ecosystem Ecology (3 Credits)**

Prerequisite: BIOL 217. An examination of the components, processes, and dynamics in communities and ecosystems. Includes reading and discussion of primary literature. (Formerly 3100:430)

**BIOL:433 Medical Microbiology (4 Credits)**

Prerequisite: BIOL 331. Pathogenic microorganisms, including bacteria, viruses, fungi, helminthes, and how they cause disease; host-pathogen interactions and the function of the immune response in controlling disease. Laboratory. (Formerly 3100:433)

**BIOL:437 Immunology (4 Credits)**

Prerequisite: BIOL 211 and BIOL 311. Nature of antigens, antibody response, and antigen-antibody reactions. Site and mechanism of antibody formations, hypersensitivity, immunologic tolerance and immune diseases considered. Laboratory. (Formerly 3100:437)

**BIOL:439 Advanced Immunology (3 Credits)**

Prerequisite: BIOL 437. Immunology is studied from a historical and current perspective. Topics include T cells, B cells, antigen presentation, HIV, and transplantation. (Formerly 3100:439)

**BIOL:440 Mycology (4 Credits)**

Prerequisite: BIOL 112 with a grade of C- or better. Structure, life history, classification of representative fungi with emphasis on the importance of fungi to humans. Laboratory. (Formerly 3100:440)

**BIOL:443 Phycology (4 Credits)**

Prerequisite: BIOL 112 with a grade of C- or better. Examination of the major groups of algae with emphasis on life histories and their relationship to algal form and structure. Laboratory. (Formerly 3100:443)

**BIOL:444 Field Marine Phycology (3 Credits)**

Prerequisite: BIOL 112 with a grade of C- or better. Collection and identification of tropical marine algae on San Salvador Island, The Bahamas. Discussion of characteristics and ecology of major groups of Caribbean algae. Laboratory. (Formerly 3100:444)

**BIOL:451 General Entomology (4 Credits)**

Prerequisites: BIOL 112 with a grade of C- or better, and BIOL 217. Structure, physiology, life cycles, economic importance and characteristics of orders and major families of insects. Laboratories parallel lectures. (Formerly 3100:451)

**BIOL:453 Invertebrate Zoology (4 Credits)**

Prerequisites: BIOL 112 with a grade of C- or better, and BIOL 217. Invertebrate groups, their classification, functional morphology, adaptive radiation and life history. A phylogenetic approach is used. Laboratories parallel lectures. (Formerly 3100:453)

**BIOL:454 Parasitology (4 Credits)**

Prerequisites: BIOL 112 with a grade of C- or better. Principles of parasitism; host parasite interactions; important human and veterinary parasitic diseases; and control measures. Laboratories parallel lectures. (Formerly 3100:454)

**BIOL:455 Ichthyology (4 Credits)**

Prerequisites: BIOL 217. Study of fishes; incorporates aspects of evolution, anatomy, physiology, natural history, and commercial exploitation of fishes. Laboratory incorporates field-based exercises and fish taxonomy. (Formerly 3100:455)

**BIOL:456 Ornithology (4 Credits)**

Prerequisite: BIOL 112 with a grade of C- or better. Introduction to biology of birds: classification, anatomy, physiology, behavior, ecology, evolution, natural history and field identification. Laboratory and field trips. (Formerly 3100:456)

**BIOL:457 Herpetology (4 Credits)**

Prerequisite: BIOL 112 with a grade of C- or better. Survey of the diversity, ecology and evolution of amphibians and reptiles. Special emphasis is given to Ohio species. Laboratory. (Formerly 3100:457)

**BIOL:458 Vertebrate Zoology (4 Credits)**

Prerequisite: BIOL 316 or permission. Biology of vertebrates, except birds evolution, ecology, behavior, systematics and anatomy. Laboratory with field trips. (Formerly 3100:458)

**BIOL:460 Medical Histology (4 Credits)**

Prerequisite: BIOL 311. 100% online course. Structure of human cells and tissues and their identification. Functional organization of the human cell and tissues. (Formerly 3100:460)

**BIOL:463 Exercise Physiology (3 Credits)**

Prerequisite: BIOL 363 or instructor permission. Through lecture, reading and critical analysis of current literature, physiologic mechanisms of exercise in animals will be explored. (Formerly 3100:463)

**BIOL:465 Advanced Cardiovascular Physiology (3 Credits)**

Prerequisite: BIOL 202, or BIOL 363, or BIOL 473. Study of biological mechanisms involved in heart attack, strokes, fluid balance, hypertension and heart disease. Controversial issues in each area will be examined and current research presented. (Formerly 3100:465)

**BIOL:466 Vertebrate Embryology (3 Credits)**

Prerequisite: BIOL 112 with a grade of C- or better. Lectures focus on development of model vertebrate organisms, and cellular and molecular mechanisms underlying animal development. (Formerly 3100:466)

**BIOL:467 Comparative Vertebrate Morphology (4 Credits)**

Prerequisite: BIOL 112 with a grade of C- or better. An introduction to the comparative morphology of major vertebrates. The laboratories consist of dissections of representative vertebrates. (Formerly 3100:467)

**BIOL:468 The Physiology of Reproduction (3 Credits)**

Prerequisites: BIOL 112 with a grade of C- or better, or BIOL 202. Study of the physiological mechanisms of reproduction throughout the animal kingdom with emphasis upon mammalian endocrinological control. Controversial issues and current research will be examined. (Formerly 3100:468)

**BIOL:469 Respiratory Physiology (3 Credits)**

Prerequisite: BIOL 202, or BIOL 363, or BIOL 473. Study of mechanisms determining gas exchange including mechanics, ventilation, blood flow, diffusion, and control systems. Emphasis is given to normal human lung function. (Clinical aspects are not considered in detail.) (Formerly 3100:469)

**BIOL:470 Lab Animal Regulations (1 Credit)**

Required of anyone working with animals, and covers government regulations, care of animals and a lab to teach basic animal handling and measurement techniques. (Formerly 3100:470)

**BIOL:471 Physiological Genetics (4 Credits)**

Prerequisite: BIOL 211 or equivalent and [BIOL 202, or BIOL 363, or BIOL 473]. The integrative study of how genetics and physiology influence complex systems from molecular to behavioral in plants and animals. Laboratory. (Formerly 3100:471)

**BIOL:472 Biological Mechanisms of Stress (3 Credits)**

Prerequisite: BIOL 202, or BIOL 363, or BIOL 473. Study of mechanisms from molecular to behavioral of how stress influences body systems and signals. The latest research and experimental issues are discussed. (Formerly 3100:472)

**BIOL:473 Foundations of Physiology II (3 Credits)**

Prerequisite: BIOL 363. Continuing fundamentals of physiology including metabolism and temperature, respiration and circulation, and osmoregulation. Adaption to extreme environments is emphasized. (Formerly 3100:473)

**BIOL:474 Foundations of Physiology Laboratory II (1 Credit)**

Prerequisite: BIOL 364; corequisite BIOL 473. Laboratory experiments in animal physiology (respiration, circulation, metabolism, osmoregulation). Presentation of results in scientific format and as oral reports. (Formerly 3100:474)

**BIOL:475 Comparative Biomechanics (3 Credits)**

Investigation of how physical constraints on biological materials, structural mechanics and locomotion relate to the survival and evolution of living organisms. (Formerly 3100:475)

**BIOL:478 Renal Physiology (3 Credits)**

Prerequisite: BIOL 112 with a grade of C- or better. The study of how the kidneys affect other body systems and how, in turn, they are affected by these systems. (Formerly 3100:478)

**BIOL:480 Molecular Biology (3 Credits)**

Prerequisite: BIOL 211 and BIOL 311. Fundamentals of molecular biology, including recombinant DNA technology, applications in biotechnology, medicine, and genetic engineering. Mechanisms of gene regulation. (Formerly 3100:480)

**BIOL:481 Advanced Genetics (3 Credits)**

Prerequisite: BIOL 211. Nature of the gene; genetic codes; hereditary determinants; mutagenesis and genes in population. Lecture and seminar. (Formerly 3100:481)

**BIOL:482 Neurobiology (3 Credits)**

Prerequisites: Completion of BIOL 111 and BIOL 112 with a grade of "C-" or better. History of Neuroscience; organization, function and development of the central nervous system; electrophysiological properties of nerve cells; learning and memory; molecular basis for mental diseases. (Formerly 3100:482)

**BIOL:483 Research Techniques in Neuroscience (3 Credits)**

Prerequisite: [BIOL 112, or BIOL 202, or BIOL 320] with a C or better. Discover how the most cutting edge neuroscience research techniques are designed and implemented to further our understanding of the brain and visual system. (Formerly 3100:483)

**BIOL:485 Cell Physiology (3 Credits)**

Prerequisite: BIOL 112 with a grade of C- or better and CHEM 401. Explores molecular and biochemical aspects of energy metabolism, inter and intracellular signaling, growth and death of cells. Emphasizes up-to-date scientific literature. (Formerly 3100:485)

**BIOL:486 Cell Physiology Laboratory (2 Credits)**

Prerequisite: BIOL 112 with a grade of C- or better and CHEM 401. Corequisite: BIOL 485. Practice of modern cell physiology laboratory techniques. Emphasis on student directed original research. (Formerly 3100:486)

**BIOL:494 Workshop in Biology (1-3 Credits)**

(May be repeated) Prerequisite: Permission of instructor. Group studies of special topics in biology. May not be used to meet undergraduate or graduate major requirements in biology. May be used for elective credit only. (Formerly 3100:494)

**BIOL:495 Special Topics in Biology (1-3 Credits)**

Special courses offered occasionally in areas where no formal course exists. (Formerly 3100:495)

**BIOL:496 Internship in Biology (1-3 Credits)**

(May be repeated for maximum of 6 credits) Prerequisites: Permission of department and a minimum 3.0 GPA in Biology courses (20 credits minimum). Work experience to focus on career applications in Biology. Maximum 3 credits will count towards Biology electives. (Formerly 3100:496)

**BIOL:497 Biological Problems (1-3 Credits)**

(May be repeated for a total of 6 credits) Prerequisites: Permission of department, 2.0 GPA or better in Biology coursework, and currently in the College of Arts & Sciences. Advanced level work, usually consisting of laboratory investigations. A maximum of 4 credits may apply toward the major degree requirements. (Formerly 3100:497)

**BIOL:499 Senior Honors Program in Biology (1-3 Credits)**

(May be repeated for a total of five credits) Prerequisites: senior standing in Honors College and approval of honors preceptor. Open only to biology and natural sciences divisional majors in Honors College. Independent study leading to completion of approved senior honors. (Formerly 3100:499)