



## Biology Courses

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### **BIOL 1110 Human Biology (4 credits)**

General introduction to biology, focusing on humans, including topics on cell biology, genetics, molecular biology, form and function of organ systems, and the interaction between humans and their environment. Intended for nonbiology majors. Lecture and laboratory. Liberal Education Goal Area 3 (LC).

### **BIOL 1120 General Biology: Evolution And Ecology (3 credits)**

A general introduction to biology with an emphasis on evolution, ecology, and the diversity of life. Intended for nonbiology majors. Includes laboratory simulations and field exercises. Liberal Education Goal Area 3 and 10.

### **BIOL 1150 Aquatic Systems (3 credits)**

An introduction to the physical characteristics, chemistry, and biology of lakes, streams, and rivers. Includes information on human impacts and alteration of these natural systems. Includes laboratory simulations and field exercises. Liberal Education Goal Area 3.

### **BIOL 1211 Introductory Biology I (4 credits)**

An introduction to the structure and function of living systems, with an emphasis on basic mechanisms and concepts in biochemistry and in cellular and molecular biology. Intended for biology majors and minors, preprofessional students, and open to any student wishing to fulfill their Liberal Education requirement. Lecture and laboratory. BIOL 1211 and BIOL 1212 must be taken in sequence. Liberal Education Goal Area 3 (LC).

### **BIOL 1212 Introductory Biology II (4 credits)**

An introduction to living organisms, with an emphasis on the basic mechanisms and concepts in organismal biology, ecology, and evolutionary biology. Topics include taxonomy and classification of the major groups of plants and animals, structure and function, development, and behavior. Intended for biology majors and minors, preprofessional students, and open to any student wishing to fulfill their Liberal Education requirement. Lecture and laboratory. Prerequisite: BIOL 1211 or consent of instructor. Liberal Education Goal Area 3 (LC).

### **BIOL 1300 Medical Terminology (2 credits)**

A study of anatomical and medical terminology by examining word roots, prefixes, and suffixes. Designed to assist pre-professional and allied health students who desire to increase their usage and understanding of medical terminology. This course does not satisfy any Biology major or minor degree requirements.

### **BIOL 2110 Human Anatomy and Physiology (5 credits)**

The structure, function, and development of the human body. Lecture and laboratory. Prerequisite: BIOL 1110 or BIOL 1211.

### **BIOL 2339 Ethics of Fish and Wildlife Management (3 credits)**

This class is designed to explore the ethical aspects of various fish and wildlife management related topics in order to better understand how ethical viewpoints at both the social and political levels have influenced natural resource policy throughout history at the local, regional, and global scales. Liberal Education Goal Area 9.

### **BIOL 2360 Genetics (4 credits)**

Fundamental principles of heredity in plants, animals, and microorganisms. Includes both classical and molecular genetic approaches to studying organisms. Prerequisites: BIOL 1211 and BIOL 1212.

### **BIOL 2610 General Ecology (3 credits)**

Introduction to the interrelationships of organisms and their environments, emphasizing the historic development of fundamental principles at the levels of individual, population, community, and ecosystem through examination of theoretical and empirical findings. Prerequisites: BIOL 1110, 1120 or BIOL 1211, 1212 or consent of instructor.

### **BIOL 2620 Field and Laboratory Projects in Ecological Research (2 credits)**

Introduction to the process of research in ecological science. The first part of the class consists of activities and lectures pertaining to basic issues of study design and execution. For the remainder of the class, students will design, carry out, and report on their own ecological study. Prerequisite or Corequisite BIOL 2610.

### **BIOL 2925 People & The Environment: Biological Perspectives on the Environment (3 credits)**

Discussion and evaluation of current environmental biology topics, including biodiversity, ecosystems, biological resources, and human impact on the environment. This course fulfills Liberal Education requirements only and does not satisfy and Biology major or minor degree requirements. Liberal Education Goal Area 10.

### **BIOL 3120 Soils (4 credits)**

Introduction to principles of soil genesis, classification, physical and chemical properties, and biological significance. Lecture and laboratory. Prerequisites: BIOL 1211 and BIOL 1212 or consent of instructor.

### **BIOL 3150 Animal Behavior (3 credits)**

Introduction to the study of the diversity, physiology, ecological context, and evolutionary development of behavior of invertebrate and vertebrate animals. Prerequisite: BIOL 1211 and BIOL 1212, or PSY 1100.

### **BIOL 3250 Comparative Vertebrate Anatomy (4 credits)**

Classification, adaptation, and evolutionary history of vertebrates; anatomy and functional morphology of vertebrates, including humans. Lecture and Laboratory. Prerequisites: BIOL 1211 and BIOL 1212.

### **BIOL 3260 Medical Physiology (4 credits)**

Physiological and pathophysiological principles and control mechanisms of organ systems within humans. Lecture and laboratory. Prerequisites: BIOL 1211, BIOL 1212, BIOL 3250, and CHEM 3312.

### **BIOL 3300 Introduction to Hematology (4 credits)**

Introduction to the principles of blood cell formation, function, and associated disorders. Lecture and Laboratory. Prerequisites: BIOL 1211, CHEM 2211, and CHEM 2212. BIOL 2360 or BIOL 3380 is recommended.

### **BIOL 3310 Entomology (4 credits)**

The biology of insects, their natural history, morphology, classification, and economic importance. Lecture, laboratory, and field study. Prerequisites: BIOL 1211 and BIOL 1212, or consent of instructor.

### **BIOL 3361 Limnology (4 credits)**

Introduction to the biology, chemistry, geology, and physics of lakes and streams. Lecture, field, and laboratory work. Prerequisites: BIOL 1211, BIOL 1212, BIOL 2610, CHEM 1111 or CHEM 2211, CHEM 1112 or CHEM 2212, or consent of instructor.

### **BIOL 3362 Stream and River Ecology (4 credits)**

An introduction to the physical characteristics, chemistry, and biology of lotic systems such as streams and rivers. Includes information on morphology, hydrology, and alteration of these natural systems. Includes laboratory simulations and field exercises. Lecture and laboratory. Prerequisites: BIOL 1211 and BIOL 1212.

### **BIOL 3380 Molecular Genetics: Theory and Practice (4 credits)**

Study of the structure, replication, repair, expression, regulation, and change of genetic material. Introduction to theory and procedures by which recombinant DNA molecules are formed, cloned, and expressed. Lecture and laboratory. Prerequisites: BIOL 1211 and BIOL 1212. Might not be offered every year.

**BIOL 3400 Fish & Wildlife Law and Administration (3 credits)**

This course is for majors in natural resources, biology, and related fields. The lectures throughout the course will cover the history, philosophy, evolution, and application of these laws in the management of fish, wildlife, and other renewable resources for the benefit of the public. The course concludes with contemporary economic, administrative and political aspects of fish and wildlife management. The course fulfills some certification requirements of The Wildlife Society and the American Fisheries Society and is recommended for students planning graduate study or employment in natural resources management. Prerequisite: BIOL 2610.

**BIOL 3420 Human Dimensions of Wildlife and Fisheries Management (3 credits)**

This course is for majors in natural resources, biology, and related fields. The lectures throughout the course will cover the history, philosophy, evolution, and application of human dimensions in wildlife and fisheries management. The course fulfills some certification requirements of The Wildlife Society and the American Fisheries Society and is recommended for students planning graduate study or employment in natural resources management. Prerequisite: BIOL 2610.

**BIOL 3554 Readings in Aquatic Biology (1 credit)**

In-depth review and focused group discussion of a selected topic or topics. Emphasis is on learning to access and synthesize relevant literature. Active participation in discussions and working groups is required. Prerequisite: Junior status in Aquatic Biology.

**BIOL 3580 Immunology (4 credits)**

The study of disease fighting mechanisms of the body. Lecture and laboratory. Prerequisites: BIOL 2360 or BIOL 3380, and one year of chemistry.

**BIOL 3590 Cell Biology (4 credits)**

Microscopic anatomy and physiological mechanisms of plant and animal cells. Gene control of cellular metabolism, mechanism of energy utilization in cells and pathways of synthesis of molecules. Lecture and laboratory. Prerequisites: BIOL 2360 or BIOL 3380; and CHEM 2211, CHEM 2212.

**BIOL 3610 Principles of Wildlife Management (3 credits)**

Introduction to the field of wildlife management, including the biological principles important to the understanding of wildlife populations and the management strategies implemented by natural resource managers. Prerequisites: BIOL 1211, BIOL 1212, and BIOL 2610. Might not be offered every year.

**BIOL 3630 Conservation Biology (3 credits)**

Principles and theories of conservation biology. Topics include biodiversity, threats to biodiversity, extinctions, management of threatened and endangered species, managing habitats for conservation, and methods to mitigate biodiversity loss. Prerequisites: BIOL 1211 and BIOL 1212, or consent of instructor. Also GEOG 3630.

**BIOL 3710 Microbiology (4 credits)**

Structure, classification, and physiology of bacteria and related microorganisms. Lecture and laboratory. Prerequisites or Corequisites: One year introductory biology and one year introductory chemistry or consent of instructor.

**BIOL 3720 Plant Form and Function (4 credits)**

Structure, function, and development of vascular plants. Interrelationships between anatomical structures and physiological processes and how plants cope with environmental challenges. Lecture and laboratory. Prerequisites: BIOL 1211, 1212 and one year of college chemistry or consent of instructor.

**BIOL 3723 Ecosystem Ecology (3 credits)**

Fundamentals of the study of ecosystems, with emphasis on the integration of abiotic and biotic components in the development of ecosystem processes. Comparisons and interactions between terrestrial, wetland, aquatic, and atmospheric systems across the major biomes. Prerequisite: BIOL 2610.

**BIOL 3730 Plant Diversity (4 credits)**

Classification, phylogeny, collection, field identification, and uses of wild plants. Lecture and laboratory. Prerequisites: BIOL 1211 and BIOL 1212 or consent of instructor.

**BIOL 3755 Medical Microbiology (3 credits)**

Introduction to pathogenic microorganisms, the interaction of pathogens and the immune system, transmission of infections, and methods of controlling infections. The laboratory portion of the class covers aseptic technique, pure culture techniques, microscopy, and diagnostic microbiology. This course is intended primarily for Nursing and Clinical Laboratory Science majors. Prerequisites: (BIOL 1211 or BIOL 1110) and (CHEM 1110 or CHEM 1111 or CHEM 2211).

**BIOL 3830 Aquatic Plants and Algae (4 credits)**

Survey of the morphology, physiology, taxonomy, systematics, and ecology of algae and aquatic vascular plants. Lecture, laboratory, and field study. Prerequisites: BIOL 1211 and BIOL 1212.

**BIOL 3840 Wetlands Ecology (3 credits)**

Survey course develops a basic understanding of the terminology, classification, ecology, values, and conservation of wetlands. Covers wetland systems from around the world, with emphasis on wetlands in North America. Prerequisites: BIOL 1211 and 1212.

**BIOL 3844 Wetlands Ecology Lab (1 credit)**

Laboratory course to supplement BIOL/ENVR 3840 Wetlands Ecology. Intended to strengthen a basic understanding of the terminology, classification, ecology, values, and conservation of wetlands. Prerequisite or Corequisite: BIOL/ENVR 3840 or consent of instructor.

**BIOL 3850 Marine Biology (3 credits)**

Lecture course introducing major concepts and theories. Includes physical and chemical components of the oceans, with special interest paid to the major groups of organisms living in marine systems. Emphasis on the different types of marine systems (coral reefs, mangroves, open water, etc.). Prerequisites: BIOL 1211 and 1212. Might not be offered every year.

**BIOL 3880 Wildlife Management Techniques (4 credits)**

This course emphasizes application of ecological principles, knowledge, and practical field skills to data collection used in the management of wildlife resources and their habitats. Use of literature, development of basic field and laboratory skills, and application of management and research principles are integral. Designed for upper level students who have met prerequisites, and graduate students, who are preparing for professional careers in wildlife conservation, natural sciences, and related areas of natural resources management. The course helps fulfill The Wildlife Society professional certification requirements. Prerequisite: BIOL 3610.

**BIOL 4030 Wetland Delineation and Classification (3 credits)**

This training course for the identification, delineation, and classification of wetlands covers the major types of wetlands and their general delineation procedures. Hydrological, soil, and vegetation characteristics will be used to identify and map wetland boundaries. Focuses on current regulations as established by the US Army Corps of Engineers' 1987 Wetland Delineation Manual with additional regulations specific for the state of Minnesota. Satisfies the requirements for basic delineation training as specified by the Corps of Engineers and certification programs in many states. Prerequisites: BIOL 1211, 1212, or consent of instructor.

**BIOL 4031 Advanced Wetland Delineation (2 credits)**

Training course intended to develop an advanced understanding of wetland delineation and regulation. Includes review of hydrological, physiochemical, and vegetation characteristics used to identify wetland boundaries, as well as specifics of wetland regulation, comprehensive wetland delineations, and post-field reporting. Covers procedures and regulations used by federal and state agencies, with an emphasis on those in Minnesota. Prerequisite: BIOL 4030 or consent of instructor.

**BIOL 4200 Freshwater Invertebrates (4 credits)**

Morphology and functional roles of representative freshwater invertebrates and their ecological interrelationships. Lecture and laboratory. Prerequisite: BIOL 1211, BIOL 1212, BIOL 3361, BIOL 3362, and junior status, or consent of instructor.

**BIOL 4210 Parasitology (4 credits)**

The biology of animal parasites, their identification, biochemistry, immunology, and epidemiology. Lecture and laboratory. Prerequisites: BIOL 1211, 1212, or consent of instructor.

**BIOL 4270 Histology (4 credits)**

Microscopic anatomy of vertebrate tissues and organs with functional correlations. Lecture and laboratory. Prerequisites: BIOL 1211 and BIOL 1212, BIOL 3250, and BIOL 3260. Might not be offered every year.

**BIOL 4330 Upland Wildlife Management (3 credits)**

An advanced pre-professional course for majors in natural resources, biology, and related fields. Lectures cover the history, philosophy, evolution, and application of wildlife management with a focus on upland wildlife as a renewable, sustainable natural resource. The course fulfills some professional certification requirements of The Wildlife Society and is recommended for students planning graduate study or employment in natural resources management. Prerequisite: BIOL 3610.

**BIOL 4360 Developmental and Tumor Biology (4 credits)**

Investigation of the mechanisms leading to the development of multicellular animal organisms from a fertilized egg. In contrast, the course also investigates how cells within a multicellular organism can become misregulated, leading to cancer. Lecture and lab. Prerequisites: BIOL 1211 and BIOL 1212. BIOL 2360 or BIOL 3380 is highly recommended. Might not be offered every year.

**BIOL 4510 Ornithology (4 credits)**

Morphology, ecology, behavior, classification, distribution, and evolution of birds. Lecture, laboratory, and field study (early morning field trips and one or two all-day field trips). Prerequisites: BIOL 1211 and BIOL 1212.

**BIOL 4520 Mammalogy (4 credits)**

Morphology, ecology, behavior, classification, distribution, and evolution of mammals. Lecture and laboratory. Collection or paper by each student. Prerequisites: BIOL 1211 and BIOL 1212.

**BIOL 4534 Ichthyology (4 credits)**

An overview of morphology, physiology, behavior, taxonomy, systematics, and ecology of fishes. This course emphasizes the evolution of ecological adaptations and the origin and conservation of biodiversity. Lecture, laboratory, and field work. Prerequisites: BIOL 1211 and BIOL 1212.

**BIOL 4545 Fisheries Management (4 credits)**

Theory and methods of fisheries management with an emphasis on quantitative methods and ecosystem management. Lecture and extensive field and laboratory work. Prerequisites: BIOL 1211, BIOL 1212, BIOL 3362, and STAT 2610. BIOL 4534 strongly recommended.

**BIOL 4620 Evolution (3 credits)**

Patterns and processes of biological evolution. Topics include phylogenies, speciation, extinctions, biogeography, adaptations, sexual selection, and behavior, with an emphasis on vertebrates and invertebrates. Prerequisite: BIOL 2360.

**BIOL 4623 Forest Ecology (4 credits)**

Fundamentals of forest ecology, including study of tree growth, tree demography, forest community dynamics, and ecosystem processes. Students also learn to identify forest trees native to the region and basic techniques of forest stand description. Prerequisite: BIOL 2610 or consent of instructor. Might not be offered every year.

**BIOL 4800 Advanced Project Certification (0 credit)**

A course designed to document a student's successful completion of a professional or graduate school entrance exam, with a student placing in at least the 60th percentile. This course is one of the options for completing the capstone project requirement in Biology.

**BIOL 4894 Advanced Research Project I (2 credits)**

This course provides a culminating experience that integrates the knowledge and skills learned in previous courses and applies them to a scholarly activity. Examples of an advanced research project may include an original research project, internship, or shadowing experience with a professional. Prerequisite: Junior status and consent of instructor.

**BIOL 4895 Advanced Research Project II (2 credits)**

This course is a continuation of BIOL 4894 for students who undertake a year-long research project. The course provides a culminating experience that integrates the knowledge and skills learned in previous courses and applies them to a scholarly activity. Examples of an advanced research project may include an original research project, internship, or shadowing experience with a professional. Prerequisite: Junior status and consent of instructor.

**BIOL 4898 Fisheries Research I (2 credits)**

Independent field projects based on the background and interests of the students and the instructor. Designed to give students experience developing original research objectives, designing methods, collecting data, and writing a research manuscript that conveys that research to their peers. Prerequisites: Completion of the Area II required writing course for the B.S. or B.A. Biology major, junior status and consent of instructor.

**BIOL 4899 Fisheries Research II (2 credits)**

This course is a continuation of BIOL 4898. It is designed to give students experience analyzing data, drawing conclusions, completing and preparing a research manuscript for publication, and developing an oral presentation for a professional meeting. Prerequisites: BIOL 4898, Completion of the Area II required writing course for the B.S. or B.A. Biology major, junior status and consent of instructor.

**All-University Courses**

The course numbers listed below, not always included in the semester class schedule, may be registered for by consent of the advisor, instructor, or department chair, or may be assigned by the department when warranted. Individual registration requires previous arrangement by the student and the completion of any required form or planning outline as well as any prerequisites.

1910, 2910, 3910, 4910 DIRECTED INDEPENDENT STUDY  
 1920, 2920, 3920, 4920 DIRECTED GROUP STUDY  
 1930, 2930, 3930, 4930 EXPERIMENTAL COURSE  
 1940, 2940, 3940, 4940 IN-SERVICE COURSE  
 1950, 2950, 3950, 4950 WORKSHOP, INSTITUTE, TOUR  
 1960, 2960, 3960, 4960 SPECIAL PURPOSE INSTRUCTION  
 1970, 2970, 3970, 4970 INTERNSHIP  
 1980, 2980, 3980, 4980 RESEARCH  
 1990, 2990, 3990, 4990 THESIS