

# BIOLOGY (BIOL)

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## **BIOL 1401. Environmental Science. 4 Hours. [TCCN: ENVR 1401]**

A general course designed to cover all areas relating to contemporary environmental issues. Topics may include air, water, and soil pollution; biodiversity, climate change; agriculture; pesticides; population growth; and energy. This course is designed for non-science majors to help them meet their General Education science requirement and as a required course in the Environmental Science degree. Includes a two-hour lab. BIOL 1401 cannot be applied to either a major or a minor in Biology. Fall, Spring, Summer.

**Prerequisite:** Demonstrated college-level readiness in reading, writing, and math.

## **BIOL 1406. General Biology I. 4 Hours. [TCCN: BIOL 1406]**

Students examine the chemical basis of life, the structure and biology of the cell, molecular biology, genetics, and mechanisms of evolution. This course is one of two introductory courses (BIOL 1406 and BIOL 1407) which comprise a two-semester survey of modern biology. The course requires a 3 hour laboratory that is concurrently taken with the course. Fall, Spring, Summer.

**Prerequisite:** Demonstrated college-level readiness in reading, writing, and math.

## **BIOL 1407. General Biology II. 4 Hours. [TCCN: BIOL 1407]**

Students undertake a detailed survey of the major phylogenetic lineages. This includes a comparison of the systems of different organisms, the ecological roles and relationships of organisms, and their behavior. This course is one of two introductory courses (BIOL 1406 and BIOL 1407) which comprise a two-semester survey of modern biology. The course requires a 3 hour laboratory that is concurrently taken with the course. Fall, Spring, Summer.

**Prerequisite:** Demonstrated college-level readiness in reading, writing, and math.

## **BIOL 1408. Contemporary Biology. 4 Hours. [TCCN: BIOL 1408]**

This course is a presentation for the non-science major of contemporary hypotheses and the unifying principles of biology, including but not limited to: the scientific method and hypothesis testing, the definition of life, cell theory, the central dogma of biology (transcription of DNA to RNA to protein), genetic regulation and heredity, metabolism and homeostasis, organismal evolution, biodiversity, and ecology. The class builds scientific literacy and critical thinking skills for use in everyday life. Credit in BIOL 1408 as a laboratory science is contingent upon completion of the laboratory section. This course is designed for non-science majors to help them meet their General Education science requirement and cannot be applied to either a major or minor in Biology. Includes a two-hour lab. Fall, Spring, Summer. >b> .

## **BIOL 1411. General Botany. 4 Hours. [TCCN: BIOL 1411]**

Students are study general principles of botany. Emphasis is placed on morphology, taxonomy, genetics, physiology, and ecology of plants in an evolutionary and ecological context. Students may begin sequence with either BIOL 1411 or BIOL 1413. Includes a three-hour lab. Fall, Spring, Summer.

**Prerequisite:** Demonstrated college-level readiness in reading, writing, and math.

## **BIOL 1413. General Zoology. 4 Hours. [TCCN: BIOL 1413]**

Students study general principles of zoology in an evolutionary context. Emphasis is placed on the anatomy, behavior, and ecology of animals. Students are introduced to evolutionary and ecological principles of biology. Students may begin sequence with either BIOL 1411 or BIOL 1413. Includes a three-hour lab. Fall, Spring, Summer.

**Prerequisite:** Demonstrated college-level readiness in reading, writing, and math.

## **BIOL 1436. Foundations Of Science. 4 Hours.**

The course focuses on the nature of science as a reliable method of acquiring knowledge about the natural world. Students will learn how to apply key scientific facts, concepts, laws and theories to distinguish science from non-science, bad science, and pseudoscience by analyzing a variety of claims and case studies. By employing an innovative, interdisciplinary approach to science education, this course is designed to increase science literacy and critical thinking skills for introductory-level students. This course is designed for non-science majors to help them meet their General Education science requirement and cannot be applied to either a major or a minor in Biology. Students must enroll concurrently in the corresponding lab for this course. Includes a two-hour lab. Fall, Spring, Summer.

## **BIOL 2110. Being a Professional Biologist. 1 Hour.**

Students explore the biological sciences as a profession and gain proficiency in the skills required of successful professional biologists. Content areas in this seminar course may include career exploration, retrieval and use of scientific literature, bibliographic procedures, critical evaluation of claims, scientific professionalism, and locating/using campus resources.

**Prerequisite:** Minimum grade of C in BIOL 1411 and BIOL 1413 or BIOL 1406 and BIOL 1407.

## **BIOL 2401. Human Anatomy. 4 Hours. [TCCN: BIOL 2401]**

This course deals with structure and form of the human body. It includes studies of cells, tissues, and organ systems. Registration is primarily for students in prenursing or majors in kinesiology or health. Two-hour laboratory. Fall, Spring, Summer as needed. Credit in this course cannot be applied to either a major or minor in Biology.

**Prerequisite:** Demonstrated college-level readiness in reading, writing, and math.

**BIOL 2402. Human Physiology. 4 Hours.**

This course will help students identify and understand the function of several important human organ systems and how these systems maintain homeostasis. Topics and the mechanisms involving circulation, digestion, metabolism, muscle action and respiration will receive the most emphasis. This course is designed to emphasize a clinical knowledge of physiology and techniques required by students studying nursing, physical therapy, and related health fields. Two-hour laboratory. Fall and Spring. Demonstrated college-level readiness in reading, writing, and math.

**Prerequisite:** Minimum grade of C in BIOL 2401 and CHEM 1406 or CHEM 1306 and CHEM 1106 or CHEM 1411 or CHEM 1311 and CHEM 1111.

**BIOL 2403. Human Anatomy & Physiology I. 4 Hours. [TCCN: BIOL 2401]**

This course is the first course in a two-semester sequence that examines the systems of the human body using an integrated approach. Emphasis will be given to the study of cells and tissues, and the anatomical and physiological interrelationships of the skeletal, muscular, and nervous systems and special senses. Laboratory exercises will enhance the student's appreciation and comprehension of the biological concepts of structure and function of the human body.

**Prerequisite:** Demonstrated college-level readiness in reading, writing, and math.

**BIOL 2404. Human Anatomy & Physiology II. 4 Hours.**

This course is the second course in a two-semester sequence that examines the systems of the human body using an integrated approach. Emphasis is placed on the study of the following systems: endocrine, cardiovascular, lymphatic and immune, respiratory, digestive, urinary, and reproductive. In addition this course requires in-depth application of topics related to cellular function and metabolism and of organ systems studied during Human Anatomy and Physiology I. Laboratory exercises will enhance the student's appreciation and comprehension of the biological concepts of structure and function of the human body.

**Prerequisite:** Minimum grade of C in BIOL 2403 and demonstrated college-level readiness in reading, writing, and math.

**BIOL 2420. Intro Applied Microbiology. 4 Hours. [TCCN: BIOL 2420]**

An introduction to microorganisms, their morphology, growth requirements, methods of culture, and the manner in which they affect health. Reactions of the body toward pathogenic organisms and the principles of immunity and chemotherapy are considered. Two-hour laboratory. Fall, Spring. Credit in this course cannot be applied to a major or minor in Biology.

**Prerequisite:** Minimum grade of C or better in BIOL 2403 and BIOL 2404, and CHEM 1411 or CHEM 1406.

**BIOL 2440. Introductory Cell Biology. 4 Hours.**

An introduction to the study of cells, including scientific method, biochemistry, metabolism, cell energetics, membranes, cellular evolution, DNA, protein synthesis, the cytoskeleton, cell division, and the cellular basis of inheritance, with emphasis on the development of problem solving skills. Three-hour laboratory. Fall, Spring, Summer.

**Prerequisite:** Minimum grade of C in BIOL 1411, BIOL 1413, and CHEM 1411.

**BIOL 2441. Forensic Biology Concepts. 4 Hours.**

Students examine general biological concepts that apply to forensic science and learn the foundations of biology as they apply to legal investigations. Course topics may include the abiotic and biotic influences of decomposition; techniques in studying human remains; the analysis of blood tissues, fluids, and wounds; principles of DNA analysis, and molecular biology as applied to forensics; and wildlife forensics. The course requires a 3 hour laboratory that is taken concurrently with the course. Fall, Spring.

**Prerequisite:** Minimum grade of C in BIOL 1406, BIOL 1407; CHEM 1411.

**BIOL 3320. Sustainability & Environment. 3 Hours.**

Students investigate and assess the impacts that human activity can have on the environment and will seek to identify innovative, cross-disciplinary solutions to many of the world's most pressing environmental challenges. Given that Sustainability Science involves making decisions and taking actions that are in the interest of protecting the natural world, course topics will include current sustainability issues related to population growth, agriculture, natural resources, energy usage, habitat degradation and ecological economics. This course is typically be offered every other fall semester. Also offered as GEOG 3320.

**Prerequisite:** BIOL 1401.

**BIOL 3364. Plant Taxonomy. 3 Hours.**

A study of the characteristics and classification of plants emphasizing systematic techniques. Focus on identification of the more common plant families allows transfer of knowledge to other regions of the country and world. Two-hour laboratory. Spring.

**Prerequisite:** Minimum grade of C in BIOL 1411 and BIOL 1413 or BIOL 1406 and BIOL 1407.

**BIOL 3390. Science Teaching Methods. 3 Hours.**

In this course, students seeking the Composite Science teaching certification for the 7th through 12th grade level examine topics related to science teaching pedagogies. Topics include relevant concepts and literature regarding the nature of science, the planning and implementation of scientific investigations and activities, theory-grounded lesson construction and implementation, the use of equipment and technology, and the implementation of safety practices in laboratory settings.

**Prerequisite:** BIOL 1413, BIOL 2440, CHEM 1411, CHEM 1412, GEOG 1401, GEOL 1403, GEOL 1404, PHYS 1301/1101, PHYS 1302/1102 or instructor approval.

**BIOL 3409. General Ecology. 4 Hours.**

A study of physical and biotic components of the environment, responses of organisms to their environment and each other. The course covers organismal, population, community, and ecosystem ecology. The application of ecological principles via field studies is an integral part of the laboratory. Three-hour laboratory and field work. Fall, Spring.

**Prerequisite:** Minimum grade of C in BIOL 1411 and BIOL 1413 or BIOL 1406 and BIOL 1407.

**BIOL 3410. Human Biology. 4 Hours.**

This course deals with the study of structure and function of the human body. The structure of various organ systems are discussed and their function as organs and systems described. Three-hour laboratory. Offered as needed.

**Prerequisite:** Minimum grade of C in (BIOL 1411, BIOL 1413, and BIOL 2440) or (BIOL 1406 and BIOL 1407).

**BIOL 3420. Comparative Vertebrate Anatomy. 4 Hours.**

A study of representative vertebrates, their anatomy, ontogeny, and phylogeny. Three-hour laboratory. Fall.

**Prerequisite:** Minimum grade of C in BIOL 1411 and BIOL 1413 or BIOL 1406 and BIOL 1407.

**BIOL 3430. Plant Physiology. 4 Hours.**

General course dealing with principal life processes of plants. Topics include photosynthesis, respiration, nutrition, flowering, dormancy, hormones, growth, and development. Writing enhanced. As needed. Four hours lecture per week. Demonstrated college-level readiness in reading, writing, and math.

**Prerequisite:** Minimum grade of C in BIOL 1311, BIOL 1111, BIOL 1313, BIOL 1113, BIOL 2440, CHEM 1311, CHEM 1111 or CHEM 1411 and CHEM 1312, CHEM 1112 or CHEM 1412.

**BIOL 3440. General Physiology. 4 Hours.**

The study of the primary mechanisms by which autotrophic and heterotrophic organisms function. Important fundamental aspects of cellular, regulatory, and systemic physiology are presented emphasizing the functional aspect of living systems at the cellular and molecular level. Students are expected to develop an integrate understanding of the areas presented and recognize the interdependence of these mechanisms in the maintenance of homeostasis. Three-hour laboratory. Spring.

**Prerequisite:** Minimum grade of C in (BIOL 1411, BIOL 1413 and BIOL 2440) or (BIOL 1406 and BIOL 1407), and CHEM 1411, CHEM 1412, CHEM 2323, CHEM 2123.

**BIOL 3450. Introductory Genetics. 4 Hours.**

Study is made of the physical basis of inheritance and principles of heredity and variation. Topics include Mendelian genetics, cytogenetics, molecular basis of genetics, gene expression and regulation, and DNA technologies. Two-hour laboratory. Writing enhanced. Fall, Spring, and Summer as needed.

**Prerequisite:** Minimum grade of C in (BIOL 1411, BIOL 1413 and BIOL 2440) or (BIOL 1406 and BIOL 1407), and CHEM 1411, CHEM 1412.

**BIOL 3460. Pathophysiology. 4 Hours.**

A study of basic physiological systems and underlying system dysfunctions associated with human disease processes across the life span. Relationships between etiologic agents and their consequence to human form and function will be stressed. Critical thinking processes integrating symptoms, treatment and prognosis will be applied to physiological perspectives. Four hours lecture per week. Fall and Summer as needed.

**Prerequisite:** Minimum grade of C in (BIOL 1411, BIOL 1413, and BIOL 2440) or (BIOL 1406 and BIOL 1407).

**BIOL 3461. Wildlife Biology. 4 Hours.**

The history and basic principles, philosophy and concepts of wildlife management as they relate to habitats, people, and the problems associated with their interactions. Three-hour laboratory and field work. Spring.

**Prerequisite:** Minimum grade of C in BIOL 1411 and BIOL 1413, or BIOL 1406 and BIOL 1407, and BIOL 3409.

**BIOL 3470. General Microbiology. 4 Hours.**

An introduction to microorganisms including bacteria, viruses, and fungi. Major areas considered are morphology, physiology, genetics, and pathology. Microorganisms are studied in relation to soil, water, food, industrial processes, and disease. Three-hour laboratory. Fall, Spring, and Summer as needed.

**Prerequisite:** Minimum grade of C in (BIOL 1411, BIOL 1413, and BIOL 2440) or (BIOL 1406 and BIOL 1407), and CHEM 1412.

**BIOL 3480. Developmental Biology. 4 Hours.**

A study of the genetic control of cell growth, differentiation, and morphogenesis in the formation of tissues, organs, and anatomy of a living organism, with emphasis on embryonic development and the evolutionary conservation of developmental mechanisms.. Three-hour laboratory. Writing enhanced. Even year, Fall.

**Prerequisite:** Minimum grade of C in (BIOL 1411, BIOL 1413, and BIOL 2440) or (BIOL 1406 and BIOL 1407) and BIOL 3450.

**BIOL 3490. Histology. 4 Hours.**

A study of animal tissues with emphasis on human materials. Identification and preparatory techniques are stressed. Three-hour laboratory. Spring.

**Prerequisite:** Minimum grade of C in (BIOL 1411, BIOL 1413, and BIOL 2440) or (BIOL 1406 and BIOL 1407), and CHEM 1412.

**BIOL 3492. Plant Morphology. 4 Hours.**

Survey of the plant kingdom with emphasis on morphogenesis, comparative structure and life cycles of representative plant forms. Three-hour laboratory. Fall, Summer.

**Prerequisite:** Minimum grade of C in BIOL 1411, BIOL 1413, and BIOL 2440.

**BIOL 4080. Field and Experiential Biology. 1-3 Hours.**

This course provides students with a first-hand, off-campus, opportunity to experience biology in a specialized setting. Potential settings include both domestic and international sites, and may consist of particular ecological regions, biological reserves, field data collection sites, laboratories, and clinics. Variable Credit (1 to 3).

**Prerequisite:** Approval of Instructor.

**BIOL 4095. Undergrad Rsrch Tpcs-Biology. 4 Hours.**

This course is designed to allow selected, advanced students in specific areas of biology to participate directly in biological research. The research project will be developed jointly by the student and a faculty mentor, and must be pre-approved by the Chair of the Department of Biological Sciences. Variable Credit (1-4). Demonstrated college-level readiness in reading, writing, and math. This course may be taken for Academic Distinction Credit. See Academic Distinction Catalog Program in this Catalog.

**Prerequisite:** Biology major, minimum Junior standing.

**BIOL 4096. Spcl Topics In Undergrad Bio. 1-4 Hours.**

This course of faculty-led study is designed to provide exposure of undergraduate students to new biological topics and concepts in a course setting, prior to that course's formal Department, College, and University course adoption. This course may be repeated for different Special Topics (different courses). Variable Credit (1-4). Demonstrated college-level readiness in reading, writing, and math. This course may be taken for Academic Distinction Credit. See Academic Distinction Catalog Program in this Catalog.

**Prerequisite:** Biology major, minimum Junior standing.

**BIOL 4110. Undergraduate Seminar. 1 Hour.**

Discussions of current literature in the biological sciences. Required of senior Biology majors. Fall, Spring. Demonstrated college-level readiness in reading, writing, and math.

**Prerequisite:** Biology major, Senior standing.

**BIOL 4111. Undergraduate Seminar. 1 Hour.**

Discussions of current research presented by faculty participating in the Department of Biological Sciences weekly seminar series. Demonstrated college-level readiness in reading, writing, and math.

**Prerequisite:** Biology major, Senior standing.

**BIOL 4306. Philosophy Of Biology. 3 Hours.**

This course will help the student understand the philosophical issues associated with defining and applying theoretical terms and constructs within evolutionary biology. Even year, Spring. of Advanced Biology.

**Prerequisite:** Minimum grade of C in (BIOL 1411, BIOL 1413, and BIOL 2440) or (BIOL 1406 and BIOL 1407), and 8 hrs.

**BIOL 4320. Environmental Toxicology. 3 Hours.**

(Also listed as ENVR 4320). This course presents basic toxicology as a qualitative and quantitative science of the effects of poisons (toxins) upon the environment, individuals, and populations. The course will also provide a comparison of the toxicology of human and other species' exposure to common environmental contaminants. Two one-hour lectures and one two-hour laboratory as needed.

**Prerequisite:** (BIOL 1411, BIOL 1413, and BIOL 2420) or (BIOL 1406 and BIOL 1407), and (8 hrs of Advanced Biology and MATH 3379) or BIOL 4374.

**BIOL 4330. Aquatic Biology. 3 Hours.**

This course covers physical, chemical, and biological features of inland waters; organisms of freshwater; factors in biological productivity; methods and equipment. Laboratory focuses on various methods of sampling biotic and abiotic components of freshwater systems. This course is designed to meet the needs of ecologists, biologists, environmental scientists, and teachers of science. Two-hour laboratory. Fall.

**Prerequisite:** Minimum grade of C in BIOL 1411 and BIOL 1413 or BIOL 1406 and BIOL 1407, and Junior standing.

**BIOL 4350. Immunology. 3 Hours.**

Humoral and cell-mediated immunobiology, innate immunity, genetics, and chemistry are considered along with immunoanalysis and pathologies. Spring.

**Prerequisite:** Minimum grade of C in (BIOL 1411, BIOL 1413, and BIOL 2440) or (BIOL 1406 and BIOL 1407), and BIOL 3470, CHEM 2323, and CHEM 2123.

**BIOL 4360. Genetic Anlys of Human Disease. 3 Hours.**

A study of the transmission and molecular basis of human genetic traits and genetic diseases. Various simple and complex genetic disorders will be examined using pedigree, molecular, and biochemical analyses. Novel approaches to the diagnosis and treatment of human genetic disorders will be discussed. Special topics examining the ethical, legal, social issues and concerns of genetic testing and discrimination, germ line therapy, genetic enhancement, and human cloning are examined. Spring. Odd years.

**Prerequisite:** Minimum grade of C in BIOL 3450.

**BIOL 4361. Evolutionary Biology. 3 Hours.**

Evolution is the core theory of modern biology. Students investigate the major principles of evolutionary biology, from the history of evolutionary thought through theory and current concepts of evolution. Emphasis will be placed on molecular and cellular evolution, mechanisms of evolution including natural selection, gene flow, founder effect, and speciation.

**Prerequisite:** Minimum grade of C in (BIOL 1411, BIOL 1413, and BIOL 2440) or (BIOL 1406 and BIOL 1407), and BIOL 3450.

**BIOL 4362. Paleobiology. 3 Hours.**

This course examines temporal and spatial changes of life on earth in an evolutionary context, particularly large scale events such as radiations and extinctions. Emphasis is placed on anatomy and taxonomy of fossil invertebrates and vertebrates. The laboratory component encompasses the collection, preparation, and description of a variety of fossil types.

**Prerequisite:** Minimum grade of C in BIOL 1411 and BIOL 1413 or BIOL 1406 and BIOL 1407.

**BIOL 4363. Genomics and Bioinformatics. 3 Hours.**

Students analyze advances in genomics and bioinformatics and apply computational and bioinformatic approaches to understand the genome structure, function, and evolution. Topics may include DNA sequencing, sequence assembly, gene and protein sequence alignments, whole genome comparison, annotation of DNA sequences, promoter analysis, transcriptomics, proteomics, and phylogenetic analysis.

**Prerequisite:** Minimum grade of C in BIOL 3450 and Junior standing.

**BIOL 4370. Microbial Ecology. 3 Hours.**

This course introduces the student to basic ecological concepts through the study of microbial communities. Interactions at the microscopic and macroscopic levels will be discussed along with biogeochemical cycles. Bioremediation concepts will also be explored. Two one-hour lectures and one three-hour laboratory as needed. Demonstrated college-level readiness in reading, writing, and math.

**Prerequisite:** BIOL 1311, BIOL 1111, BIOL 1313, BIOL 1113, BIOL 2440, and BIOL 2420 or BIOL 3470, CHEM 2125 and CHEM 2325, and Junior standing.

**BIOL 4374. Biostatistics. 3 Hours.**

This course includes an introduction to statistical methods and their application to real biological problems. Topics include descriptive statistics, probability distributions, estimation, hypothesis testing, correlation and regression, and analysis of variance. Use of the computer in statistical analyses will also be stressed. Fall and Spring.

**Prerequisite:** (Minimum grade of C in MATH 1314 or MATH 1420 and 8 hours of advanced Biology) or (Junior standing, BIOL 3409, and C or better in MATH 1342, 1420, or 3379).

**BIOL 4380. Medical Microbiology. 3 Hours.**

An advanced study of the microorganisms that cause disease and of the disease processes with focus on bacteria and viruses. Emphasis will be placed on pathology, epidemiology and treatment/prevention of specific infectious diseases of medical importance. Spring. Demonstrated college-level readiness in reading, writing, and math.

**Prerequisite:** Minimum grade of C in BIOL 3470 and Junior standing or consent of the instructor.

**BIOL 4381. Advanced Molecular Biology. 3 Hours.**

Students investigate key concepts in molecular biology and biochemical processes of prokaryotic and eukaryotic cells and their viruses. Topics include the detailed examination of genes and chromosomes, as well as the mechanisms of DNA replication, repair, and recombination. Additional topics may include regulation of gene expression, transcription, RNA processing, RNA interference, translation, protein folding and modification, as well as the relevant techniques used to study these biological processes.

**Prerequisite:** Minimum grade of a C in BIOL 3450, BIOL 3470, and CHEM 2323.

**BIOL 4394. Biological Sciences Internship. 3 Hours.**

A supervised, off-campus intern work experience in an approved area of the biological sciences with business, industry or government. This elective course provides the student with direct professional work experience in such areas as biotechnology, biomedical research, ecological assessment, wildlife biology, and science/nature education. Academic credit is based on a written technical report and an oral presentation. Writing enhanced. of advanced biology.

**Prerequisite:** Biology major and 6 hrs.

**BIOL 4398. Senior Thesis I. 3 Hours.**

In this class, a student works under close faculty supervision on a sustained research project to produce a thesis proposal. Project topics will vary based on advisor's research expertise. Students will gain hands on experience in conducting research and scientific writing. Successful completion of BIOL 4398 and BIOL 4399 may qualify the student to graduate with Academic Distinction (see the undergraduate catalog for additional requirements of the Academic Distinction Program).

**Prerequisite:** Senior standing and approval of the department chair.

**BIOL 4399. Senior Thesis II. 3 Hours.**

Students in this course work under close faculty supervision on a sustained research project to produce a thesis. Project topics will vary based on advisor's research expertise. Students will gain hands-on experience in conducting research and scientific writing. Successful completion of BIOL 4398 and BIOL 4399 may qualify the student to graduate with Academic Distinction (see the undergraduate catalog for additional requirements of the Academic Distinction Program).

**Prerequisite:** Minimum grade of B in BIOL 4398 and approval of the department chair.

**BIOL 4410. General Entomology. 4 Hours.**

Students examine insect morphology, taxonomy, development, and life histories. Collection techniques and the use of keys to identify insects are stressed.

**Prerequisite:** BIOL 2440 or BIOL 1406 and BIOL 1407.

**BIOL 4430. Vertebrate Natural History. 4 Hours.**

This course deals with the taxonomy, natural history, and ecology of vertebrates. Laboratories emphasize the identification of Texas vertebrate species and field techniques used in their study. Two-hour laboratory. Odd year, Spring.

**Prerequisite:** Minimum grade of C in BIOL 1411 and BIOL 1413 or BIOL 1406 and BIOL 1407.

**BIOL 4460. Parasitology. 4 Hours.**

Morphology, life cycles, physiological adaptations, evolution, and distribution of parasitic animals. Three-hour laboratory. Fall.

**Prerequisite:** Minimum grade of C in BIOL 2440 or BIOL 1406 and BIOL 1407.

**BIOL 4470. Animal Behavior. 4 Hours.**

A study of the mechanisms and functional explanations of behavior. Experimental approaches to addressing questions of behavior will be emphasized. Topics will include behavioral genetics, neuroethology, migration, habitat selection, foraging, communication, social behavior, reproductive strategies, and human sociobiology. Field studies and independent projects will be integral components of this course. Two-hour laboratory. Fall.

**Prerequisite:** Minimum grade of C in (BIOL 1411 and BIOL 1413) or (BIOL 1406 and BIOL 1407).

**BIOL 4471. Invertebrate Zoology. 4 Hours.**

This course will explore the diversity of invertebrate types morphologically, embryologically and physiologically. The ecological role of invertebrates will be emphasized. Two-hour laboratory. Even year, Fall.

**Prerequisite:** Minimum grade of C in BIOL 2440 or (BIOL 1406 and BIOL 1407).

**BIOL 4480. Molecular Genetics. 4 Hours.**

A hands-on study of the structure and function of molecules important for the Central Dogma of molecular biology, including DNA and protein, with emphasis on electrophoretic analysis and gene cloning. Three-hour laboratory. Fall, Spring.

**Prerequisite:** Minimum grade of C in BIOL 2440 or (BIOL 1406 and BIOL 1407), and BIOL 3450, BIOL 3470, CHEM 2125 and CHEM 2325.

**BIOL 4481. Physiological Ecology. 4 Hours.**

This course is a study of the functional processes of organisms within the context of ecological and evolutionary theory, focusing on mechanisms of organismal function, energetics, and the energetic consequences of homeostasis when function is influenced by the environment and other ecological and evolutionary processes. This course is designed for students preparing for graduate studies in integrative biology and does not meet the physiology requirement or recommendation for physiology of medial/dental or allied health programs. Three-hour laboratory. Spring. Demonstrated college-level readiness in reading, writing, and math.

**Prerequisite:** Minimum grade of C in BIOL 3450, BIOL 3409, Concurrent enrollment allowed; Junior standing.

**BIOL 4490. Cell Biology. 4 Hours.**

A study of eukaryotic cell structure and function, including protein synthesis, membrane structure and function, intracellular trafficking, cell communication, cell motility, mitosis, and cell cycle control, with emphasis on the use of model organisms. Three-hour laboratory. Fall.

**Prerequisite:** Minimum grade of C in BIOL 2440 or BIOL 1406 and BIOL 1407, and BIOL 3450, BIOL 347, CHEM 2125, and CHEM 2325.

**BIOL 4493. Endocrinology. 4 Hours.**

This course is designed to familiarize the student with the structure, development, comparative anatomy, and physiology of the endocrine system. Two-hour laboratory. Spring, or as needed. Demonstrated college-level readiness in reading, writing, and math.

**Prerequisite:** Minimum grade of C in BIOL 3450 and Junior standing.