Biology Courses

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 1111 Anatomy and Physiology for Allied Health I (4 credits)
This course is designed as the first semester of a year-long human anatomy and physiology course for allied health students including nursing and community health. The course covers aspects of the structure, function, and development of the human body from the cellular level through an introduction to the nervous system. Both lecture and laboratory are required.

BIOL 1112 Anatomy and Physiology for Allied Health II (4 credits)
This course is designed as the second semester of a year-long human anatomy and physiology course for allied health students including nursing and community health. The course covers aspects of the structure, function, and development of the human body from the nervous system through digestion and nutrition. Both lecture and laboratory are required. Prerequisite: BIOL 1111.

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.

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 2750 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 majors. Prerequisites: (BIOL 1211 or BIOL 1110) and (CHEM 1110 or CHEM 1111 or CHEM 2211).

BIOL 2925 People of the Environment: Biological Perspectives (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 3074 Molecular Techniques (2 credits)
This is a hybrid lecture and lab-based course and is an introduction to several common molecular-based techniques. Students will learn basic pipetting, protein assays, electrophoresis, PCR, and other molecular genetic techniques. Prerequisite(s): BIOL 1211, BIOL 2360, CHEM 2211, CHEM 2212; or consent of instructor.

BIOL 3075 Cellular Techniques (2 credits)
This course is the one of two options for completion of techniques core requirement for the BCMB major and for specific Biology majors. Includes an introduction to cell culture, cell imaging, cell-based assays, and stem cell biology. Prerequisite(s): BIOL 3074 or BCMB 3074.

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 or BIOL 1120) and (GEOL 1110 or BIOL 1212) or consent of instructor. May not be offered every year.

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 3170 Dendrology (2 credits)
The main function of a dendrology class is to learn the identification and basic ecology of woody plants (trees, shrubs, woody vines) for a region, along with the basic vocabulary used to describe woody plants. Prerequisite(s): (BIOL 1211, 1212, and 2610) or consent of instructor.

BIOL 3250 Human Anatomy (4 credits)
Anatomical structure of the human body, from individual organ systems to the integrated whole. BIOL 1211.

BIOL 3260 Human Physiology (4 credits)
Physiological and pathophysiological principles and control mechanisms of organ systems within humans. Lecture and laboratory. Prerequisites: BIOL 1211, 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 3337 Science Communication (3 credits)
This online course includes training in the skills, tools, and habits of mind of the practicing scientist. These skills include navigating and understanding the scientific literature, framing evidence-based and model-driven scientific questions, proposing and testing hypotheses, conducting research responsibly and ethically, analyzing and visualizing data, and communicating scientific rationale and results in lab meetings, presentations, research funding applications, and job searches.

BIOL 3338 Science Communication Lab (1 credit)
All students in the Biology Baccalaureate Partnership at North Hennepin Community College are expected to co-enroll in this 1 credit face-to-face section on the NHCC campus when taking BIOL 3337 online. The on-campus discussion section will cover supplementary topics and material and is intended to build scientific community and communications skills among the BBP cohort. The lab section will not impact the main course grades. Co-requisite BIOL 3337.

BIOL 3339 Bioethics (3 credits)
In this online Bioethics course we will grapple with the many philosophical, ethical, and practical questions created by advances in medicine and biology using a combination of readings, case studies, scientific literature, and popular culture. The course has undergraduate and graduate sections and is intended for students in their Junior year of college or later. Topics include prenatal testing, abortion, assisted suicide, human augmentation/transhumanism, cloning, disability rights, animal rights, genetically modified organisms, and environmental ethics. Liberal Education Goal Area 9.

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 Streams and Rivers (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 (3 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. Prerequisites: BIOL 1211 and BIOL 2360.

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 3580 Immunology (3 credits)
The study of disease fighting mechanisms of the innate and adaptive immune systems. Prerequisites: BIOL 2360 and one year of chemistry.

BIOL 3590 Cell Biology (3 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. Prerequisites: (BIOL 2360 or BIOL 3380) and (CHEM 2211, CHEM 2212) or consent of instructor.

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 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 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 (3 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. Prerequisites: BIOL 1211, BIOL 2360.

BIOL 4447 Genomics (3 credits)
Genomics is the study of the content, structure, organization, evolution, and conservation of whole genomes. Because of its reliance on precision instrumentation and scale, and the unprecedented volume of data produced, genomics is unusual among biological disciplines in its integration of engineering, statistics, and information science. Genomics also requires the biologist to engage in systems thinking by taking a wide view of the dynamic physical and informational network that comprises a single genome. One must further consider the human genome as itself a component of an even larger network of genomes that make up the holobiont-that's us plus our always-changing resident community of microbial pals. After covering these and other topics, and carrying out a substantial genome annotation project for the lab component of the course, we explore personal genomics, or how all this information and understanding affects our lives as 21st century human beings. Prerequisite: BIOL 2360.

BIOL 4448 Genomics Lab (2 credits)
All students in the Biology Baccalaureate Partnership at North Hennepin Community College are expected to co-enroll in this 2 credit face-to-face section on the NHCC campus when taking BIOL4447 online. This lab section consists of a hands-on genome annotation project in collaboration with the national Genomics Education Partnership, as well as practice using other bioinformatics tools and databases. Prerequisites: BIOL2360, co-enrollment with BIOL4447.

BIOL 4449 Gene Expression (4 credits)
While mutations in genomic DNA play a major role in human health and disease, the control of gene expression plays the pivotal role in establishing developmental patterning, cellular differentiation, responsiveness to environmental stimuli, and defense against pathogens and invasive genetic elements. Changes in genomic DNA over time are a key driver of evolution, but the control of gene expression is also a major generator of species diversity and a driver of genome structure and function. Chromosomes in eukaryotic nuclei are made up of a combination of DNA and proteins packaged and compacted into a composite called chromatin-in turn, chromatin structure and modification determines whether a gene is "open" for transcription or closed. One of the most efficient and well-characterized systems for studying the relationship between chromatin and gene expression is the so-called position effect variegation (PEV) in the compound eye of Drosophila melanogaster, in which the variable expression of a reporter transgene allows reproducible measurement of gene expression in response to genetic and environmental factors. We will use a combination of classroom and laboratory approaches to understand and complete original research projects using this system. Successful completion of this course satisfies BSU Biology's capstone requirement. Prerequisite: BIOL 2360.

BIOL 4460 Stem Cells and Regenerative Medicine (3 credits)
This course is designed as an introduction to stem cell biology and the medical applications of stem cells including in the field of regenerative medicine. Prerequisite(s): BIOL 2360.

BIOL 4470 Introduction to Vaccinology (4 credits)
This course will introduce students to the field of vaccinology and aspects of the bioscience industry related to vaccine discovery, production, and testing. Students will learn about the history of vaccines; the production of vaccines in a regulated environment; the benefits and concerns with vaccine use. The course will include a discussion of vaccine types, delivery, efficacy, and safety. Students will learn about the mechanism of action of different vaccines; traditional verses modern vaccine production methods, the process of clinical trials and approval for new vaccines; and discuss ethical concerns related to vaccine use. Prerequisite(s): BIOL 2360.

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 or consent of instructor.

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 4715 Clinical Microbiology (3 credits)
Clinical techniques used to identify medically important microorganisms will be examined. Correlate the presence of microorganisms to health and disease. Prerequisite(s): BIOL 3710.

BIOL 4800 Advanced Project Certification (0 credit)
A course designed to document a students 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