

DEPARTMENT OF BIOLOGY

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Faculty

Dr. H. A. Ahmad, Professor
 Dr. I. Farah, Professor
 Dr. B. Graham, Associate Professor
 Dr. C. Howard, Professor
 Dr. H. C. Huang, Assistant Professor
 Dr. N. Ibrahim, Assistant Professor
 Dr. R. Kafoury, Associate Professor
 Dr. R. Kulawardhana, Assistant Professor
 Dr. A. Mbemi, Assistant Professor
 Dr. K. Ndebele, Associate Professor
 Dr. F. Noubissi, Assistant Professor
 Dr. M. Pacurari, Associate Professor
 Dr. A. Patlolla, Assistant Professor
 Dr. J. Stevens, Professor
 Dr. Tammie Taylor, Assistant Professor
 Dr. Brent Thoma, Assistant Professor

Masters

- Biology (M.S.) (<https://jsums-public.courseleaf.com/graduate/college-science-engineering-technology/department-biology/biology-ms/>)

Doctoral

- Environmental Science (Ph.D.) (<https://jsums-public.courseleaf.com/graduate/college-science-engineering-technology/department-biology/environmental-science-phd/>)

Course Descriptions

BIO 501 ENVIRONMENTAL SCIENCE (3 Hours)

An introductory course for non-major graduate students dealing with the science of the environment and man's relationships through political, social, economic, and ethical processes.

BIO 506 HUMAN ENVIRONMENT & NATURL SYS (3 Hours)

Emphasis placed on fundamental problems that confront man from day to day. Topics among others for discussion are ecology, population, energy, food, transportation and land pollution.

BIO 507 BIOLOGY FOR ELEMENTARY TEACHER (3 Hours)

Prerequisite: None.

The application of biological procedures and techniques at the elementary school level with emphasis on selected topics in biology.

BIO 509 GENERAL GENETICS (3 Hours)

Prerequisite: ; Bio 318.

A study of the principal concepts of heredity to include the application of classical and modern genetics.

BIO 511 BIostatISTICS (3 Hours)

This course is designed for students in biological sciences with no advanced training in mathematics. Basic concepts in statistical methods and experimental techniques and their general applicability in biology will be stressed.

BIO 512 NATURAL RESOURCES & CONS (3 Hours)

A study of our natural resources with emphasis on their origin, properties, use and misuse and good conservation practices.

BIO 513 HUMAN NUTRITION (3 Hours)

Prerequisite: Bio 233 or 218 and CHEM 241.

Review of nutrient sources, requirements and deficiency diseases of man. Emphasis on nutritional metabolism under normal and pathological conditions, and current research.

BIO 515 MOLECULAR BIOLOGY (3 Hours)

Study of the structure, synthesis, isolation and interactions of macromolecules of biological interest.

BIO 517 MAMMALIAN PHYSIOLOGY (3 Hours)

BIO 523 ECOLOGY (3 Hours)

Prerequisite: Senior standing or consent of instructor.

A study of the tropic relationships and energy transfer in ecosystems.

BIO 530 ADVANCED MICROBIOLOGY (3 Hours)

Prerequisite: BIO 313; CHEM 242.

Special techniques for culturing microorganisms. Includes a survey of some of the important microbes in medicine, industry and public health.

BIO 531 INVERTEBRATE ZOOLOGY (3 Hours)

Prerequisite: BIO 114, CHEM 142.

Intended for students who wish to obtain a comprehensive knowledge of the invertebrates.

BIO 532 ADVANCED PARASITOLOGY (3 Hours)

Prerequisite: BIO 331; CHEM 142, 242.

The physiology of specific parasite and host-parasite relationships will be studied in great detail. Clinical specimens will be studied.

BIO 540 CELL BIOLOGY (3 Hours)

Prerequisite: BIO 111, 119 or 121, 313, and CHEM 241.

Study of cell anatomy as revealed by electron microscopy. Emphasis on bioenergetics, cell metabolism and current cell research.

BIO 550 IMMUNOLOGY & SEROLOGY (3 Hours)

The study of antibodies that are elicited in response to antigens and the difference between the protoplasm of one organism and another as reflected in the blood.

BIO 561 MOLECULAR VIROLOGY (3 Hours)

An introduction to the types of viruses that infect humans, animals, 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 570 HUMAN PHYSIOLOGY (3 Hours)

Prerequisite: BIO 115, CHEM 242.

The study of physiological processes related to the human. The physiological systems to be examined are: gastro-intestinal, renal, endocrine, neural, and reproductive.

BIO 575 ENDOCRINOLOGY (3 Hours)

Prerequisite: BIO 115, 218; CHEM 142, 242.

The basic fundamentals of endocrinology. The role of the endocrine glands and their products (hormones) in the maintenance of a constant internal environment in living organisms.

BIO 576 HISTOPATHOLOGY (3 Hours)

Prerequisite: BIO 115, 218, and 441.

Provides general consideration of the principal concepts of tissues and cellular pathology, with emphasis on human tissues and pathology. The course prepares students for further studies in medicine, dentistry, and allied health fields.

BIO 587 INDEPENDENT STUDY (2-4 Hours)

Prerequisite: Graduate standing in biology.

Students will elect a specific topic that is not covered in other biology courses. The student, working independently, will be required to submit a research paper that includes an exhaustive review of literature.

BIO 589 GRADUATE SEMINAR (1 Hour)

A course designed for survey of biological literature. The student will be required to prepare and present reports and assigned projects. Required of all students.

BIO 599 THESIS RESEARCH (1-6 Hours)

Thesis representing original research. (Required for M.S. students)

BIO 610 ENVIRONMENTAL MICROBIOLOGY (3 Hours)

The study of the roles of microorganisms in natural systems with attention given to the examination of nutrient cycles, methods of analysis of microbial biomass and activities as well as the functional roles of microorganisms.

BIO 615 PRINCIPLES OF BIOREMEDIATION (3 Hours)

This course uses modern knowledge in life sciences, as well as new developments in biotechnology to address important issues related to environmental clean-up of hazardous wastes. The nature of environmental pollution is reviewed, and basic concepts in molecular biology, biochemistry, and microbiology and plant physiology are applied to demonstrate the significance of bioremediation and phytoremediation in pollution control. Therefore, an emphasis is put on the use of biological methods and processes for the remediation of contaminated soils and water resources.

BIO 620 INDEPENDENT STUDY (1-6 Hours)

Students will elect a specific topic that is not covered in other biology courses. The student, working independently, will be required to submit a research paper that includes an exhaustive review of literature.

BIO 623 SYSMS BIO & SIGNALING NETWORKS (3 Hours)

The objectives of the Systems Biology course is to present methods for modeling and analyzing biological systems, in particular cellular systems. It is designed to cover intracellular processes, including enzymatic reactions, polymerization processes, gene expression, gene-environment interactions, and signal transduction. Also the course introduces mathematical modeling fundamentals, including deterministic models, including linear regression methods, explains the differences between linear and nonlinear regression, and illustrates how to determine input variables to improve estimation accuracy during experimental design. The material covers the process-function-behavior sequence in cells and illustrates how modeling and analysis of signal transduction units play a mediating role between process and function.

BIO 650 ANALYSIS OF HORMONE ACTION (3 Hours)

Prerequisite: Graduate status and consent of the instructor.

An analysis of the cellular mechanisms of hormone action. The role of target tissues, receptors, hormone analogs and, metabolic inhibitors in studies of hormone action will be discussed.

BIO 689 ADVD TPCS IN COMPUTATIONAL BIO (3 Hours)

The Advanced Topics in Computational Biology will introduce the students to data-driven models of molecular interaction networks and applications of discrete algorithms, data mining, and machine learning to the modeling and analysis of molecular interactions and computational disciplines in systems biology networks.

ENV 700 ENVIRONMENTAL SYSTEMS (3 Hours)

A groundwork of environmental science, environmental awareness and ecological literacy for the incoming Ph.D. students is presented. The environment and its living and non living components, and the interactions of these component areas studied. The course is set in a thermodynamic perspective and is based on a nested hierarchy of systems. Key concepts and principles that govern how we think the environment works are presented while learning how to apply these concepts to possible solutions of various environmental degradation, pollution and resource problems.

ENV 701 ENVIRONMENTAL CHEMISTRY (3 Hours)

Prerequisite: One year of general Chemistry and one year of organic chemistry.

Studies of the basic concepts of environmental chemistry; the nature of chemical compounds; organic and inorganic; chemical reactions; their effects, and fate of chemical species, in aquatic systems. This include: Studies of equilibrium phenomena of acids, bases, salts, complex compounds, and oxidation/reduction reactions. Studies of water pollution, environmental chemistry of water and its properties.

ENV 702 ENVIRONMENTAL HEALTH (3 Hours)

This course focuses on the impact of environmental problems on human health. Health issues related to water pollution/contamination by physical, chemical and biological agents; wastewater discharges; radiations; air pollution; municipal, and industrial wastes; food contamination; pesticides; occupational hazards; and vector-borne diseases are discussed.

ENV 710 ENVIRONMENTAL MICROBIOLOGY (3 Hours)

ENV 711 APPLIED ENVIRONMENTAL BIOSTATS (3 Hours)

Prerequisite: Biostatistics (Bio 511) or equivalent.

This course is designed as an applied, advanced biostatistics course for students in the Environmental Science Ph.D. Program. Students will learn how to apply important concepts and principles of environmental biostatistics in the conduct of their research, from the initial designing of experiments to proper data collection and analysis, inferences, interpretation of results in applied terms, reporting and presentation of the results. The statistical computer software (SAS) will be used to analyze and interpret results.

ENV 715 PRINCIPLES OF BIOREMEDIATION (3 Hours)

This course uses modern knowledges in life sciences, as well as new developments in biotechnology to address important issues related to environmental clean-up of hazardous wastes. The nature of environmental pollution is reviewed, and basic concepts in molecular biology, biochemistry, microbiology, and plant physiology are applied to demonstrate the significance of bioremediation and phytoremediation in pollution control. Therefore, an emphasis is put on the use of biological methods and processes for the remediation of contaminated soils and water resources.

ENV 717 INTRO TO REMOTE SENSING (3 Hours)**ENV 718 REMOTE SENSING APPLIED (3 Hours)****ENV 720 ENVNMNTL & OCCUPATION HEALTH (3 Hours)**

This course explores the relationship and impact of the environment to health and illness in human populations. An exploration of man-made and natural environmental hazards will be discussed. Environmental health and risk assessment will be discussed as well as interventions. Environmental policy and practices will be viewed from the public health perspective and include the study of energy, waste, environmental justice, and regulation.

ENV 721 SOLID WASTE MANAGEMENT & TREAT (3 Hours)

This course emphasizes on waste control methodologies for both municipal and industrial wastes including hazardous and nonhazardous waste under the Resource Conservation and Recovery Act (RCRA). The students are familiarized with environmental legislation regulating these wastes at state and federal levels. A thorough review is done on waste handling, transport, treatment technologies including chemical, physical, biological and thermal treatments, and disposal options such as land disposal of wastes. Waste minimization techniques such as source reduction and recycling are also discussed.

ENV 751 WATERQUALITY MANAGEMENT (3 Hours)

This course provides students with basic concepts and principles in Water Quality Management. The effects of organic, inorganic, biological and thermal pollutants/contaminants in various systems of the hydrologic cycle including streams, reservoirs, and estuaries; eutrophication; water quality criteria and standards; monitoring concepts; methods in water quality management; regulatory considerations; and non point source pollution control, are discussed.

ENV 755 AIR QUALITY MANAGEMENT (3 Hours)

This course provides students with basic concepts and principles of air quality management. Contaminant classification, pollutant sources, criteria pollutants, health effects, exposure and risk assessment are discussed. Pollutant measurements and air quality assessment techniques are considered with regard to atmospheric effects on dispersion and transport. Identification of, and control strategies for, stationary and mobile sources, and environmental regulations are studied, and indoor air quality considered.

ENV 780 ENVIRONMENTAL EPIDEMIOLOGY (3 Hours)

This course is designed to provide students with the basic knowledge and skills required to develop and apply epidemiologic principles and concepts to the study of adverse effects of various environmental factors on both human and ecological health. Emphasis is put on the study of the health effects of physical, chemical and biologic factors in the external environment, broadly conceived from the epidemiologic point of view. As such, it enables students to interpret epidemiological data and understand the approaches used in the epidemiologic investigations of acute and chronic diseases. The course also covers the basic methods and issues involved in epidemiologic investigation of disease conditions in human populations.

ENV 800 ENVIRONMENTAL TOXICOLOGY (3 Hours)

Prerequisite: ENV 701, ENV 702.

This course is designed to provide an overview of the basic principles and concepts of toxicology including : exposure characterization, dose-response relationship, kinetics and distribution of toxicants in a biological system; to understand the fate, behavior and toxicities of xenobiotic chemicals, and the mechanisms by which they affect cells and organs; and to identify the sources and discuss the effects of various groups of environmental toxicants including heavy metals, pesticides and other industrial byproducts.

ENV 801 RISK ASSESSMENT&MANAGMNT (3 Hours)

Prerequisite: ENV 800, MATH 700.

This course is designed to provide students with qualitative and quantitative skills necessary to evaluate the probability of injury, disease and death in humans and other life forms, from exposure to various environmental contaminants. Hazard identification, exposure assessment, dose-response evaluation and risk characterization are emphasized. Regulatory and technical aspects of risk assessment in the promulgation of public and environmental safety standards are discussed.

ENV 802 ENVIRONMENTAL PHYSIOLOGY (3 Hours)

This course provides students the basic concepts of homeostasis and adaptation to the environment. Discussions are designed to provide an understanding of the physiological responses to various types of pollutants in the different environmental systems including aerospace, hyperbaric, marine and terrestrial environments. Emphasis is placed on homeostatic responses at cellular, organ and organ system levels to various environmental stresses.

ENV 803 WETLAND ECOLOGY (3 Hours)

This course is designed to provide scientific knowledge for a better understanding of interactions between biological, physical and chemical components of wetlands. The structure and function of various types of wetlands; their biodiversity, biogeochemistry, and the impact of pollution on their ecological characteristics are discussed. Discussions are also done on how constructed wetlands can be used as water quality enhancers.

ENV 805 MEDICAL GEOLOGY (3 Hours)

This course is designed to provide students with qualitative and quantitative skills necessary to examine and understand the impacts of the natural geologic materials and processes on the prevalence, incidence and distribution of human (and other animal) diseases. The course focuses on the understanding of the nature and behavior of geological factors, and the examination of their impacts on health. Hence, the course will encompass major local, national and global health issues impacted by geological materials and/or processes. It will also encompass the interactions between human activities, geological factors, environment and health, as well as the innovative technologies that are used for the characterization and impact assessment of geologic materials on health.

ENV 900 SEMINAR (0.5 Hours)

This course focuses on contemporary issues in environmental health science. The student is expected to review, discuss, and present orally a report on a topic related to contemporary environmental issues. Topic areas for selection include (but not limited to): environmental biology, environmental chemistry, environmental microbiology, environmental toxicology, atmospheric science, water quality management, solid and hazardous waste management, computer modeling and remote sensing. Students are required to attend all scheduled seminars.

ENV 989 RESEARCH PROBLEMS (6 Hours)

ENV 999 DISSERTATION RESEARCH (1-6 Hours)

Original research in one of several subdisciplines in Environmental Science. Credit per academic session allowable is 1-6 hours. Student must produce, present and defend a document of publication quality.