

# BIOLOGY

## Minor

A minor must contain 15 to 18 semester hours of coursework, including at least 9 hours of upper-division courses at the 3000-4000 level. Courses taken to satisfy Core IMPACTS may not be counted toward completion of the minor. Courses taken in the Field of Study may sometimes be used to fulfill minor requirements.

A minor in Biology must include 15 credit hours of biology course work, with at least 9 hours at the 3000-level or above.

Two degree level BIOL courses	6
Three of the following upper electives:	9
BIOL 3000	Research Methods in Biology
BIOL 3150	Science and Society
BIOL 3200K	Cellular Biology
BIOL 3300K	Developmental Biology
BIOL 3340K	General Microbiology
BIOL 3660K	Entomology
BIOL 3400K	Genetics
BIOL 3500K	Ecology
BIOL 3510K	Plant Biology
BIOL 3520K	Invertebrate Zoology
BIOL 3530K	Freshwater Ecology
BIOL 3550	Conservation Biology
BIOL 3600K	Ornithology
BIOL 3650K	Herpetology
BIOL 3700	Field Biology Techniques
BIOL 3850	Neuroscience
BIOL 3900	Readings in Biology
BIOL 4000	Senior Seminar
BIOL 4100	Immunology
BIOL 4200	Pathology
BIOL 4250	Evolution
BIOL 4251	Human Evolution
BIOL 4275	Bioremediation
BIOL 4300	Epidemiology
BIOL 4360K	Comparative Vertebrate A & P
BIOL 4410K	Molecular Biology
BIOL 4500K	Biotechnology
BIOL 4600	Ecotoxicology
BIOL 4700	Microscopy
BIOL 4800	Service Learning in Biology
BIOL 4850K	Human Dissection
BIOL 4900	Special Topics in Biology
BIOL 4960	Research in Biology
<b>Total Hours</b>	<b>15</b>

## Courses

### BIOL 1011K. Introductory Biology w/ Lab. 3-2-4 Units.

An introduction to fundamental unifying principles in biology. Topics covered in the course include: chemistry of life, cell structure and membranes, cellular functions (metabolism, respiration, photosynthesis, communication, and reproduction), genetics (inheritance patterns, DNA structure and function, gene expression, and biotechnology), and evolution. This course involves both lecture and lab components. Prerequisites: ENGL 0999 unless exempt.

### BIOL 1012K. Introductory Biology II w/ Lab. 3-2-4 Units.

This course covers the evolution and diversity of organisms, including microbes, protists, fungi, plants, and animals. Additional topics include body systems, the immune system, reproduction and development, and ecology. For non-biology majors only. Prerequisites: BIOL 1107K or BIOL 1011K.

### BIOL 1100. Human Biology. 3-0-3 Units.

Prepares students for employment in the health professions. Topics include basic chemistry, cell biology, genetics, and digestive, excretory, respiratory, circulatory, endocrine, reproductive, and skeletal systems. Laboratory demonstrations and practices are included. (Career Course) (F,S,M)

### BIOL 1105K. Environmental Studies. 3-2-4 Units.

Focuses on the interrelationship of the biological and physical components of the environment and the impact of human activities on the biosphere. Students should not take BIOL 1105K if they have taken ENVS 2202, only one course can apply toward program requirements(F,S,M) Prerequisites: ENGL 0999 unless exempt.

### BIOL 1107K. Principles of Biology I. 3-2-4 Units.

Introduces fundamental unifying principles of biology. Topics include scientific method, biological chemistry, cell structure and function, energetics, cell division, genetics and evolution.(F,S,M) Prerequisites: ENGL 0999 unless exempt.

### BIOL 1108K. Principles of Biology II. 3-2-4 Units.

Continuation of BIOL 1107K. Topics include the structure and function of the following animal, including human, systems: nervous, circulatory, immune, respiratory, digestive, urinary, endocrine, and reproductive, as well as diversity, development, behavior and ecology.(F,S,M) Prerequisites: BIOL 1107K.

### BIOL 1203K. Botany. 3-2-4 Units.

This course is intended for non-science-majors with an interest in botany. The course aims to foster an understanding of plants' structure, reproduction, physiology and emphasizes the present and future use of plants and the relationship between plants and society. The course content includes an introduction to the biology of plants, the history of agriculture, domestication of crops, medicinal, spices, and herbal plants, and their relation with human societies and ecosystems. Special attention will dedicate to biotechnology's role in genetically engineered food, industrialized agriculture, and pharmaceutical medicines.(S) Prerequisites: ENGL 0999 unless exempt.

### BIOL 1224K. Principles of Entomology. 3-2-4 Units.

Presents an introduction to the anatomy, biology, and behavior of insects. The laboratory emphasizes classification and identification of insects to family, which are required as part of assembling a collection during the course.(F) Prerequisites: ENGL 0999 unless exempt.

**BIOL 2251K. Anatomy and Physiology I. 3-3-4 Units.**

This integrated lecture and laboratory course is the first course in a two-semester sequence designed to explore the biological and chemical processes underlying the structure and function of the human body at the cellular, tissue, organ, and whole-body level. Topics to be covered include, but are not limited to, biological chemistry; cellular structure and function; tissues; and the integumentary, skeletal, muscular, and nervous systems. This course includes laboratory exercises that supplement the material covered in lectures. This course is designed primarily for non-biology majors, especially those pursuing majors in nursing and the allied health professions. (This course will NOT satisfy an Area D requirement and will only satisfy an Area F requirement only if specifically listed as an option for the program of study.) (F,S,M) Prerequisites: BIOL 1107K, except Associate of Science in Nursing (2 year) majors, Associate of Applied Science in Radiologic Technology and Associate of Applied Science in Respiratory Therapy.  
Prerequisites: ENGL 0999 unless exempt.

**BIOL 2252K. Anatomy and Physiology II. 3-3-4 Units.**

This integrated lecture and laboratory course is the second course in a two-semester sequence designed to explore the biological and chemical processes underlying the structure and function of the human body at the cellular, tissue, organ, and whole-body level. Topics to be covered include, but are not limited to, the cardiovascular, endocrine, lymphatic and immune, respiratory, digestive, urinary, and reproductive systems. Metabolism and fluid, electrolyte, and acid-base balance will also be covered. This course includes laboratory exercises that supplement the material covered in lectures. This course is designed primarily for non-biology majors, especially those pursuing majors in nursing and the allied health professions. (This course will NOT satisfy an Area D requirement and will only satisfy an Area F requirement only if specifically listed as an option for the program of study.) (F,S,M)  
Prerequisites: BIOL 2251K or permission of MLT advisor.

**BIOL 2260K. Microbiology. 3-2-4 Units.**

This integrated lecture and laboratory course provides an introduction to microbiology. This course introduces the student to the diversity and classification of medically significant microorganisms, their modes of pathogenesis and transmission, and the infectious diseases they cause. Topics to be covered include, but are not limited to, microbial cell biology and genetics; major classes of disease-causing microorganisms; host immune response; microbial control; aseptic technique; disinfection; and isolation, culture, staining, and identification of microorganisms. Select laboratory exercises will provide training in the basic laboratory techniques for culture and identification of microbes. This course is designed primarily for non-biology majors, especially those pursuing majors in nursing and the allied health professions. (This course will NOT satisfy an Area D or Area F requirement only if specifically listed as an option for the program of study.) (F,S,M)  
Prerequisites: BIOL 1107K or BIOL 2251K.

**BIOL 2270. Ethical Issues in Science. 2-0-2 Units.**

Provides an introduction to basic ethical concepts and develops the concept of ethical decision-making and how this applies to the increasing number of biological ethics decisions made daily. A variety of bioethical questions will be proposed and students will explore the science and social science aspects of each particular question. (F,S)  
Prerequisites: BIOL 1108K.

**BIOL 3000. Research Methods in Biology. 3-0-3 Units.**

Prepares students for independent research by training them in laboratory safety, storage and disposal of reagents, standard methods and equipment used for research in a range of specialties and the ethical conduct of research. Students will develop skills in critical analysis of literature, experimental design, project proposal preparation, maintain lab log books, data analysis, time-management and oral and written presentation of results. This class is a suggested pre or co-requisite for BIOL 3900 and BIOL 4960. (F,S)  
Prerequisites: BIOL 1108K, COMM 1110, MATH 2200 or MATH 1401.

**BIOL 3100. Careers & Prof. Dev in Biology. 1-0-1 Unit.**

This course will lay the groundwork of professional development for students pursuing the Biology degree. Students will learn about post-graduation options, professional and graduate school requirements, curriculum vitae, and interviewing skills.  
Prerequisites: BIOL 1108K.

**BIOL 3150. Science and Society. 3-0-3 Units.**

This course provides historical and contemporary perspectives on the roles of science and technology in society. Specific historical periods will be reviewed, with selected biographical information to gain a social perspective relative to an individual scientist's contributions to a field, and the impact of science and technology on society. Current topics will be covered. Potential topics may include vaccines (e.g. historical research, currently available vaccines, and social controversies related to usage), climate change (e.g. aspects of ecology, evolution, energy policy & technology), reproductive biology (e.g. birth control, abortion), aging (e.g. theories of aging, medical treatments for age-related pathologies, social and economic costs), or other regional scientific issues and history.  
Prerequisites: BIOL 2270 and Upper division eligibility.

**BIOL 3200K. Cellular Biology. 3-3-4 Units.**

An exploration of the basic unit of living organisms. Study of the structure and function of cellular structures with emphasis on the unifying nature of cell membrane systems, cellular energetics, motility and transport intercellular interactions, cellular communication, and cell division. Laboratory experiences introduce basic cytological study techniques. (F,S)  
Prerequisites: BIOL 1108K, CHEM 1212K.  
Corequisites: CHEM 3211K.

**BIOL 3300K. Developmental Biology. 3-2-4 Units.**

Introduces students to the developmental process in animals with the formation of gametes through the embryonic stages, birth, maturation and aging. Anatomical development, experimental embryology and the molecular mechanisms of cell differentiation will be covered. Laboratory techniques in developmental biology including animal cell and tissue cultures will be utilized. (Spring as enrollment requires)  
Prerequisites: BIOL 3200K.

**BIOL 3340K. General Microbiology. 3-2-4 Units.**

Introduces students to the biology of noncellular, prokaryotic, and eukaryotic microorganism. Topics include microbial metabolism, genetics, systematics, pathogenesis, epidemiology, and ecology. The history of microbiology, host defense against disease, and human exploitation of microbes will also be studied. The laboratory introduces students to the culture and identification of microorganisms. (Fall as enrollment requires)  
Prerequisites: BIOL 1108K, CHEM 1211K.

**BIOL 3400K. Genetics. 3-3-4 Units.**

A study of Mendelian principles, molecular genetics and population genetics. Topics include simple Mendelian inheritance, extensions of Mendelian inheritance, linkage, genetic mapping, quantitative inheritance, population genetics, prokaryotic genetics, and molecular genetics.(F,S,M)  
Prerequisites: BIOL 3200K, CHEM 3211K; Corequisite: CHEM 3212K.

**BIOL 3500K. Ecology. 3-3-4 Units.**

A study of the interrelationships of organisms with their physical and biological environment. Topics include an exploration of adaptations, population structure and dynamics, organization and classification of communities, and nutrient and energy flows in ecosystems.(F,S,M)  
Prerequisites: BIOL 1108K.  
Corequisites: CHEM 1211K.

**BIOL 3510K. Plant Biology. 3-3-4 Units.**

An in-depth examination of the structures, growth, reproduction, competition, survival, and diversity of plants.(S)  
Prerequisites: BIOL 1108K, CHEM 1211K.

**BIOL 3520K. Invertebrate Zoology. 3-3-4 Units.**

An in depth examination of the taxonomy, morphology, physiology, and evolution of the more common invertebrate phyla. A study of the distribution and interspecific relationships among invertebrates and other forms of life.(Fall as enrollment requires)  
Prerequisites: BIOL 1108K.

**BIOL 3530K. Freshwater Ecology. 3-3-4 Units.**

An examination of freshwater habitats, including streams, lakes, and wetlands. The course will focus on the physical and chemical characteristics and biological communities of these ecosystems and their functioning. The effects of human activities on these systems will be assessed. Students will conduct field work, stressing collecting techniques and analysis, and identification of organisms (S).  
Prerequisites: BIOL 1108K

**BIOL 3550. Conservation Biology. 3-0-3 Units.**

An in depth study of the biological aspects of environmental crises and how principles from major areas in biology can provide solutions to the conservation of species and ecosystems. Major topics will include population ecology, population genetics, and community ecology. Because of the interdisciplinary nature of conservation we will discuss the social and political aspects of the field. Supplemental readings will come from primary literature. A semester long project which requires developing a management plan for a novel environmental problem is required.(Fall as enrollment requires)  
Prerequisites: BIOL 1108K.

**BIOL 3600K. Ornithology. 3-3-4 Units.**

Birds have been the subjects of scientific investigation for centuries, and research on birds has contributed much to our modern understanding of morphology, physiology, behavior, ecology, evolution, and global change. The purpose of this course is to investigate these myriad but interrelated topics with birds as our focus in both lecture and laboratory settings. The course will involve hands-on learning of ornithology using traditional lecture and lab activities along with experimental design and research. (Spring as enrollment requires)  
Prerequisites: BIOL 1108K.

**BIOL 3650K. Herpetology. 3-1-4 Units.**

Herpetofauna have been the subjects of scientific investigation, curiosity, and awe for centuries, and research on reptiles and amphibians has contributed to our understanding of morphology, physiology, behavior, ecology, evolution, and global change. This course will investigate these numerous but interrelated topics with "herps" as our focus in both lecture and laboratory settings. The course will involve hands-on learning of herpetology using traditional lecture, traditional lab, and field lab activities along with experimental design and research (F). Pre-requisites: BIOL 1108K.

**BIOL 3660K. Entomology. 3-2-4 Units.**

This course provides an overview of the classification of arthropods and the place of hexapods in that classification. All orders of hexapods will be covered in some depth including details of the external anatomy of hexapods which will be essential for identification of the different hexapod groups. Additional topics following the classification section of the course include internal anatomy, interactions between hexapods and other organisms (their ecology), and specifics about several interesting behaviors (taxes and orientation, communication, thermoregulation, voltinism). Students are also required to assemble a collection of no less than 100 different hexapods, and prepare, label, and identify them (to family level). (Fall even years as enrollment supports).  
Prerequisites: Biology 1108K.

**BIOL 3700. Field Biology Techniques. 3-0-3 Units.**

This course is designed to expose students to standard field techniques for collecting habitat and specimen data. Additionally, this course is designed to expose students to current peer reviewed literature, learn basics of scientific writing and grant writing, and explore career options for students in biology.(Summer, Even Years)  
Prerequisites: BIOL 3000 or BIOL 3500.

**BIOL 3850. Neuroscience. 3-0-3 Units.**

This course introduces the cellular mechanisms of neural signals, neural systems for sensory and motor functions, and the basics of higher order brain functions. Research techniques are discussed in the context of the material.(Fall as enrollment requires)  
Prerequisites: BIOL 3200K, CHEM 1212K.

**BIOL 3900. Readings in Biology. 2-0-2 Units.**

Independent study of the literature within a topic of current research in Biology.(F,S,M)  
Prerequisites: 12 hours of Biology courses and approval of a faculty supervisor and Chair of Department of Life Science required before registration.

**BIOL 4000. Senior Seminar. 2-0-2 Units.**

Focuses on a topic, issue, or area of study within the biological sciences. Students will demonstrate mastery of the student learning outcomes in this course and program through completion of a capstone presentation and discussion of scientific literature.(F,S)  
Prerequisites: 19 hours 3000/4000-level Biology (Departmental approval via application process) Go to the DSC website > Academics > School & Departments > School of Arts & Sciences > STEM Forms and fill out the appropriate form for this course.

**BIOL 4100. Immunology. 3-0-3 Units.**

Provides an introduction to the cellular and molecular basis of the immune response, which includes antigen presentation, immunogenetics, effector mechanisms, and medical immunology.(Spring as enrollment requires)  
Prerequisites: BIOL 3200K.

**BIOL 4200. Pathology. 3-0-3 Units.**

An examination of the pathogenesis of human disease. This course focuses on the cellular, morphologic, and functional responses to chemical, physical, and microbial injuries in the human body. This course explores cardiovascular pathobiology, cancer, inflammatory disorders, and infectious, neurodegenerative, and immunodeficiency diseases. Students learn to identify and explain pathological changes, interpret pathology lab tests, and develop skills in case study analysis, collaborative work, and prepare for board-level examinations (S).

Prerequisites: BIOL 2251K and BIOL 2252K.

**BIOL 4250. Evolution. 3-0-3 Units.**

A study of the principles of evolutionary biology including discussions of natural selection, adaptation, population genetics, speciation, and phylogeny reconstruction, and the distribution, abundance and adaptations of living organisms as mediated by the environment and natural selection.(F,S,M)

Prerequisites: BIOL 3400K, CHEM 1212K.

**BIOL 4251. Human Evolution. 3-0-3 Units.**

An exploration of the evolution and genetic relatedness of humans and their closest relatives. Students will study evidence of evolution and basic mechanisms for evolution using examples from primate evolution.

Prerequisites: BIOL 3200K

**BIOL 4275. Bioremediation. 3-0-3 Units.**

Bioremediation and phytoremediation use microbes and plants, respectively, in the treatment of contaminated soils and water. These methods are increasingly utilized at sites requiring remediation, either individually or in conjunction with more traditional remediation techniques. This course will examine the histories, theories, benefits, drawbacks and applications of various bioremediation and phytoremediation techniques of organic and inorganic pollutants. Some of the techniques addressed will be natural attenuation, biodegradation, bio filtration, phyto extraction and phyto stabilization.(Spring as enrollment requires)

Prerequisites: BIOL 1108K.

**BIOL 4300. Epidemiology. 3-0-3 Units.**

This course is designed to introduce students to the basic principles of epidemiology. The focus is on methods used to collect data and establish causation, as well as application of epidemiologic methods to public health policy. Examining the many ways diseases/health related states are defined, challenges to study design and data analysis, outbreak investigation, and ethical considerations are emphasized throughout the course (F).

Prerequisites: BIOL 3000 and three additional upper-level Biology courses.

**BIOL 4360K. Comparative Vertebrate A & P. 3-3-4 Units.**

Broad comparative analysis of vertebrate morphology by considering anatomical structure and function and the integration of these structures in the individual organism, as well as the functional process of vertebrate organs and organ systems, and their physiological integration. Consideration will be given to the relationship between structure and functional demands of vertebrates to particular environments as well as the details of each vertebrate organ system, emphasizing the structure-function relationship of the organs/organ systems, and the range of structural and evolutionary modifications of organ systems seen in different vertebrate classes.(Spring as enrollment requires)

Prerequisites: Any 3-4000 level BIOL courses (excludes BIOL 3900, BIOL 4800, BIOL 4960).

**BIOL 4410K. Molecular Biology. 3-3-4 Units.**

In depth examination of the molecular aspects of cell structure and function, emphasizing the chemical and molecular basis of cellular physiology. Addresses genetic function at the chromosomal and molecular levels, gene expression, and regulation.(Spring as enrollment requires)

Prerequisites: BIOL 3400K, CHEM 3211K.

**BIOL 4500K. Biotechnology. 3-3-4 Units.**

A study of the applied aspects of biochemistry and molecular biology in various fields, with emphasis on the use of recombinant DNA methods and protein engineering. (Fall as enrollment requires) .

Prerequisites: BIOL 3400K.

**BIOL 4600. Ecotoxicology. 3-0-3 Units.**

This course provides an introduction to the field of ecotoxicology, classes of contaminants, mechanisms of action, biomarkers, and effects at the individual, population, and community level. Also included will be historical background of the field and the history of environmental legislation in the United States.(Fall as enrollment requires)

Prerequisites: Any 3-4000 level BIOL courses (excludes BIOL 3900, BIOL 4800, BIOL 4960).

**BIOL 4700. Microscopy. 3-0-3 Units.**

This limited-enrollment course will focus on the theory and practice of multiple types and subtypes of microscopy. In particular, the course will focus on standard light microscopy (bright field, dark field, and phase contrast), fluorescence microscopy, and scanning electron microscopy.It will contain a mix of theory and application based lecture with practical hands-on experience with microscopes and relevant techniques. The class will meet for 3 hours per week, with roughly one hour devoted to lecture and classroom activities and 2 hours for laboratory activities(although this may vary some weeks), (F).

Prerequisites: 12 hours of 3000/4000 level Biology and permission of the instructor.

**BIOL 4800. Service Learning in Biology. 0-0-2 Units.**

Lecture assistantship or laboratory assistantship within a biology course at Dalton State. Repeatable for a maximum of 4 credit hours. (F,S,M) Students with a laboratory assistantship must have successfully completed the course with a B or better.

Prerequisites: 12 hours of Biology and approval of a faculty supervisor and Chair of Department of Life Science required before registration.

**BIOL 4850K. Human Dissection. 0-4-3 Units.**

This is a laboratory course that requires prosection of a human cadaver which will be used as an instructional aid in other courses at Dalton State. Students will review the history of cadaver use, demonstrate various dissection techniques and knowledge of medical human anatomy. (S) Prerequisites are 3 upper level BIOL courses and permission of the instructor.

**BIOL 4860. Internship in Biology. 0-0-1-4 Unit.**

Independent and in-depth internship with a field of biology. Repeatable for a maximum of 4 credit hours.(F,S,M)

Prerequisites: 12 hours of Upper Level Biology and approval from both a faculty supervisor and department chair.

**BIOL 4900. Special Topics in Biology. 1-0-1-4 Unit.**

Advanced concepts in biology will be presented, the detailed content varying from year to year. Course may be repeated for credit when topic differs. Course may be repeated for credit when topic differs. (Offered as Needed) For title of MCAT Preparation: Go to the DSC website > Academics > School & Departments > School of Arts & Sciences > STEM Forms and fill out the appropriate form for this course.

Prerequisites: BIOL 3400K and 3 additional upper level Biology courses.

**BIOL 4960. Research in Biology. 0-0-1-3 Unit.**

Research project conducted by a student under guidance of a faculty member. Repeatable for a maximum of 4 hours. (F,S,M) Justification: These were rewritten by the URC to facilitate getting TAs/Research students in lower level classes. We still require both instructor and chair approval, as before.

Prerequisites: 16 hours Biology courses and approval of a faculty supervisor and Chair of Department of Life Science required before registration.