

BIOLOGICAL SCIENCES

Biological Sciences is part of the department of Natural Sciences. The Associate of Science in Core Curriculum with a pathway plan of study for the BS in Biological Science, a Biology Minor, as well as the Bachelors of Science degree in biology with various foci are offered.

Programs in Biological Sciences

- Degree information for the Associate of Science in Core Curriculum with a Biological Science Transfer Pathway (<http://catalog.asurams.edu/undergraduate/degree-programs/>)
- Biology Minor (<http://catalog.asurams.edu/undergraduate/arts-sciences/biological-sciences/minor-biology/>)
- Biology, Bachelor of Science (<http://catalog.asurams.edu/undergraduate/arts-sciences/biological-sciences/biology-bachelor-science/>)

BIOL 1011K. Introduction to Biology. (4 Credits)

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. Offered: Fall, Spring.

BIOL 1012K. Introduction to Biological Science II. (4 Credits)

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. Offered: Fall, Spring.

BIOL 1100K. Human Anatomy and Physiology for the Health Care Professional. (4 Credits)

This course is a survey of general principles of human anatomy and physiology with an emphasis on medical applications. It is restricted to students in Health Science programs or requires the consent of the division Dean. Laboratory exercises supplement the instructional material. Offered: Fall, Spring, Summer.

BIOL 1110K. Introduction to Environmental Biology. (4 Credits)

This course uses an interdisciplinary approach to contemporary environmental problems. Emphasis is placed on the study of ecosystems, human population growth, energy, pollution, and other environmental issues as well as important environmental regulations. Laboratory exercises supplement the lecture material. Prerequisite: None. Offered: Fall, Spring, Summer.

BIOL 1111K. Introduction to Biological Sciences. (4 Credits)

A course designed for non-science majors that emphasizes fundamental concepts of the cell (i.e., cell structure and function, mitosis and metabolism), and plant anatomy and physiology through the use of lectures, audio visual aids, selected laboratory experiments, and demonstrations. Offered: Fall, Spring, Summer.

BIOL 1112K. Intro to Biological Sciences. (4 Credits)

A course designed for non-science majors that emphasizes human anatomy and physiology, classical and molecular genetics, evolution, ecology, and surveys the plant and animal kingdoms through lectures, audio-visual aids, selected laboratory experiments, and demonstrations. Offered: Fall, Spring, Summer.

BIOL 1115K. Introduction to Environmental Biology. (3 Credits)

This course studies the basic concepts and impact of the interrelated complexities of the environment on man, plants, animals and society.

BIOL 1801. Science Career Exploration. (1 Credit)

This course is designed to introduce students (majors and nonmajors) to the diverse career opportunities in the biological, biomedical, chemical and related sciences. Course Prerequisite: None Offered: Fall, Spring.

BIOL 2000K. Foundations of Research 1. (1 Credit)

This course is the introductory course of the research track designed for biology majors to gain competence as biomedical scientists. The goal of this course is to introduce students to the various types of research literature (primary, secondary, articles for the public, etc.) for developing competence in the use of literature sources. Prerequisite: None Offered: Fall.

BIOL 2001K. Introduction to Research. (2 Credits)

This 3 contact hour (2 credit hour) course is designed to teach science majors the basic principles of performing a scientific research project. Each student will identify a problem, perform a literature search, design and perform an experiment, analyze data, and present the results. Prerequisites: BIOL 2108K or CHEM 1212K or PHYS 1112K or consent of the Division Dean. Offered: Spring.

BIOL 2004. Anatomy/Phy Mid Grades. (3 Credits)

This course will provide a survey of the general principles of human anatomy and physiology. This course does not satisfy any core curriculum requirement. Restricted to Middle Grades Teachers. Offered: On demand.

BIOL 2107K. Principles of Biology I. (4 Credits)

This is an integrated conceptual course which includes all levels of biological organization with the principles of origin, development, genetics, diversity, behavior and energetics. Laboratory exercises supplement the lecture material. Offered: Fall, Spring, Summer.

BIOL 2108K. Principles of Biology II. (4 Credits)

Biology II is the second part of the two course sequence required for students majoring in Biology. The two course sequence is designed to give students a broad foundation in the biological sciences that will enable them to pursue advanced courses in the biology curriculum. The continuity and diversity of life, evolution and activities of plant and animal life and this environment will be discussed. Emphasis will be placed on the following topics: classical and molecular genetics, organic evolution, plant and animal reproduction, human anatomy and physiology, ecology and environment. Laboratory exercises will supplement the lecture material. Prerequisite: BIOL 2107K or permission of instructor Offered: Fall, Spring, Summer.

BIOL 2211K. Introduction to Microbiology. (4 Credits)

This is a general course in microbiology designed for Nursing majors or non-biology majors which discusses the fundamental principles of the different types of microorganisms associated with organismal pathology, genetics, immunity, and disease control included. Select laboratory exercises will provide the basic skills and tools necessary in staining, culturing and the identification of different types of microorganisms associated with disease. Prerequisite: (BIOL 1100K and CHEM 1151K) or BIOL 1011K or BIOL 1111K or BIOL 2107K or BIOL 2411K (for non-science majors) Offered: Fall, Spring, Summer.

BIOL 2240. Foundation of Research II. (2 Credits)

This is the second course for the research track to build student confidence in formulating hypotheses and designing experiments. This course also includes an introduction to the ethical issues that arise in research. Through case studies and review of literature, the course will present hypothesis-driven research from diverse areas related to biomedical science. Prerequisite: BIOL 2000 or permission of the instructor Offered: As Needed.

BIOL 2250. Responsible Conduct of Research. (2 Credits)

This course is designed to provide an introduction to the basic concepts required for the responsible and ethical conduct of students engaged in undergraduate research. Topics will include lab safety, conflict of interest, data management, data sharing, authorship, animal welfare and policies involving use of human and animal subjects. Prerequisites: BIOL 2107K or permission of instructor Offered: Spring .

BIOL 2311L. General Botany I Lab. (1 Credit)

Laboratory exercises will emphasize plant structure and function, plant metabolism, reproduction and heredity and plant diversity. Perquisites: Biology 2112 Co-requisite: Biology 2311.

BIOL 2320K. Laboratory Research Techniques. (3 Credits)

This course provides students with hands-on training in cutting-edge techniques, technologies, and equipment that are essential for conducting general and biomedical research. It contains four modules: Basic Lab Skills, DNA, Protein Techniques and Instrumental Methods in Chemistry. Students learn experimental techniques including reagent preparation, pipetting, DNA isolation, protein purification, Agarose Gel Electrophoresis, SDS Gel Electrophoresis, Conventional PCR, cell culture, Western blot, ELISA, chromatography (GC-MS) and spectroscopy (FT-IR, NMR, UV-Vis). Prerequisite: BIOL 2107K or CHEM 2112K Offered: As Needed .

BIOL 2330. Principles of Epidemiology. (3 Credits)

This course is the first of two courses offered for students pursuing the track in public health. Principles of Epidemiology provides an overview of epidemiology methods used in research studies that address disease patterns in community and clinic-based populations. Topics covered include distribution and determinants of health-related states or events in specific populations and application to control of health problems. Course Prerequisite: BIOL 2107K or permission of instructor. Offered: As Needed .

BIOL 2411K. Human Anatomy and Physiology I. (4 Credits)

BIOL 2411K is designed as an introductory course in human anatomy and physiology. Discussions include fundamental concepts related to the gross and microscopic structure and functional relationships of the integument, bones, muscles, nerves and endocrine organs. Laboratory exercises supplement the lecture material. Prerequisite: Completion or exemption of all learning support requirements. Offered: Fall, Spring, Summer.

BIOL 2412K. Human Anatomy and Physiology II. (4 Credits)

This course is a continuation of human anatomy and physiology I (BIOL 2411K). Discussion will focus on the structure and functions of body systems (endocrine, cardiovascular, lymphatic, immune, digestive, respiratory, urinary and reproductive). Laboratory exercises supplement the lecture material. Prerequisite: BIOL 2411K or permission of instructor Offered: Fall, Spring, Summer.

BIOL 2501. Introduction to Biomass. (2 Credits)

As the introductory course for students in the bioenergy track, this course is designed to introduce students to the source of bioenergy, which is biomass. Topics include defining biomass, sources of biomass, processing biomass, uses of biomass, and the role of environment and pollution in biomass production. Prerequisite: BIOL 2107K or permission of instructor Offered: Spring.

BIOL 2601. Intro to Foodborne Diseases. (3 Credits)

This course is one of the two courses offered for students completing the track in food safety. This is an intermediate level course, which will introduce students to the major pathogens associated with foodborne diseases, their epidemiology, and approaches to outbreak investigation and control of foodborne illness. Prerequisite: BIOL 2107K or permission of instructor Offered: Spring.

BIOL 3000K. Fundamentals of Biotechnology. (4 Credits)

A course designed to illustrate the current rise in biotechnology and explore its possible applications in plant, animal, biomedical, societal and global environments. Basic concepts of gene and recombinant DNA technology and laboratory on biotechnology research techniques is included. Offered: As Needed.

BIOL 3101K. Environmental Biology. (4 Credits)

Environmental Biology is an interdisciplinary science that integrates the disciplines and sub-disciplines of biology, chemistry, social sciences, technology, business, law, ethics, philosophy, morality, aesthetics and government. Environmental Biology analyzes the effects and subsequent impact of man's activities on Earth's ecosystems as related to issues of personal and community health. Laboratory exercises supplement the lecture material. Prerequisite: BIOL 2108K or permission of instructor Offered: Fall, Spring, Summer .

BIOL 3103. The Fundamentals of Bioenergy. (3 Credits)

This course expands upon the concepts introduced in BIOL 2501. The course introduces students to the application of biomass in the bioenergy field. Topics include defining bioenergy, sources of bioenergy, and the social, political and economic effects of using bioenergy. Prerequisite: BIOL 2501 or permission of instructor Offered: Fall, Summer.

BIOL 3201. Fund of Public Hlth Nutrition. (2 Credits)

This course is one of the two courses offered for students completing the track in food safety. This course will provide an introduction to Public Health Nutrition and the role of the Public Health Nutrition professional. Emphasis will be on definition, identification and prevention of nutrition related disease, as well as improving health of a population by improving nutrition. Prerequisite: BIOL 2701K Offered: Fall, Summer.

BIOL 3250K. Biochemistry. (4 Credits)

The student examines the structure, function, and metabolism of carbohydrates, amino acids and proteins, lipids, and nucleic acids. Topics include bioenergetics, enzyme kinetics, photosynthesis, and the interdependence of the various metabolic pathways of intermediate metabolism. Course. Prerequisite: CHEM 2302.

BIOL 3300K. General Botany I. (4 Credits)

An introduction to the study of the plant kingdom with emphasis on plant structure and function, reproduction and heredity. Prerequisite: BIOL 2108K. Offered: Fall, Spring, Summer.

BIOL 3311K. Introduction to Natural Resources. (3 Credits)

Lecture and laboratory activities in this course are designed to introduce students to the problems of population, resource availability and environmental quality. Aspects of air, water resource problems, conventional sources of energy, and food and land resources issues will be considered in the course. Prerequisite: BIOL 2107K and CHEM 1212K or permission of instructor Offered: Fall, Spring.

BIOL 3316K. Sources & Uses of Plant & Wildlife Resources. (3 Credits)

Lecture and laboratory activities introduce the student to the ways plant and wildlife resources have been used throughout history and studies their importance in food production and non-edible production utilization. Prerequisite: BIOL 3101K or 3311K. Offered: Fall, Spring .

BIOL 3320K. Principles and Techniques in Water Resource. (4 Credits)

Lecture and laboratory activities introduce the student to the procedures needed to examine water over a wide range of qualities, including water suitable for domestic or industrial supplies, surface water, and treated and untreated municipal or industrial wastewater. Prerequisite: BIOL 2108K or permission of instructor Offered: Fall, Spring.

BIOL 3333K. Microbiology and Applications. (4 Credits)

A general course in microbiology specifically for Biology majors. Lecture and laboratory activities emphasize the fundamental concepts of the different groups of microorganisms as related to applications in human, animal and plant health, environment, industry, technology and biotechnology. The course will cover Archaea, bacteria, protists, fungi, viruses, parasites, algae and other microbial groups. Prerequisite: BIOL 2107K or BIOL 2108k or permission of instructor Offered: Fall, Spring, Summer .

BIOL 3401K. Introduction to Histology. (4 Credits)

Lecture and laboratory activities introduce the study of tissues with emphasis placed on light microscopic preparations. Prerequisite: BIOL 2107K or BIOL 2108K or permission of instructor. Offered: Fall, Spring, Summer.

BIOL 3501K. Principles of Genetics. (4 Credits)

Lecture and laboratory activities introduce the study of the classical and modern concepts of heredity in plant and animal systems. Prerequisite: Biology 2108K or permission of instructor Offered: Fall, Spring, Summer.

BIOL 3506. Bioinformatics. (3 Credits)

This course is designed to help students master the DNA analysis tools and resources to study the functions of genomics, understand the gene identity, facilitate the analysis and presentation of molecular and biochemical data. Prerequisite: BIOL 2702K or BIOL 2107K or permission of instructor Offered: Fall .

BIOL 3611K. Medical Mycology. (4 Credits)

Lecture and laboratory activities are designed to acquaint students with select fungal groups that cause human disease. Prerequisite: BIOL 2108K or permission of instructor Offered: Fall, Spring .

BIOL 3701. Current Issues and Topics in Biotechnology. (2 Credits)

This course is to familiarize the students with some of the frontier areas if biotechnological applications where a huge scope for further contributions for betterment of the society exists. This course will allow students to gain theoretical and practical, hands-on knowledge of both commonly used and some specialized laboratory instruments, as well as preparation of common solutions, reagents and methodology. Prerequisite: BIOL 2702K or permission of instructor Offered: Spring .

BIOL 3801. Env Hlth Conc in Public Hlth. (2 Credits)

As the second course for student's pursuing the track in public health, this course provides a survey of major topics of environmental health. Topics include sources, routes, media, and health outcomes associated with biological, chemical, and physical agents in the environment; effects of agents on disease, water quality, air quality, food safety, and land resources; current legal framework, policies, and practices associated with environmental health and intended to improve public health. Prerequisite: BIOL 2330 or permission of instructor Offered: Summer, Fall.

BIOL 3901. Pathophysiology. (3 Credits)

This course discusses the fundamentals of human diseases, with emphasis on anatomical, physiological and clinical processes. Prerequisite: BIOL 2108K or permission of instructor Offered: Fall .

BIOL 4001. Research and Independent Study I. (1 Credit)

This is a required course for the biology major. The student will be introduced to concepts, methods and techniques necessary for the development of an undergraduate research topic. The student will make oral presentations on scientific topics of interest and plan a research project with assistance from a faculty advisor. (Required of all majors). Prerequisite: Junior classification or permission of the instructor. Offered: Fall, Spring, Summer .

BIOL 4002. Research and Independent Study II. (1 Credit)

This is an elective course conducted under the supervision of a faculty advisor. This course is geared towards biology and biology education majors. Prerequisite: Biology 2108K Offered: As Needed.

BIOL 4101K. General Physiology. (4 Credits)

In this course, lecture and laboratory activities will emphasize the experimental approach to physiology including the nerve impulse, enzymes and their properties, along with other selected topics. Prerequisite: BIOL 2108K or permission of instructor Offered: Fall.

BIOL 4201K. Introduction to Parasitology. (4 Credits)

Fundamentals of parasitology are investigated using lecture and laboratory activities with emphasis on the life histories and economic importance of protozoan, helminth, and arthropod parasites. Prerequisites: BIOL 2108K or permission of instructor Offered: Spring .

BIOL 4222K. Biology Senior Research. (3 Credits)

This is a required course for Biology majors. The student will conduct a supervised research project in the biological, biomedical, or related sciences. The students will perform an experiment, collect and analyze the data, and write up the research findings in a scientific report. The student will also give an oral presentation of the research findings. Prerequisite: BIOL 4001 or permission of instructor Offered: Fall, Spring .

BIOL 4223. Found of Research III. (1 Credit)

As the third and final course of the Research track, this course will provide students the formal context to become critical writers and speakers of biomedical information. Students will learn to critique scientific literature, thereby, helping them to improve their own writing. Students will prepare both written and oral presentations of their research and results. Written communications include posters in the formats of the professional societies in their disciplines. Prerequisite: BIOL 2240 or BIOL 4222 or permission of instructor Offered: Fall, Spring.

BIOL 4301K. Developmental Biology. (4 Credits)

Lecture and laboratory activities will emphasize classical methods of analysis and the series of embryonic stages from gametogenesis to histogenesis. Also, basic conceptual topics such as nuclear totipotency, cell determination, cytoplasmic localization, induction, and morphogenesis are interspersed. Prerequisite: Biology 2108K or permission of instructor Offered: Spring.

BIOL 4401K. Comparative Vertebrate Anatomy. (4 Credits)

Course lectures will include comparative structure and evolutionary relationships among a series of chordates from amphioxus to mammals with thorough laboratory dissections of at least one representative from each of the vertebrate classes. Prerequisite: BIOL 2108K or permission of instructor Offered: As Needed.

BIOL 4501K. Immunology. (4 Credits)

Biology 4501K is an introductory level course in immunology. Lecture and laboratory exercises cover the basic concepts of the immune system, antigen, autoimmune diseases, tumor immunology, specific and non-specific types of immune responses. Prerequisite: BIOL 3333k or permission of instructor Offered: Spring .

BIOL 4601K. Plant Physiology. (4 Credits)

Lecture and laboratory exercises study vascular plant functions, including absorption and translocation of water and solutes, transpiration, photosynthesis, respiration, growth and development and hormonal regulation. Prerequisite: Biology 3300K or permission of instructor Offered: Spring.

BIOL 4701K. Cell and Molecular Biology. (4 Credits)

This course is designed to acquaint students with the organization and function of the cell utilizing cellular and molecular techniques to investigate structure and function. Prerequisite: BIOL 2108K or BIOL 3333K or permission of instructor Offered: Fall, Spring, Summer.

BIOL 4703K. Genetic Engineering. (4 Credits)

This course is intended to bring students up to the leading edge of research in developing genetically altered organisms. Focus will be on concepts and laboratory techniques pertaining to transgenic organisms, including, transformations; screening and selection of transgenic organism Prerequisite: BIOL 2702K or permission of instructor Offered: Spring.