

DEPARTMENT OF BIOLOGY

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Faculty of Department

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Objectives

The objectives of the Department of Biology are as follows:

- To develop the student's understanding of the basic biological principles.
- To help students think logically and communicate clearly.
- To help students become conscious of social problems, especially those relevant to the life sciences.
- To prepare students for careers in the life sciences, teaching, and graduate studies.
- To provide a strong pre-professional foundation for medicine, dentistry, veterinary medicine, pharmacy, optometry, physical therapy, dental hygiene, medical technology, nursing, and medical records administration.
- To engage in basic and applied research that benefits the local and scientific community.
- To offer introductory biology courses to non-biology majors to fulfill their general education requirements.

Bachelor

- Biology (B.S.) Environmental Science Track (<https://jsums-public.courseleaf.com/undergraduate/college-science-engineering-technology/department-biology/biology-bs-environmental-sciences/>)
- Biology (B.S.) Marine Science Track (<https://jsums-public.courseleaf.com/undergraduate/college-science-engineering-technology/department-biology/biology-bs-marine-science/>)
- Biology (B.S.) Pre-Medicine/MCAT Track, Pre-Dentistry/DAT Track, Pre-Optometry/OAT Track (<https://jsums-public.courseleaf.com/undergraduate/college-science-engineering-technology/department-biology/biology-bs-pre-medicine-pre-veterinary-pre-dentistry-pre-optometry/>)
- Biology (B.S.) Pre-Pharmacy Track (<https://jsums-public.courseleaf.com/undergraduate/college-science-engineering-technology/department-biology/biology-bs-pre-pharmacy-concentration/>)
- Biology (B.S.) Pre-Physical Therapy Track, Pre-Physician Assistant Track, Pre-Nursing Track (<https://jsums-public.courseleaf.com/undergraduate/college-science-engineering-technology/department-biology/biology-bs-pre-physical-therapy/>)
- Biology (B.S.) Pre-Veterinary Medicine Track (<https://jsums-public.courseleaf.com/undergraduate/college-science-engineering-technology/department-biology/biology-bs-pre-veterinary20medicine20track/>)

Minor

- Biology Minor (<https://jsums-public.courseleaf.com/undergraduate/college-science-engineering-technology/department-biology/biology-minor/>)

Course Descriptions

BIO 101 INTRO TO BIOLOGICAL SCIENCE (2 Hours)

Designed to acquaint the student with fundamental principles of biological science and their functional applications. This course is primarily for the general education program. (F, S, Sum)

BIO 103 ENVIRONMENTAL SCIENCE (2 Hours)

An introduction to the fundamental principles of ecology, biology, and chemistry for a better understanding of the interrelationships between man and his environment. (F, S, Sum)

BIO 111 GENERAL BIOLOGY (3 Hours)

An introduction to the major unifying concepts among the biological sciences: metabolism, physiology, organization, genetics, evolution, and ecology. (F, S, Sum)

BIO 112 GENERAL BIOLOGY (3 Hours)

Prerequisite: BIO 111.

An introduction to the major unifying concepts among the biological sciences: metabolism, physiology, organization, genetics, evolution, and ecology. (F, S, Sum)

BIO 114 Introduction to Marine & Environmental Sciences (3 Hours)

Prerequisite: None.

An introduction to the fundamental principles of marine and environmental sciences. Emphasis will be placed on broad treatment of aquatic and terrestrial ecology, chemistry pollution, and biodiversity for a better understanding of the interrelationships between man and his environment.

BIO 115 GENERAL ZOOLOGY (3 Hours)

Study of the phyla protozoa through chordata. (F, S, Sum)

BIO 119 GENERAL BOTANY (3 Hours)

Prerequisite: BIO 111 and 112.

Fundamentals of plant morphology, plant taxonomy and plant physiology are discussed in addition to the survey of lower and higher plants. (F, S, Sum)

BIO 135 PROFESSIONAL DEVELOPMENT IN PRE-VETERINARY MEDICINE (1 Hour)

This course is focused on the professional preparation of pre-veterinary medicine students and helps to prepare them for the Veterinary Medical College Application Service application process and provides them with an understanding of the academic and professional "profile" of a successful applicant for a Doctor of Veterinary Medicine Program.

BIO 200 Introduction to Cell Biology (3 Hours)

Emphasis on the structure and function of cellular organelles.

Introduction to bioenergetics and enzymes. Laboratory instruction for developing molecular biological techniques. (Sum)

BIO 201 INTRO TO ENVIRONMENTAL SCIENCE (3 Hours)

Basic environmental principles involved in natural environments will be addressed. Their relationships to human environmental functioning will be stressed. (S)

BIO 202 ELEMENTARY BIOSTATISTICS (3 Hours)

This course is designed as an applied introductory course for biology students. The students will be exposed to the basic concepts of biostatistics that will form the foundation for future admission to other schools that include biostatistics in their requirements. The Statistical Analysis System (SAS) computer software will be used to analyze and explain the various concepts. The course serves as a prerequisite for BIO 511. (F, S)

BIO 209 Principles of Genetics (3 Hours)

Prerequisite: BIO 112, C or better.
An introductory study of the principles of heredity to include mechanisms of gene action and gene diversity.

BIO 213 PRIN OF MICROBIOLOGY (3 Hours)

Prerequisite: BIO 112.
Cultural and immunological properties of medically important bacteria and viruses and their epidemiology. Concepts of pathogenicity, antibiotic action, and drug resistance. (F, S, Sum)

BIO 234 HUMAN ANATOMY & PHYSIOLOGY I (3 Hours)

Prerequisite: BIO 111 and 112.
A study of introductory biological principles and some of the structure, physiology, and disorders of the human body with emphasis on the various organs and systems. (F, S, Sum)

BIO 235 HUMAN ANATOMY & PHYSIOLOGY II (3 Hours)

Prerequisite: BIO 234.
A study of the structure, physiology and disorders of the human body with emphasis on the various organs and systems. (F, S, Sum)

BIO 236 CONCEPTS OF PUBLIC HEALTH (3 Hours)

This course provides an introduction to the concepts and practice of public health at the community, state, and national levels. It addresses the philosophy, purpose, history, organization, function, tools, activities, and result of public health practice. (F, S)

BIO 302 BIOINFORMATICS AND COMPUTATIONAL BIOLOGY (3 Hours)

Prerequisite: BIO 101 or BIO 111 and CSC 115
This course aims to introduce basic concepts of bioinformatics analyses such as (multiple) sequence alignment, distance matrix for clustering, molecular phylogeny, RCSB & NCBI database searching, and NGS data analyses. Also, introduction of the important probability and statistics concept for bioinformatics is covered in this course.

BIO 304 MARINE SCIENCE (2 Hours)

Introduction to subject matter and scope of the various marine studies specialties with view to stimulating undergraduate interest in participating in marine sciences program. No formal laboratory. (F, S)

BIO 313 INTRODUCTION TO MICROBIOLOGY (3 Hours)

Prerequisite: BIO 112, 115, CHEM 141, 142, 241, and 242.
The study of bacteria, molds, yeasts, and viruses. Structure, growth, and the significance of these organisms in medicine, industry, and environment. (F, S, Sum)

BIO 318 INTRODUCTORY GENETICS (3 Hours)

Prerequisite: BIO 112, 115 and 119; open for juniors and seniors only.
An introductory study of the principles of heredity to include mechanisms of gene action and gene diversity. (F, S, Sum)

BIO 332 PARASITOLOGY (3 Hours)

Prerequisite: BIO 110, 114, and 115.
The basic principles of parasitology. Emphasis will be placed on classification, morphology, life-histories, host-parasite relationships, and ecology of the important parasites of man and other animals. (F, S)

BIO 335 INTRODUCTION TO ANIMAL SCIENCE (3 Hours)

Prerequisite: BIO 112 and CHEM 142
This course provides a survey of animal agriculture and companion animal husbandry. Aspects of inheritance, breeding, development, feeding and nutrition, and animal management will be introduced. An overview of animal products and the animal industry will be covered.

BIO 390 SEMINAR IN BIOLOGY (1 Hour)

Prerequisite: Junior or senior standing.
Student is provided with an opportunity to present an oral and written report on current scientific topics in an attempt to acquire the fundamentals of biological statistics and to evaluate critically scientific papers. (F, S, Sum)

BIO 391 INTRODUCTION TO RESEARCH (2 Hours)

Basic research methodology in the biological sciences will be demonstrated. Faculty advisors will be assigned on the basis of the nature of the project. (F, S, Sum)

BIO 392 INDEPENDENT STUDY (2 Hours)

Prerequisite: Junior or senior standing.
Students will elect a specific topic that is not covered in other biology courses. The student, working independently will be required to submit a paper that includes an exhaustive review of literature. (F, S, Sum)

BIO 393 INTRO TO MEDICAL TERMINOLOGY (3 Hours)

Prerequisite: Junior standing or consent of instructor.
The etymology of Greek and Latin terms as it relates to the medical sciences. (F, S, Sum)

BIO 395 Principles of Biochemistry (3 Hours)

Prerequisite: BIO/BIO 112 (C or better grade required) and CHEM/CHML 242 (C or better grade required).
This course is a study of the chemical composition of living matter and the chemical mechanics of life processes. (F, S, SUM).

BIO 404 ENVIRONMENTAL SCIENCE (3 Hours)

Prerequisite: BIO 115 and CHEM 142.
An introduction to the fundamental principles of ecology, biology, and chemistry which are necessary for a better understanding of the interrelationships between man and his environment. (F, S)

BIO 406 HUMAN ENVIRONMENT & NATURAL SYSTEMS (3 Hours)**BIO 409 Genetics (3 Hours)**

Prerequisite: BIO 209 (C or better grade).
This course provides an in-depth course of study of the principles of heredity to include the mechanisms of gene action and gene diversity.

BIO 412 NATURAL RESOURCES & CONSERVATION (3 Hours)

Prerequisite: BIO 115 and CHEM 142.
A study of our natural resources with emphasis on their origin, properties, use and misuse and good conservation practices. (S)

BIO 413 HUMAN NUTRITION (3 Hours)

Prerequisite: BIO 218 or 234, CHEM 235 or 241.
A course designed to study the sources, requirements and chemical composition of food constituents; a survey of human diseases resulting from malnutrition. (F, S)

BIO 423 ECOLOGY (3 Hours)

Prerequisite: Senior standing and consent of instructor.
A study of the trophic relationships and energy transfer in the ecosystem. (F, S)

BIO 425 INTRODUCTION TO MARINE BIOLOGY (3 Hours)

Prerequisite: BIO 114, 115, CHEM 142 and CHML 142.

Life in the sea: an introduction to marine organisms, their position and function in the marine environment. Lecture and lab to be taken in the same semester. (F, S)

BIO 431 INVERTEBRATE ZOOLOGY (3 Hours)

Prerequisite: BIO 115, and CHEM 142.

An extensive review of the principal types of invertebrates not studied in the introductory zoology course. (F, S, Sum)

BIO 433 BIOLOGY OF WATER POLLUTION (3 Hours)

Prerequisite: BIO 313.

Biological approaches to water pollution problems are discussed. The effect of pollution on life in aquatic environments is emphasized. (S)

BIO 435 ANIMAL NUTRITION (3 Hours)

Prerequisite: BIO 335 and CHEM 241

This course examines the science of animal feeding and the nutrition of common animal foodstuffs with a focus on major domesticated animal species. Topics include: anatomy and physiology of animal digestive systems; classification and functions of feedstuffs (carbohydrates, proteins, lipids, minerals, and nutrients); nutritional requirements for maintenance, growth, reproduction, and lactation; common nutritional and metabolic diseases.

BIO 440 CELL BIOLOGY (3 Hours)

Prerequisite: BIO 111 and CHEM 242.

Emphasis on the structure and function of cellular organelles; introduction to biochemical properties of proteins, carbohydrates, lipids, and nucleic acids; the genetic code and protein synthesis. (S)

BIO 441 HISTOLOGY (3 Hours)

Prerequisite: BIO 115 and 218.

Development and characteristics of cellular organization of tissues and organ systems. (F, Sum)

BIO 447 Introduction to Oceanography (3 Hours)

Prerequisite: BIO 112 (C or better) or SCI 201 (C or better) or CHEM 142 (C or better) or consent of the instructor.

This course provides a broad overview of the marine world. Students will learn about the geological, geographical, chemical, physical and biological factors that shape the marine environment. Lecture or laboratory to be taken during the same semester.

BIO 450 MARINE INVERTEBRATE ZOOLOGY (3 Hours)

An introductory course in entomology that covers diverse topics including insect structure and function, benefits and harm as related to humans. Emphasis is given to insects of medical and agricultural importance. Use of insecticides to control harmful insects and the impacts of insecticides on the environment is also addressed. (F, S)

BIO 451 INTRODUCTION TO IMMUNOLOGY (3 Hours)**BIO 461 INTRODUCTION TO VIROLOGY (3 Hours)**

An introduction to the types of viruses that infect humans, animals, and plants and bacteria, their mode of replication, mode of swiping cellular functions, human viral diseases and viral vaccines, and drug development, and the medical and economic significance of viral diseases in public health.

BIO 470 HUMAN PHYSIOLOGY (3 Hours)

Study of normal physiological processes in mammals with reference to abnormal conditions. (F)

BIO 475 ENDOCRINOLOGY (3 Hours)

Prerequisite: BIO 114, 115, CHEM 141 and 142.

An introduction to endocrine organs in animals, with major emphasis on roles of endocrine glands and their hormonal secretions in integration, control systems and metabolism. (S)

BIO 496 Cancer Biology (3 Hours)

Prerequisite: BIO 200/BIOL 200 (C or better grade), BIO 209/BIO 318 and BIOL 209/BIOL318 (C or better grade).

An introductory study to the principles of cancer to explore the cellular and molecule mechanisms that underlie cancer development.

BIOL 101 INTRO TO BIO SCI LAB (1 Hour)

Laboratory experience designed to re-enforce lecture materials in BIO 101. Primarily, the activities will involve the study of the basic principles in Biology including cell structures, metabolism, photosynthesis, genetics, etc. (F, S, Sum)

BIOL 103 ENVIRONMENTAL SCIENCE LAB (1 Hour)

Laboratories will consist of demonstrations of lecture materials as well as films and outside speakers relative to each week's topic. Field trips will be planned when appropriate. (F, S, Sum)

BIOL 111 GENERAL BIOLOGY LAB (1 Hour)

Prerequisite: Concurrent enrollment in BIO 111.

Laboratory experiments designed to study the principles of metabolism, photosynthesis, genetics and other principles basic to biology. (F, S, Sum)

BIOL 112 GENERAL BIOLOGY LAB (1 Hour)

Continuation of laboratory experiments begun in BIOL 111. Exercises will complement those topics covered in BIO 112. (F, S, Sum)

BIOL 115 GENERAL ZOOLOGY LAB (1 Hour)

Laboratory exercise involving the basic structure of protozoans through chordates. Laboratory must be taken with lecture (BIO 115). (F, S, Sum)

BIOL 119 GENERAL BOTANY LAB (1 Hour)

Laboratory exercises pertaining to plant morphology, plant taxonomy, plant physiology, and lower and higher plants are conducted. Laboratory must be taken with the lecture. (F, S, Sum)

BIOL 200 INTRO TO CELL BIOLOGY LAB (1 Hour)

Prerequisite: BIO112, C or better.

Designed to illustrate genetic principles through laboratory experiences. Studies on Drosophila and plant genetics are utilized. Must be taken with lecture.

BIOL 209 Principles of Genetics Lab (1 Hour)**BIOL 213 PRINCIPLES OF MICROBIOLOGY LAB (1 Hour)**

Methods for isolating pathogenic bacteria and determining their significant properties. Laboratory must be taken with lecture. (F, S, Sum)

BIOL 234 HUMAN ANATOMY & PHYSIOLOGY LAB (1 Hour)**BIOL 235 HUMAN ANATOMY & PHYSIOLOGY LAB (1 Hour)****BIOL 313 INTRODUCTION TO MICROBIOLOGY L (1 Hour)**

Laboratory designed to acquaint students with techniques for culturing and identifying bacteria and fungi. Must be taken with lecture. (F, S, Sum)

BIOL 318 INTRODUCTORY GENETICS LAB (1 Hour)

Prerequisite: BIO 111, 112, 115, and 119.

Designed to illustrate genetic principles through laboratory experiences. Studies on Drosophila and plant genetics are utilized. Must be taken with lecture. (F, S, Sum)

BIOL 395 Principles of Biochemistry Lab (1 Hour)

This course will cover the theory and practice of biochemical techniques commonly used in biochemical research. Basic techniques for the purification and/or analysis of biomolecules will include chromatographic, spectrophotometric, and electrophoretic methods of analysis as well as enzyme kinetics. (F, S, SUM)

BIOL 406 HUMAN ENVIRNMNT & NAT SYSM LAB (1 Hour)

Laboratory associated with pollution, energy, transportation, drugs, etc.

BIOL 413 PRINCIPLES OF HUMAN NUTRIT LAB (1 Hour)

Laboratory activities to develop techniques for diet evaluation, qualitative and quantitative analyses of food for protein, carbohydrates, fat and mineral content. (F, S)

BIOL 423 ECOLOGY LABORATORY (1 Hour)

Laboratory exercises on relationships among ecosystems. Must be taken with lecture. (F, S)

BIOL 425 INTRODUCTN TO MARINE BIOLOGY L (1 Hour)

Field trips, collection, preservation techniques, classification and identification of marine organisms with emphasis on structure of the marine environment. Must be taken with lecture. (F, S)

BIOL 440 CELL BIOLOGY LAB (1 Hour)

Prerequisite: BIOL 111 and CHML 242.

Experimentation to develop techniques for cell fractionation; introduction to spectrophotometry, electrophoresis and chromatography. (S)

BIOL 441 HISTOLOGY LAB (1 Hour)

Exercises studying the microanatomy of tissues and organ systems. Must be taken with BIO 441. (F, S, Sum)

BIOL 447 Introduction to Oceanography Lab (1 Hour)

Prerequisite: Must be taken with BIOL 447.

This course provides an introduction to oceanographic gear, its application methodology and sampling techniques; field work in practical applications.

BIOL 470 HUMAN PHYSIOLOGY LAB (1 Hour)

Use of instrumentation for diagnostic studies of normal physiological processes with reference to certain abnormal conditions. (F)