BIOLOGY (BIO)

BIO 500 - Thesis Proposal Preparation (1.0 hour)
Designed to prepare students to write and present their graduate thesis proposal. The instructor will work with students to develop the appropriate timeline and give a general outline of relevant information for a thesis proposal and instruction on developing and giving presentations. Students will also be directed to the CITI site to complete an ethics training module. The student will work with the thesis advisor to develop and edit the thesis proposal. The course will serve as a mechanism to organize proposal development and presentation. Ultimate responsibility for student grade and confirmation of completion of the work will reside with the faculty advisor who will report to the instructor of record. It is intended that students will present their written proposal to their chosen thesis committee and present their thesis proposal orally to the committee and department at the end of the semester they are enrolled in this course.
Prerequisite: Graduate standing or consent of Graduate Advisor

BIO 502 - Biometry (3.0 hours)
Principles of biological measurement. Topics include the nature of data, sampling, experimental design, and statistical analysis.
Prerequisite: C or better in BIO 260, 261 or equivalent.

BIO 503 - Molecular Genetics (3.0-4.0 hours)
Molecular genetics is the study of the intricate control of cellular events such as DNA replication, transcription, and translation. Familiarizes students with the exciting and rapidly advancing field of molecular biology and with some of the techniques that are used by molecular biologists. Primary focus will be on eukaryotic organisms.
Prerequisite: C or better in BIO 310 (Genetics); permission of instructor.

BIO 505 - Topics in Bioethics (3.0 hours)
Topics in Bioethics aims to enlighten students to ethical issues in modern biology. This will be done through films, readings, discussions and student writing and presentations. Topics will include eugenics, medical ethics, implications of the human genome project, and genetically modified organisms.
Prerequisite: Junior standing with a GPA of 3.0 or higher. BIO 111 or BIO 151 recommended

BIO 506 - Advanced Microbiology (3.0 hours)
Comprehensive discussion of selected topics of current interest in microbiology, including microbial genetics, microbial growth, environmental microbiology, infectious diseases and immunity, and the exploitation of microorganisms by humans. Laboratory experiments will demonstrate and further explore techniques and ideas discussed in lecture. Students will discuss and critically analyze primary research literature that is complementary to topics discussed in lecture. Lab mandatory. Cross-listed as BIO 406.
Prerequisite: four semesters of biology with laboratory; organic chemistry; or consent of instructor. Students who have credit for BIO 406 may not enroll in BIO 506.

BIO 508 - Advanced Bacterial Pathogenesis (3.0 hours)
Basic bacterial cell biology and the human innate and adaptive immune systems. Focuses on and explores the cellular and molecular mechanisms used by bacterial pathogens to bypass the defenses of the body to cause infection in humans. Cross-listed as BIO 408.
Prerequisite: C or better in BIO 151 and BIO 152 or BIO 111 and BIO 113 or equivalent required. Junior standing in Biology or Chemistry with a GPA of 3.0 or higher or consent of instructor. Students with credit for 408 cannot enroll in 508.

BIO 509 - Human Genetics (3.0 hours)
Genetic theory and methodology applied to humans.
Prerequisite: C or better in BIO 310 or consent of instructor

BIO 517 - Environmental Physiology (3.0 hours)
Provides an understanding of the mechanisms that animals use to cope with environmental conditions, including extreme habitats, and habitat fluctuations. Lectures will focus on the physiology of metabolism, body temperature, respiration, osmoregulation, and nervous systems in both invertebrate and vertebrate animals from a broad range of habitats. Laboratory experiments will focus on the biochemical and organismal acclimations animals use to cope with fluctuations in temperature, oxygen, and salinity. Crosslisted with BIO 417.
Prerequisite: C or better in BIO 250, 251, and 252 (or equivalent)and senior or graduate standing; or consent of instructor. Students who have credit for BIO 417 may not enroll in BIO 517.

BIO 519 - Comparative Animal Behavior (3.0 hours)
Advanced content encompassing a wide variety of vertebrate and invertebrate species with emphasis on comprehension of primary literature and research. Cross-listed as BIO 419.
Prerequisite: 6 hours college-level biology and senior or graduate standing. Students with credit in BIO 419 cannot enroll in BIO 519.

BIO 520 - Advanced Ecosystems Ecology (3.0 hours)
A comprehensive description of ecosystem form and function with focus on biogeochemistry, food webs, and energy transformations within natural systems. Emphasis on application of ecosystem principles to sustainable land management and current issues such as global change and nitrogen deposition. Understanding of the complex nature of the systems emphasized through use of primary literature, small group discussion and individual projects. Cross-listed as BIO 420.
Prerequisite: C or better in BIO 250 and BIO 251 (or equivalent); CHM 116; MTH 115 or 121; graduate standing or consent of instructor. Students with credit in BIO 420 cannot enroll in BIO 520.

BIO 523 - Advanced Freshwater Ecology (3.0 hours)
The course will explore the major types of freshwater ecosystems and the interactions among physical, chemical, and biological processes that determine ecosystem structure and function. There will be an emphasis on water as a resource and the consequences of human activities, such as species introductions and pollution, on sustainable resource use. Lab will focus on skills needed for measuring key physical, chemical, and biological characteristics of freshwater ecosystems. Cross listed as BIO 423.
Prerequisite: C or better in BIO 250 and BIO 251 (or equivalent); CHM 116; MTH 115 or 121; graduate standing or consent of instructor. Students with credit in BIO 423 cannot enroll in BIO 523.

BIO 525 - Advanced Physiology (3.0 hours)
Detailed study of the structure and function of animals; special reference to the human body; theories and methods of investigation mostly at organ system level; adaptational strategies to special conditions.
Prerequisite: one semester of physiology or consent of instructor.

BIO 526 - Advanced Pathophysiology (3.0 hours)
Detailed presentation of pathological conditions in the human body, with particular focus on the cellular basis for disease in muscular, respiratory, renal, and cardiovascular systems.
Prerequisite: BIO 525 or concurrent enrollment, or consent of the instructor.

BIO 527 - Physiology of Anesthesia (3.0 hours)
Emphasis on the pharmacokinetics and pharmacodymanics of various anesthetic agents in the human body, with particular attention on the effect of the agents on the major physiological systems.
Prerequisite: BIO 525; consent of instructor.

BIO 530 - Plant Systematics (3.0 hours)
Evolution, classification, and characteristics of various flowering plant families.
Prerequisite: 6 hours college-level biology.

BIO 540 - Evolution (3.0 hours)
Advanced content in evolutionary history, the mechanisms of evolution, and how evolutionary theory forms the basis for all biology. In-depth examination of selected evolutionary topics utilizing discussions, primary literature, and student presentations. Cross-listed as BIO 440.
Prerequisite: Graduate standing or consent of instructor. Students who have credit for BIO 440 may not enroll in BIO 540.

BIO 550 - Conservation Biology (3.0 hours)
Advanced content on the preservation of biodiversity. In-depth examination of selected conservation issues utilizing case studies, field trips, discussions, primary literature, and student presentations. Cross-listed as BIO 450.
Prerequisite: graduate standing or consent of instructor. Students who have credit for BIO 450 may not enroll in BIO 550.

BIO 563 - Advanced Plant Ecology (3.0 hours)
Physiological and growth responses of plants to environmental stresses, and consequences to the structure and function of communities and ecosystems. Cross-listed as BIO 463.
Prerequisite: Graduate standing or consent of instructor. Students who have credit for BIO 463 may not enroll in BIO 563.

BIO 564 - Advanced Cell Biology (3.0 hours)
Structural and functional organization of cells and their dynamic interactions with the environment. Methods and techniques of investigation. Cross-listed as BIO 464.
Prerequisite: C or better in BIO 310, or consent of instructor. Students who have credit for BIO 464 may not enroll in BIO 564.

BIO 568 - Cellular and Molecular Immunology (3.0 hours)
Interaction between foreign antigen, antigen presenting cells, B lymphocytes, and T lymphocytes to mount immune responses. Molecules responsible for immune interactions. Random generation of the diversity of the immune response, its associated problems, and natural solutions through selection and energy. Lab required. Cross-listed as BIO 468.
Prerequisite: BIO 564 or equivalent, or consent of instructor. Students who have credit for BIO 396 or BIO 468 may not enroll in BIO 568.

BIO 570 - Seminar (1.0 hour)
Selected topics in biological sciences. May be repeated under different topics for a maximum of 3 credit hours.
Prerequisite: 3.0 grade point average in student's major; senior or graduate standing; consent of instructor.

BIO 575 - Special Graduate Topics in Biology (2.0-3.0 hours)
Selected graduate-level coursework in biology. May be repeated under different topics for a total of 6 credit hours.
Prerequisite: 3.0 grade point average in graduate-level biology program; or consent of instructor.

BIO 580 - Readings (1.0-3.0 hours)
Individual assignments of relevant topics in biological sciences.
Prerequisite: 3.0 grade point average in student's major; senior or graduate standing; consent of instructor.

BIO 582 - Endocrinology (3.0 hours)
Provides an understanding of how hormones regulate physiological systems and their role in endocrine disorders. Expert guest lectures from those in the field will provide supplementary content related to advanced topics. Cross-listed with BIO 482. For cross-listed undergraduate/graduate courses, the graduate level courses will have additional academic requirements beyond those of the undergraduate course. Students that have credit for BIO 382 or BIO482 may not enroll in BIO 582.
Prerequisite: C or better in BIO 250 (or equivalent); graduate standing or consent of instructor.

BIO 583 - Stem Cell Biology and Tissue Regeneration (3.0 hours)
Provides graduate students with an understanding of basic biology of stem cells including the role of stem cells in development and endogenous tissue regeneration. Cross-listed as BIO 483. Students that have credit for BIO 483 may not enroll in BIO 583.
Prerequisite: C or better in BIO 250 (or equivalent); graduate student standing or consent of instructor.

BIO 584 - Neurophysiology (3.0 hours)
An introduction to the basic principles of cellular and molecular neurobiology of the nervous system. General topics include cellular, molecular and developmental biology of nerve cells, synapses and neural systems. Cross-listed as BIO 484. Students with credit in BIO384 or BIO 484 cannot enroll in BIO 584.
Prerequisite: C or better in BIO 250 (or equivalent); graduate standing or consent of instructor.

BIO 585 - Research (1.0-6.0 hours)
Individual research for qualified students in special areas of biology.
Prerequisite: senior-graduate standing, consent of instructor, 3.0 grade point average in the major field of study.

BIO 681 - Readings (1.0-6.0 hours)
Readings in an area of interest to the student.
Prerequisite: graduate standing and consent of instructor.

BIO 683 - Research (1.0-6.0 hours)
Research in an area of interest to the student.
Prerequisite: graduate standing and consent of advisor.

BIO 699 - Thesis (0.0-6.0 hours)
Research and thesis preparation. Repeatable to a maximum of six hours of credit.
Prerequisite: consent of program coordinator.