

BIOLOGY (BIO)

BIO 101 - Diseases of Life (3.0 hours)

Core Curriculum: NS

Explores the science behind disease including the underlying biology, impact on students' daily lives, and accuracy of media coverage.

BIO 103 - The Biology of Sex (3.0 hours)

Core Curriculum: NS

Introduces the concept of sex as it relates to reproduction, gender, and evolution. Focus will include impact on students' daily lives, and accuracy of media coverage.

BIO 111 - Introduction to Cell Biology (3.0 hours)

Introduces the concept of biological molecules and discusses the role of these molecules in the genetics and cell biology of the organism.

Prerequisite: Education majors and allied health majors such as nursing, health science and dietetics. Biology minors can also enroll in this course with an approved Course Reserve Form.

BIO 112 - Introduction to Ecology and Evolution (3.0 hours)

Basic principles of evolutionary and ecological processes.

BIO 113 - Introduction to Cell Biology Laboratory (1.0 hour)

Emphasizes the concept of biological molecules and discusses the role of these molecules in the genetics and cell biology of the organism through inquiry based laboratory exercises.

Prerequisite: Allied health majors such as nursing, health science and dietetics. Biology minors can also enroll in this course with an approved Course Reserve Form.

BIO 114 - Introduction to Ecology and Evolution Laboratory (1.0 hour)

Emphasizes the basic principles of evolutionary and ecological processes through inquiry based laboratory exercises.

Corequisite: BIO 112

BIO 150 - Introduction to Biology (2.0 hours)

Introduces Biology majors to critical concepts in biological sciences on broad topics such as hypothesis testing, ethics in science, and use of humans and animals in research. Exposes students to faculty research in the Department of Biology, as well as provides exposure to invited research seminars.

Prerequisite: Biology major.

BIO 151 - Molecules to Cells (3.0 hours)

Introduces the concept of biological molecules and discusses the role of these molecules in the genetics and cell biology of the organism.

Prerequisite: Biology, chemistry or LSM major; permission of the instructor. Credit will not be given for both BIO 151 and BIO 111.

Corequisite: BIO 152 Molecules to Cells laboratory.

BIO 152 - Molecules to Cells Laboratory (1.0 hour)

Core Curriculum: WI

Emphasizes the concept of biological molecules and discusses the role of these molecules in the genetics and cell biology of the organism through inquiry based laboratory exercises.

Prerequisite: Biology, chemistry, or LSM major, or permission of instructor. Corequisite: BIO 151

BIO 153 - Introduction to Research Immersion (1.0 hour)

Emphasizes the skills and concepts required to be successful in research immersion in biology core courses. Designed for students that are transferring into the biology curriculum.

Prerequisite: Biology major

BIO 155 - Integration of Biological Concepts (1.0 hour)

An inquiry-based approach will be used to expose students to the skills necessary to integrate biological concepts across key content in sub-cellular and cellular biology.

Prerequisite: Biology, Biomedical Science or Environmental Science Major.

BIO 190 - Biology Freshman Scholars (1.0 hour)

Students that are invited to participate in this program will examine the unique and integrated nature of sub-organismal, organismal and supra-organismal sub-disciplines of the field of biology through discussions and demonstrations of the scientific method and experimental approaches used across breadth of biology. In the second semester students will continue discussion as a group and will begin to explore hands on research through research experiences with faculty mentors in their research lab.

Prerequisite: ACT score greater than or equal to 30, SAT score greater than or equal to 1340, or consent of chair.

BIO 202 - Microbiology and Immunology (4.0 hours)

Core Curriculum: NS

Basic bacteriology, parasitology, virology, genetics, and principles of infection and immune response. Emphasis on application to health and disease.

BIO 204 - Pathophysiology (3.0 hours)

Provides an understanding of human pathophysiology including dysfunction of the cardiovascular, respiratory, renal, and immune systems. The focus will be on understanding the abnormal physiology of the systems and how system dysfunction leads to disease states. Treatment options for various pathological conditions will be discussed.

Prerequisite: Transfer credit for BIO 230 and BIO 232. This course is for transfer students only.

BIO 230 - Human Anatomy and Physiology I (Lecture) (3.0 hours)

A comprehensive survey of human physiology and pathophysiology of the major organ systems of the body from a molecular and cellular perspective. To provide students with a combined understanding of all organ systems of the body and their integration in supporting homeostasis while providing insight into the disease process and how it disrupts normal physiology.

Prerequisite: C or better in BIO 111 or permission of department chair

BIO 231 - Human Anatomy and Physiology Laboratory I (1.0 hour)

Covers anatomical positions and gross anatomy of skeletal muscles, selected nerves, soft anatomy (including the digestive, respiratory, urogenital, excretory, and endocrine systems), systemic, pulmonary, and cardiac circulation, the hepatic portal system, and heart anatomy. Dissected specimens and human models are used.

Prerequisite: BIO 230 or concurrent enrollment

BIO 232 - Human Anatomy and Physiology II (Lecture) (3.0 hours)

A continuation of BIO 230 designed to provide students with a comprehensive understanding of human physiology and pathophysiology. Lectures will address the function of all major organ systems of the body from a molecular and cellular perspective. Students gain an understanding of organ system integration in supporting homeostasis and also of how the disease process interrupts physiological systems.

Prerequisite: C or better in BIO 111 and BIO 230 or permission of department chair.

BIO 233 - Human Anatomy and Physiology Laboratory II (1.0 hour)

Covers histology and function of the following tissues: integument, blood vessels, and muscle, connective, lymphoid, respiratory, excretory, digestive, endocrine, reproductive, and nervous tissues. Content includes axial and appendicular skeletal anatomy, brain anatomy and function, cardiac function, spirometry, and origin and activity of selected hormones. Gross anatomy and anatomical features are covered or reviewed from BIO 231. Dissected specimens and human models are used.

Prerequisite: BIO 230, 231, and 232 or concurrent enrollment in BIO 232

BIO 250 - Organismal Biology (4.0 hours)

Core Curriculum: WI

Basic functions and related anatomy of a variety of organisms at various levels of organization. With laboratory.

Prerequisite: CHM 110, 111; C or better in BIO 151.

BIO 251 - Ecology, Evolution and Biodiversity (3.0 hours)

An introduction to evolutionary and ecological processes and the diversity of life that these processes have generated.

Prerequisite: C or better in BIO 151 and BIO 152.

BIO 252 - Ecology, Evolution and Biodiversity Laboratory (1.0 hour)

An introduction to evolutionary and ecological processes and the diversity of life through inquiry based laboratory exercises.

Prerequisite: C or better in BIO 151

Corequisite: BIO 251

BIO 260 - Biological Statistics I (1.0 hour)

Introduction to statistics including basic skills for summarizing data, basic probability theory and probability distributions necessary to understand and evaluate variation in environmental systems.

Prerequisite: Biology, Biomedical Science or Environmental Science major; Biology Minor; or consent of instructor.

BIO 261 - Biological Statistics II (2.0 hours)

A follow-up to Biological Statistics I introducing hypothesis testing, and the use and interpretation of statistical analyses such as the T Test and analysis of variance.

Prerequisite: C or better in BIO 260; or consent of instructor.

BIO 280 - Directed Research (1.0-3.0 hours)

Individual reading and research projects for qualified underclassmen. Repeatable up to 3 semester hours. Pass/Fail.

Prerequisite: Advanced Placement biology credit, department placement test credit, or consent of chair.

BIO 300 - Population, Resources and Environment (3.0 hours)

Core Curriculum: MI,NS

Introduction to the fundamental principles of how the environment functions and how people interact with their environment. The emphasis will be on populations, resource use, pollution, disease and land-use and the associated ethical, economic and political concerns. The course is designed to integrate an understanding of the way in which people interact with their environment and use resources, the consequences of this interaction and mechanisms by which the impacts can be mitigated and sustainable systems achieved.

Prerequisite: Students with credit for ENS 110 may not enroll in BIO 300. Junior or senior standing, or sophomores by permission.

BIO 301 - Biotechnology and Society (3.0 hours)

Core Curriculum: NS

Various biotechnologies from medicine, agriculture, and industry; societal impacts of these technologies.

Prerequisite: Junior or senior standing, or sophomores by permission.

BIO 303 - Plants and People (3.0 hours)

Core Curriculum: NS

This course examines the interdependence of humans and plants.

Emphasis is on the plants that provide us with food, medicine, recreation, personal hygiene products and material goods as well as those that produce stimulating, intoxicating and psychoactive effects. Also included are the impacts of plants on human history, health and technology. Field trips will enrich the learning experience.

Prerequisite: Junior or senior standing, or sophomores by permission of instructor

BIO 304 - Ecology of Place (3.0 hours)

Core Curriculum: MI,NS

Provides a landscape level understanding of the ecological principles and environmental constraints that determine the characteristics of a specific location. Focus will also extend to the historical culture and human enterprise supported by that environment.

Prerequisite: Junior or senior standing, or sophomores by permission of instructor

BIO 310 - Genetics (3.0 hours)

Strengthens the understanding of Mendelian genetics and introduces the topic of non-Mendelian genetics. Modern molecular genetics concepts of DNA replication, transcription, and translation, primarily in prokaryotes, will be included. An introduction to molecular genetic techniques will be provided. The laboratory will include experiments designed to characterize genetic crosses through phenotypic as well as molecular approaches in prokaryotes and eukaryotes.

Prerequisite: CHM 110, CHM 111; C or better in MTH 115 or MTH 121; C or better in BIO 150, BMS 150 or CHM 292; BIO 151, BIO 152, and BIO 250; or consent of instructor.

BIO 311 - Genetics laboratory (1.0 hour)

The genetics laboratory will provide a demonstration of Mendelian genetics as well as an introduction into molecular genetic techniques through guided experiments as well as group research projects.

Laboratory exercises will demonstrate DNA cloning, sequencing, restriction digestion and the polymerase chain reaction. Additional experiments demonstrating other aspects of genetics, gene regulation and molecular biology will be employed.

Prerequisite: Enrollment in BIO 310 or consent of instructor.

BIO 312 - Developmental Biology (4.0 hours)

Descriptive chemical and experimental analysis of principles of development.

Prerequisite: BIO 310 with a C or better.

BIO 314 - Plant Development (4.0 hours)

Plant development will be covered from seed germination through establishing a plant body plan, including the maturation of all organs. Examples of molecular genetic control of plant development will be included as well as discussing the role of the environment on plant development.

Prerequisite: BIO 310 with a C or better.

BIO 323 - Comparative Anatomy (4.0 hours)

Gross anatomy; evolution of chordate structure.

Prerequisite: 6 hours college-level biology.

BIO 324 - Plant Diversity (4.0 hours)

Structure and function of the major groups of photosynthetic organisms in the context of evolutionary history.

Prerequisite: C or better in BIO 151 and 251.

BIO 334 - Reproduction and Identification of Flowering Plants (4.0 hours)

Evolution and ecology of flowering plant reproduction. Characteristics and identification of common flowering plant families of Illinois.

Prerequisite: C or better in BIO 151, 250 and 251.

BIO 341 - Personal Genomics (3.0 hours)

This course will explore issues in personal genomics and genealogy. The course will discuss the methods of obtaining personal genomic information and introduce them to interpretation of the results and how to obtain more information about themselves. Students will be encouraged to obtain their personal genomic information to explore or to use available information. Priority for enrollment will be given to students in the biology minor. The course will not count towards the biology major. Prerequisite: C or better in BIO 111 or BIO 151; C or better in BIO 112 or BIO 251; C or better in BIO 260 and BIO 261, or PSY 205, or EHS 310; or consent of the instructor.

BIO 343 - Cells and Genomes (3.0 hours)

The Human Genome Project, completed in 2001, ushered in a new era of biological research and understanding, as the relationship between DNA sequences and cellular functions became easier to study. The first half the course provides students a general background in genome structure and function, along with an advanced look at selected topics in cell biology. This knowledge will then be used as a basis to delve into detailed explanations of important health-related topics, including immune system function, cancer, and development. Priority for enrollment will be given to students in the biology minor. The course will not count towards the biology major.

Prerequisite: C or better in BIO 111, BIO 151, or equivalent; or permission from instructor.

BIO 345 - Virology (3.0 hours)

Provides molecular and clinical aspects of virus construction, infection, and replication in the host, transmission, evolution, etiology and epidemiology, immune response, and disease prevention and treatment. Other topics will include vaccine technology, emerging viruses, and potential bioterrorism agents. Students will coherently and thoroughly present selected viral pathogens. Priority for enrollment will be given to students in the biology minor. The course will not count towards the biology major.

Prerequisite: BIO 111 or BIO 151; Junior or senior standing; or permission of instructor.

BIO 347 - Our Microbial World (3.0 hours)

Microorganisms play an integral part in our daily lives. This course will explore the many ways in which microorganisms impact our everyday lives, including topics such as the impact of microorganisms on our health and infectious disease, the use of microorganisms for the fermentation of food, the impact of microorganisms on food preservation and spoilage, the use of microorganisms in biotechnology, and the impact of microorganisms on the environment and agriculture. Priority for enrollment will be given to students in the biology minor. The course will not count towards the Biology major.

Prerequisite: BIO 111 or BIO 151; or consent of instructor.

BIO 351 - Human Histology (3.0 hours)

Students will expand upon their basic knowledge of cell structure by examining the various cell types found in the human body. Emphasis will be placed on how cell structure varies between tissue types and how structure determines function. In addition, students will understand how each tissue type develops and what occurs during tissue damage and repair. Priority for enrollment will be given to students in the biology minor. The course will not count towards the Biology major.

Prerequisite: C or better in BIO 111 or BIO 151; or consent of instructor

BIO 353 - Human Physiology and Pharmacology (3.0 hours)

Prepares students interested in post-graduate medical or medically-affiliated programs with increased exposure to human physiology and pharmacology. Physiology, broadly defined, is the study of the functionality of cells, organs, organ systems, and the organism, and homeostatic balance. Pharmacology is defined as the study of substances that interact with living systems through chemical processes. This course will focus on the physiological effects of drugs on a variety of physiological systems. Priority for enrollment will be given to students in the biology minor. The course will not count towards the biology major.

Prerequisite: C or better in BIO 230 and BIO 232, or BIO 250, or consent of instructor.

BIO 355 - Soil Biology (3.0 hours)

Focuses on the role of soil microbes in the structure and functioning of ecosystems. Includes discussions of the characteristics of soil microorganisms and the way in which they interact with their environment. Hands-on activities will focus on skills needed for soil sampling, identification of organisms, and determining rates of C and N processing. Soils are essential for human health through the role they play in plant production and ecosystem services. Priority for enrollment will be given to students in the biology minor. The course will not count towards the biology major.

Prerequisite: C or better in BIO 112 or BIO 251 or consent of instructor.

BIO 358 - Research Exploration in Biology (1.0-3.0 hours)

Students enrolled in the class will see first-hand how biology research is conducted and how biology research informs our daily lives. Many of the decisions made in medicine, policy, law, etc. are currently being made based on the research conducted by biologists. This course will allow students insight to the realities of scientific research. Students that are seeking a biology minor or increasing their depth of understanding of research would benefit from this course. Under the direction of a faculty mentor, students will be exposed to the research processes, hypothesis formulation, data collection, analysis, interpretation, and presentation of research results.

Prerequisite: 2.75 grade point average in students major and consent of instructor.

BIO 359 - Current Topics in Biology (2.0-8.0 hours)

Provides students with an understanding of a content area of Biology that they cannot experience through any course currently offered in biology at the level appropriate for the minor. The courses will be organized, taught, and graded in a manner that is consistent with the other courses offered for the Biology Minor and as consistent with the practice of the Biology Department. Priority for enrollment will be given to students in the biology minor. BIO 359 will not count towards the biology major.

Prerequisite: C or better in BIO 111 and BIO 112; Biology minor or consent of instructor

BIO 361 - Microanatomy (4.0 hours)

Organs, tissues, and cells of animals: ultrastructure and relation to function.

Prerequisite: 6 semester hours of college-level biology or two years of high school biology; physical or natural science major or consent of instructor.

BIO 371 - Invertebrate Zoology (4.0 hours)

Detailed biological survey of major invertebrate phyla and their evolutionary relationships. Emphasis will be placed on organism physiology and ecology. Students will gain knowledge in invertebrate morphology and classification through dissection of representative animals. Lecture and laboratory. Cross listed as GES 302.

Prerequisite: C or better in BIO 151, and BIO 251 (or equivalent); or consent of instructor.

BIO 381 - Comparative Animal Physiology (3.0-4.0 hours)

Fundamental concepts of mechanisms employed by various animal groups to satisfy functional requirements for living. Physiological differences and similarities. Four hours if taken with lab.

Prerequisite: CHM 116, 252, 253; C or better in BIO 250.

BIO 385 - Supervised Research (0.0-3.0 hours)

Core Curriculum: EL

Supervised research for qualified students in special areas of biology. May be repeated for a total of 6 credit hours.

Prerequisite: 2.75 grade point average in student's major and sophomore standing; or consent of instructor

BIO 406 - General Microbiology (4.0 hours)

Distinguishing features of microorganisms: structure, function, and their underlying basis, genetics. Microbial growth and death. Phylogeny of microbes and horizontal gene transfer. Infectious diseases and immunity. Exploitation of microbes by humans. Lab mandatory. Cross-listed as BIO 506.

Prerequisite: C or better in BIO 151 and CHM 110.

BIO 408 - Bacterial Pathogenesis (3.0-4.0 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. Laboratory optional. Cross-listed as BIO 508.

Prerequisite: C or better in BIO 151 and BIO 152 or BIO 111 and BIO 113.

BIO 417 - Environmental Physiology (3.0-4.0 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 517.

Prerequisite: C or better in BIO 250, 251, and 252 (or equivalent); or consent of instructor.

BIO 419 - Ethology (4.0 hours)

Development and evolution of animal behavior in individuals and social groups from various phyla. Cross-listed as BIO 519.

Prerequisite: C or better in BIO 151, BIO 250 and BIO 251.

BIO 420 - Ecosystem Ecology (4.0 hours)

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. Cross-listed as BIO 520.

Prerequisite: C or better in BIO 250 and BIO 251 (or equivalent); CHM 116; MTH 115 or 121; or consent of instructor.

BIO 423 - Freshwater Ecology (4.0 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 523.

Prerequisite: C or better in BIO 250 and BIO 251 (or equivalent); CHM 116; MTH 115 or 121; or consent of instructor. Students with credit for BIO 523 will not be allowed to enroll in BIO 423.

BIO 430 - Soil Ecology (3.0 hours)

The role of soils and soil microbes in the structure and functioning of ecosystems. Focus will include current principles and best management practices for long-term sustainability. The laboratory experience will explore soil chemistry and biology as related to land use practices.

Prerequisite: C or better in BIO 250, 251, and 252 (or equivalent); CHM 116; or consent of instructor.

BIO 440 - Evolution (3.0 hours)

Mechanisms of evolution, historical evolution, and history of evolutionary thought. Cross-listed as BIO 540.

Prerequisite: C or better in BIO 151, BIO 250, BIO 251 and 310; MTH 115 or 121.

BIO 450 - Conservation Biology (3.0 hours)

Conservation biology is a multidisciplinary field that focuses on the preservation of biological diversity. Class work emphasizes conservation values and ethics, patterns of biodiversity, threats to biodiversity, and management strategies at the population, species, and ecosystem levels. Active learning activities include discussions of case studies, stakeholder meetings, field trips to observe local conservation issues and work, and guest presentations by conservation professionals. Cross-listed as BIO 550.

Prerequisite: C or better in BIO 151, BIO 250 and BIO 251.

BIO 460 - Ecology (4.0 hours)

Interrelationships among animals, plants, and their environment: ecosystems, biotic communities, population changes, and applied ecology.

Prerequisite: MTH 115 or 121; C or better in BIO 250 and BIO 251 (or equivalent); or consent of instructor.

BIO 463 - Plant Ecology (4.0 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 563.

Prerequisite: C or better in BIO 151, BIO 250 and BIO 251 (or equivalent); or consent of instructor.

BIO 464 - Cell Biology (3.0-4.0 hours)

Structural and functional organization of cells and their dynamic interactions with the environment. Methods and techniques of investigation. Cross-listed as BIO 564.

Prerequisite: C or better in BIO 310, CHM 252, and CHM 253.

BIO 468 - Immunology of Host Defense (3.0-4.0 hours)

Immune response to foreign challenges. Immunologically important molecules and cells; their formation, generation of diversity, and interaction within specialized tissues to mount and regulate an immune response. Contemporary and classical tools and strategies for investigating immunity and their application to other fields. Anomalous immune responses and resultant diseases. Lab optional. Cross-listed as BIO 568. Course is not open to those students with BIO 396 credit. Prerequisite: C or better in BIO 151 and CHM 110, or consent of instructor.

BIO 470 - Seminar (0.0-1.0 hours)

Selected topics in biological sciences. May be repeated under different topics. Repeatable to a maximum of six hours. Prerequisite: 2.0 grade point average in student's major; junior or senior standing; or consent of instructor.

BIO 475 - Special Topics Biol (2.0-4.0 hours)

Selected coursework in biology. May be repeated under different topics for a total of 8 credit hours. Prerequisite: 2.75 grade point average in student's major and junior standing; or consent of instructor.

BIO 480 - Readings (1.0-3.0 hours)

Individual assignments of relevant topics in biological sciences. Prerequisite: 2.75 grade point average in student's major; junior or senior standing; consent of instructor.

BIO 482 - Endocrinology (3.0 hours)

Provides an understanding of how hormones control the physiological systems of the body. Lectures will include definitions of hormones and hormone types, regulation of hormones and their receptors, classes of hormones, signal transduction and regulation of intracellular messengers, growth factor receptors, and nuclear receptors. Additional lecture topics will include growth hormones, prolactin, neurotrophic factors, hematopoietic growth factors and cytokines. Cross-listed with BIO 582. Students that have credit for BIO382 or BIO582 may not enroll in BIO 482. Prerequisite: C or better in BIO 250 or consent of instructor.

BIO 483 - Stem Cell Biology and Tissue Regeneration (3.0 hours)

Provides an understanding of basic biology of stem cells including the role of stem cells in development and endogenous tissue regeneration. Cross-listed as BIO 583. Students that have credit for BIO 583 may not enroll in BIO 483. Prerequisite: C or better in BIO 250 (or equivalent); or consent of instructor.

BIO 484 - Neurophysiology (3.0-4.0 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. Laboratory optional. Cross-listed with BIO 584. Students that have credit for BIO384 or BIO584 may not enroll in BIO 484. Prerequisite: C or better in BIO 250 or consent of instructor.

BIO 485 - Research (0.0-6.0 hours)

Core Curriculum: EL
Individual research for qualified students in special areas of biology. Prerequisite: 3.0 grade point average in student's major; either a minimum of 3 credit hours in BIO 385 or senior standing; or consent of instructor

BIO 490 - Biology Capstone (1.0 hour)

Core Curriculum: EL
Students will apply the skills and knowledge developed in the Biology major to complete collaborative projects with guidance from a team of faculty. Required for all Biology majors. Prerequisite: Senior standing (junior standing with consent of chair).

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 pharmacodynamics 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.