

BIOLOGY

Courses

BIO 101. Life, Environment, and Society. 3 Hours

An introductory course covering the study of life in all its forms, understanding how life interacts with the environment and the role of biological inquiry in society. Emphasis will be placed on discussing topical issues relevant to evaluating the critical role of the life sciences in society today. Supporting laboratory strongly recommended, but optional. No prerequisite. For non-science majors only.

BIO 101L. Life, Environment, and Society Laboratory. 1 Hour

A hands-on approach to the study of life, understanding how life interacts with the environment, and the role of biological inquiry in society. Lab activities will stress an experiential, inquiry-based approach to topics relevant in today's society in an effort to increase student's abilities to critically evaluate modern science media. Laboratory topics are designed to run parallel to lecture topics. Recommended that the laboratory be taken concurrently with BIO 101 lecture. One two-hour laboratory per week. For non-science majors. Corequisite(s): BIO 101.

BIO 151. Concepts of Biology I: Cellular & Molecular Biology. 3 Hours

Introduction to the biological concepts surrounding cell and molecular biology. Topics include scientific practice, molecular basis of life, cellular composition and energy processes, genetics, and biotechnology. Intended for science majors. Core biology course.

BIO 151L. Concepts of Biology Laboratory I: Cellular & Molecular Biology. 1 Hour

Laboratory-based introduction to the biological concepts surrounding cell and molecular biology. Utilizing a hands-on approach to the study of life, students will take part in experiential, inquiry-based activities as they observe the properties of cellular, micro-scale biology while concurrently defining proper laboratory procedures, operating modern scientific instrumentation, and practicing effective documentation of experiments. Topics include scientific practice, biological instrumentation, cellular composition and processes, genetics, and biotechnology. One three-hour lab per week. Intended for science majors. Core biology course. Corequisite(s): BIO 151.

BIO 152. Concepts of Biology II: Evolution & Ecology. 3 Hours

Introduction to the biological concepts surrounding evolution and ecology. Topics include scientific practice, evolutionary basis of life, phylogeny and systematics, biodiversity, ecology and biosphere sustainability. Intended for science majors. Core biology course.

BIO 152L. Concepts of Biology Laboratory II: Evolution & Ecology. 1 Hour

Laboratory-based introduction to the biological concepts surrounding evolution, diversity and ecology. Utilizing a hands-on approach, students will take part in experiential, inquiry-based activities as they explore the concepts of evolution and macro-scale biology while concurrently developing proper laboratory procedures, operating modern scientific instrumentation, and practicing effective scientific presentation of research through the two most widely accepted formats: the scientific journal article and the research poster presentation. Topics include evolution and phylogeny, the diversity of life, ecology, and human impact on ecosystems. One three-hour laboratory per week. Intended for science majors. Core biology course. Corequisite(s): BIO 152.

BIO 15F. Science Major Biology Unaligned - First Semester. 0-5 Hours

BIO 15FL. SCI MJR Bio Lab Unaligned 1st. 1-2 Hours

BIO 15S. Science Major Biology Unaligned - Second Semester. 1-5 Hours

BIO 15SL. Science Major Biology Lab Unaligned - Second Semester. 1-5 Hours

BIO 207L. Trees of Ohio. 1 Hour

A practical laboratory of dendrology. Taxonomy and ecology of woody plants of Ohio with an emphasis on identification skills. Field trips to encounter various species and habitats, taxonomic and botanical terminology, working with a dichotomous key and laboratory exercises will be blended together. Prerequisites: BIO 152; BIO152L.

BIO 299. Biology Seminar. 1 Hour

Introduction to biological journals and abstracting materials. Practice in reviewing, abstracting, and presenting biological information, and career development. Core biology course. Biology and environmental biology majors only. Prerequisite(s): BIO 152.

BIO 300. Research Experience in Biology. 0-1 Hours

In this course, students will engage in faculty mentored experiential learning in Biology. These experiences may be related to biology research activity in a field or laboratory setting and course outcomes will be assessed through a reflection following the experience.

BIO 301. Evolution. 3 Hours

Theory and evidence of organic evolution, with emphasis on microevolutionary change and population genetics. Prerequisite(s): BIO 152.

BIO 301L. Evolution Laboratory. 1 Hour

A laboratory research experience in evolution with emphasis on phylogenetic reconstruction and natural selection. Prerequisites: BIO 152. Corequisites: BIO 301.

BIO 309. Comparative Anatomy of the Vertebrates. 3 Hours

Study of changes that have occurred in the vertebrate body with the passage of time, and analysis of their significance. Prerequisite(s): BIO 152.

BIO 309L. Comparative Anatomy Laboratory. 1 Hour

Dissection and study of the anatomical structure of representative vertebrate animals. One three-hour laboratory per week. Corequisite(s): BIO 309.

BIO 310. Ecology. 3 Hours

Interrelationship of plants, animals, and micro-organisms with the physical-chemical environment: nutrient cycles, energy flow, ecosystems, and factors affecting distribution and abundance of organisms. Core biology course. Prerequisite(s): BIO 152.

BIO 310L. Ecology Laboratory. 1 Hour

Measurement of population, community, and environmental variables in terrestrial and aquatic systems. The lab is field-based using local ecological resources. One three-hour laboratory per week and weekend field trips. Corequisite(s): BIO 310.

BIO 311. Introductory Entomology. 3 Hours

Classification, physiology, ecology, and impact of insects on society. Prerequisite(s): BIO 152.

BIO 312. General Genetics. 3 Hours

Study of the principles of variation and heredity covering both Mendelian and molecular genetics. Core biology course. Prerequisite(s): BIO 152.

BIO 312L. Genetics Laboratory. 1 Hour

Exploration of heredity using molecular genetic methods. One three-hour laboratory per week. Corequisite(s): BIO 312.

BIO 314. Plant Biology. 3 Hours

Consideration of structure, function, reproduction, and inheritance as applicable in the plant patterns of life. Emphasis on the vascular plants. Prerequisite(s): BIO 152.

BIO 314L. Plant Biology Laboratory. 1 Hour

Emphasis on generalized structure and function of plants. One three-hour laboratory per week. Corequisite(s): BIO 314.

BIO 320. Marine Biology. 3 Hours

Introduction to the physical, chemical, and biological components of the marine environment with emphasis on ecology, biodiversity, ecosystem function, and conservation of marine resources. Prerequisites: BIO 151, BIO 152, BIO 310.

BIO 320L. Marine Biology Laboratory. 2 Hours

Examination of marine organisms and processes. Laboratory work conducted on UD campus and at off-campus field sites in the southern United States or Hawaii. Prerequisite(s): Permission of instructor. Corequisite(s): BIO 320.

BIO 330. Animal Behavior. 3 Hours

An evolutionary approach to the study of animal behavior, emphasizing both proximate mechanisms and functional explanations of the survival value of behavior. Prerequisite(s): BIO 152.

BIO 330L. Animal Behavior Laboratory. 1 Hour

Analysis of animal behavior using various animal models. One three-hour laboratory per week and occasional Saturday field trips. Corequisite(s): BIO 330.

BIO 350. Applied and Environmental Microbiology. 3 Hours

This course covers the fundamentals of applied and environmental microbiology, such as the production of fine and commodity chemicals, agriculture and food manufacturing, bioremediation of wastes and toxic chemicals, as well as other relevant topics in the applications of microbes for human and societal benefits. Prerequisites: BIO 151; BIO 152; CHM 124.

BIO 359. Sustainability & the Biosphere. 3 Hours

Study of the principles of sustainability. All areas of sustainability will be covered with emphasis on ecological facets of sustainability. Discussion of loss of habitat and biodiversity in the context of sustaining natural resources for future generations. Prerequisite(s): BIO 152 or SCI 230.

BIO 362. Bioessentialism and Constructions of Bodies. 3 Hours

Study of bodies from an essentialist and bio-psychosocial models, as well as culturally informed and historical perspectives. Examines the historical and cultural impact on biological processes and identity formation. Through an intersectional lens, examines power dynamics impacting inclusion and exclusion in dominant structures. Prerequisites: Sophomore standing or higher.

BIO 370. Conservation Biology. 3 Hours

An ecosystem approach to the study of and threat to local, regional, and global biodiversity. Application of ecological principles of conservation of species and habitats. Prerequisite(s): BIO 152.

BIO 395. Global Environmental Biology. 3 Hours

Presentation of the biological and ecological principles needed for the critical discussion and evaluation of current global issues related to human impact on the environment. Ecological data on the current extinction crisis and sustainable solutions will be addressed. No credit toward a biology major or minor. Prerequisite(s): BIO 101, BIO 151 or SCI 230.

BIO 402. Vertebrate Zoology. 3 Hours

The morphology, physiology, ecology, and distribution of representative vertebrate groups. Prerequisite(s): BIO 310 or BIO 312.

BIO 402L. Vertebrate Zoology Laboratory. 1 Hour

Laboratory focused on the diversity, systematics and ecology of vertebrates. One three-hour laboratory per week. Corequisite(s): BIO 402.

BIO 403. Physiology I. 3 Hours

Physical-chemical examination of the physiological events occurring in a living system with emphasis on physiology of the cell, excretion, nerves, muscles, bone, blood, heart, circulation, and respiration. Prerequisite(s): BIO 152; CHM 314.

BIO 403L. Physiology Laboratory I. 1 Hour

Systematic approach to the acquisition and interpretation of information about the physiology of living systems. One three-hour laboratory per week. Corequisite(s): BIO 403 or HSS 307.

BIO 404. Physiology II. 3 Hours

Integrated systems based examination of physiological processes in humans with a special emphasis on molecular mechanisms of pathophysiological conditions in humans and experimental animal systems. Prerequisite(s): BIO 403.

BIO 407. Plant Diversity & Ecology. 3 Hours

Lecture course addressing plant diversity and ecology. Course includes an overview of plant systematics and aspects of plant anatomy, population ecology, community ecology, ecosystem ecology, and global ecology. Prerequisite(s): BIO 310.

BIO 407L. Plant Diversity & Ecology Laboratory. 1 Hour

Field laboratory course addressing plant diversity and ecology. Includes a series of field labs focused on plant identification, followed by labs focused on quantitatively assessing plants, plant communities, and ecosystems. Labs will take place in a variety of natural areas. Corequisite(s): BIO 407.

BIO 409. Ecological Restoration. 3 Hours

Principles and practices of ecological restoration. The course presents the rationale and knowledge needed to understand, appreciate, plan and perform ecological restoration. Prerequisite(s): BIO 310.

BIO 409L. Ecological Restoration Laboratory. 1 Hour

Practical applications of the principles of ecological restoration to a variety of ecosystems. One three-hour laboratory per week. Corequisite(s): BIO 409.

BIO 411. General Microbiology. 3 Hours

Introductory course stressing the physiology, cultivation, and classification of microbial organisms; their role in medicine, agriculture, and industry. Prerequisite(s): BIO 152; CHM 313.

BIO 411L. General Microbiology Laboratory. 1 Hour

Lab exercises focusing on the basic techniques involved in the isolation and identification of bacteria, including assessment of biochemical activities, growth characteristics of bacteria, and the impact of the environment on microbial growth. One three-hour laboratory per week. Corequisite(s): BIO 411.

BIO 412. Genetics Human Diseases. 3 Hours

Study of the molecular genetics of inherited human diseases using a systems approach. Survey of inherited diseases linked to major organs and organ systems. Prerequisite(s): BIO 312; CHM 313.

BIO 414. Virology. 3 Hours

This course is designed to enhance students' understanding of virology, with special emphasis on human and animal viruses, their structure, genetic make-up, strategies of virus replication, and their classification. This course will also cover the mechanism of viral pathogenesis and strategies to control and prevent viral diseases. Prerequisites: BIO 312.

BIO 415. Neurobiology. 3 Hours

Structure and function of the brain and nervous system. Emphasis on understanding cellular and molecular events within the nervous system using model organisms. Prerequisite(s): BIO 152; CHM 124.

BIO 415L. Neurobiology Laboratory. 1 Hour

Laboratory research experience in neuroscience with emphasis on cellular, molecular and behavioral neurobiology and neurochemistry. Prerequisite(s): BIO 152, BIO 415 (may be taken as a co-req), CHM 124.

BIO 416. Neuroscience Seminar. 1 Hour

Advanced seminar focusing on major topics in the field of Neuroscience and emphasizing the critical analysis of experimental approaches and research findings. Prerequisite(s): BIO 415 (may be taken as a co-req).

BIO 417. Neurobiology of Disease. 3 Hours

An advanced neuroscience course focusing on the pathogenetic neurobiological mechanisms underlying major neuropsychiatric, neurodevelopmental, and neurodegenerative disorders, and their pharmacotherapeutic treatments. Prerequisite(s): BIO 415.

BIO 418. Biomedical Pharmacology. 3 Hours

Introduction to the biomedical discipline of Pharmacology focusing on general pharmacological principles, the molecular mechanisms of drug actions, and clinically important drug classes that pertain to specific organ systems and/or therapeutic indications. Prerequisites: BIO 403 or HSS 307 or BIO 415 or Instructor Permission.

BIO 420. Biology Capstone Seminar. 1 Hour

Seminar course designed to further develop students' ability to communicate and synthesize within their discipline and prepare them for their chosen career paths in the Biological and Environmental professions. All class activities, including presentations, relate to key issues facing society today in addition to continued career development skills. Biology core and capstone course. Prerequisite(s): BIO 299, BIO 310, BIO 312.

BIO 421. Biological Problems. 1-2 Hours

Laboratory research problems. Topics arranged with faculty advisors. Prerequisite(s): (BIO 310 or BIO 312); Permission of department chairperson.

BIO 422. Biological Problems. 1-2 Hours

Library research problems. Topics arranged with faculty advisors. Prerequisite(s): (BIO 310 or BIO 312); Permission of department chairperson.

BIO 426. Herpetology. 3 Hours

An overview of the biology of amphibians and reptiles with emphasis on biodiversity, ecology, evolution, morphology, physiology, behavior, and conservation. Prerequisite(s): BIO 310.

BIO 426L. Herpetology Laboratory. 1 Hour

Laboratory focused on the diversity, morphology, and ecology of amphibians and reptiles. One three-hour laboratory per week. Prerequisite(s): BIO 310 and BIO 310L and BIO 426 (BIO 426 may be taken as a co-req).

BIO 427. Immunology. 3 Hours

Discussions of antigens, antibodies, antigenicity, immunogenicity, and antigen-antibody reactions including hypersensitivity, immune tolerance, and transplants. Prerequisite(s): (BIO 403 or BIO 411 or BIO 440 or BIO 442) or CHM 420.

BIO 427L. Immunology Laboratory. 1 Hour

This laboratory course aims to provide students with hands-on experience in immunological techniques, including preparing sub-unit vaccines, troubleshooting the assays, and interpreting the results by critical analysis. Prerequisite: BIO 427 (may be taken as a co-req).

BIO 435. Microbial Ecology. 3 Hours

Study of the diversity and activity of microorganisms and the interrelationships between microorganisms and their environments with emphasis on aquatic ecosystems. Prerequisite(s): BIO 411; CHM 314.

BIO 435L. Microbial Ecology Laboratory. 1 Hour

Examination of the methods of isolation and enumeration of microorganisms and techniques for determining their activities in the field and laboratory. One three-hour laboratory per week. Corequisite(s): BIO 435.

BIO 439. Analysis & Interpretation of Biological Data. 3 Hours

Introducing the nature of some of the important types of data that are generated in biological research, the databases that warehouse such data, the principles involved in the analysis of such data, the use of appropriate software to analyze such data, and the biological interpretation of the results of analysis. Prerequisite(s): BIO 152.

BIO 440. Cell Biology. 3 Hours

Study of the function, structure, composition, heredity, and growth of cells. Analysis of cell concepts in biochemical terms. Prerequisite(s): BIO 152; CHM 314.

BIO 440L. Cell Biology Laboratory. 1 Hour

Experimental approaches to explore modern concepts in cell structure, function, and biology. One three-hour laboratory per week. Corequisite(s): BIO 440.

BIO 442. Developmental Biology. 3 Hours

Study of animal development, including morphological patterns of development, mechanisms of cellular differentiation, cell-cell interactions during development, and mechanisms of differential gene expression. Emphasis on understanding development at the cellular and molecular levels. Prerequisite(s): BIO 152; CHM 314.

BIO 442L. Developmental Biology Laboratory. 1 Hour

Exploration of the development of key model organisms from the morphological and molecular perspectives with an emphasis on basic developmental laboratory techniques. One three-hour laboratory per week. Corequisite(s): BIO 442.

BIO 445. Evolution & Development. 3 Hours

Molecular and population genetic examination of the evolution of animal form. Topics include comparative developmental biology, population genetics, and molecular evolution. Prerequisite(s): BIO 312.

BIO 450. Comparative Animal Physiology. 3 Hours

Organized on a function-system basis, course dealing with environment-organism interaction and with integrative systems of the principle phyla of animals. Prerequisite(s): (BIO 310 or BIO 312); CHM 124.

BIO 450L. Comparative Animal Physiology Laboratory. 1 Hour

Examination of physiological responses to the physical environment. Variations of the physical environment are examined in the field. Study of animals under controlled laboratory conditions with experimental design, data collection and analysis to assess physiological adaptations. One three-hour laboratory or field trip per week. Corequisite(s): BIO 450.

BIO 452. Biology of Rivers & Lakes. 3 Hours

The biological interrelationships of organisms in rivers, streams, lakes and ponds including biodiversity, ecological/evolutionary adaptations and structure of aquatic ecosystems. Prerequisite(s): BIO 310.

BIO 452L. Biology of Rivers & Lakes Laboratory. 1 Hour

Laboratory and field exercises emphasizing the biological, chemical and physical attributes of freshwater ecological systems. One three-hour laboratory or field trip per week. Corequisite(s): BIO 452.

BIO 459. Environmental Ecology. 3 Hours

The application of current ecological knowledge and principles toward the study of human impact on the environment. Emphasis on ecosystem dynamics, applied ecology, disturbance ecology, and approaches to solving global environmental problems. Prerequisite(s): BIO 310.

BIO 459L. Environmental Ecology Laboratory. 1 Hour

Analytical approach to studying applied ecology and human impact on the environment. Emphasis on laboratory and field approaches to solving environmental problems through the use of ecological principles. One three-hour laboratory per week. Corequisite(s): BIO 459.

BIO 461. Invertebrate Zoology. 3 Hours

Survey of the structure, activities, life histories, and relationships of the invertebrate animals, with some emphasis on their origin and development. Prerequisite(s): BIO 310 or BIO 312.

BIO 461L. Invertebrate Zoology Laboratory. 1 Hour

Examination of the structure and function of the major invertebrate phyla. Survey of representative animals with an emphasis on observational skills for analysis of the structural adaptations of live animals. One three-hour laboratory per week. Corequisite(s): BIO 461.

BIO 462. Molecular Biology. 3 Hours

Analysis of the nature of the gene and gene action. Particular attention to genetic regulation and to recent advances in molecular genetics. Prerequisite(s): BIO 312; CHM 314.

BIO 466. Biology of Infectious Disease. 3 Hours

Overview of infectious diseases with specific emphasis on the biology of the pathogen and mechanisms of diseases. The topics are organized based on transmission routes and sites of infections. Prerequisites: BIO 312.

BIO 470. Cancer Biology. 3 Hours

Study of growth patterns and causes of cancer at the cellular and molecular levels. Discussion of the hereditary and environmental factors that contribute to the development of the disease in cancer patients. Description of the research being conducted to understand and cure the disease. Prerequisites: BIO 312, CHM 313. Corequisites: BIO 403 or BIO 415 or BIO 440 or BIO 442.

BIO 475. Human Anatomy. 3 Hours

Study of the fundamental principles of human gross anatomy with emphasis on all organ systems. Prerequisite(s): BIO 152; CHM 314.

BIO 475L. Human Anatomy Laboratory. 1 Hour

Study of human gross anatomy emphasizing all organs systems using computer-assisted dissection, anatomical human models and occasional dissection of nonhuman cadaver organs. One three-hour laboratory per week. Corequisite(s): BIO 475.

BIO 477. Honors Thesis Project. 3 Hours

First of two courses leading to the selection, design, investigation, and completion of an independent, original Honors Thesis project under the guidance of a faculty research advisor. Restricted to students in the University Honors Program with permission of the program director and department chairperson. Students pursuing an interdisciplinary thesis topic may register for three semester hours each in two separate disciplines in consultation with the department chairpersons. Prerequisite(s): Approval of University Honors Program.

BIO 478. Honors Thesis Project. 3 Hours

Second of two courses leading to the selection, design, investigation, and completion of an independent, original Honors Thesis project under the guidance of a faculty research advisor. Restricted to students in the University Honors Program with permission of the program director and department chairperson. Students pursuing an interdisciplinary thesis topic may register for three semester hours each in two separate disciplines in consultation with the department chairpersons. Prerequisite(s): Approved 477; approval of University Honors Program.

BIO 479L. Environmental Biology Research Methods Laboratory. 1 Hour

The understanding and use of field- and laboratory-based equipment to study current environmental issues. Emphasis on team-centered approaches to investigating environmental problems. One three-hour laboratory per week. Prerequisites: BIO 310.

BIO 480. Principles of Microscopy. 3 Hours

Focus on basic principles and theory of light and electron microscopy, and how these techniques address fundamental questions in science. Prerequisite(s): BIO 152.

BIO 480L. Principles of Microscopy Laboratory. 1 Hour

Application and practice of light and electron microscopy. One three-hour laboratory per week. Corequisite(s): BIO 480.

BIO 489. Mycology. 3 Hours

Introductory course stressing the interrelationship between fungi and the rest of the biological world. Emphasis on the basic biology and ecology of fungi, decomposition, species interactions, plant pathology and medical mycology. Prerequisite(s): BIO 152.

BIO 496. Special Topics in Biology. 1-3 Hours

Lecture course addressing advanced topics in biology. Topics are variable depending on faculty teaching the course and the course aims. Students should consult the class schedule. May be repeated. Prerequisite(s): BIO 151, BIO 152.

BIO 496L. Special Topics Laboratory in Biology. 1 Hour

Laboratory course addressing advanced topics in biology. Topics are variable depending on faculty teaching the course and the course aims. Students should consult the class schedule. May be repeated. Prerequisites: BIO 151L, BIO 152L.

BIO 499. Environmental Biology Internship. 2 Hours

Majors will have the opportunity to obtain valuable training and experience under the mentorship of established scientists and professionals. Emphasis on approaches to solving environmental problems including such research areas as bioremediation, risk assessment, and ecological restoration. May be repeated up to six semester hours. Prerequisites: Permission of Environmental Biology Program Coordinator.

BIO 501. Seminar. 0 Hours

Presentation of biological research data by faculty members and visiting scientists. Required of all graduate students each semester.

BIO 503. College Teaching Seminar. 1 Hour

To assist graduate teaching assistants in acquiring information, understanding, and skills seen as important components of effective teaching.

BIO 509. Ecological Restoration. 3 Hours

Principles and practices of ecological restoration. The course presents the rationale and knowledge needed to understand, appreciate, plan and perform ecological restoration. Prerequisite(s): Graduate status.

BIO 511. Ecosystem Dynamics. 3 Hours

An advanced course examining ecosystem structure and function. Emphasis on community level interactions, applied ecology and the ways in which ecosystem biodiversity can be influenced by the biotic and abiotic forces of the environment, including the global impact of the human species.

BIO 512. Genetics of Human Disease. 3 Hours

Study of the molecular genetics of inherited human diseases using a systems-approach. This course is a survey of inherited diseases linked to major organs and organ systems. Prerequisite(s): Graduate student status.

BIO 515. Regulation of Growth, Development and Cancer. 3 Hours

An advance course to study Growth regulation during development and cancer. This course will cover topics such as molecular control of growth regulation and cell behavior; and evidences for the involvement of these mechanisms in cancer. This course includes journal club discussions, presentations by students on topics discussed in the course. Prerequisites: BIO 552.

BIO 517. Mechanisms in Cancer Biology. 3 Hours

Advance level course that examines the molecular and cellular signaling processes connected to initiation and progression of cancer. Course will provide in-depth understanding of topics like tumor suppressor genes, oncogenes, role of the tumor microenvironment, and epigenetic changes and their relation to cancer. Course will discuss latest research and techniques that have helped integrate the molecular mechanisms with current treatments, improved diagnosis or treatment options for cancer. Prerequisite: Upper level course in Developmental biology, cell biology, genetics with basic understanding of cancer.

BIO 518. General Pharmacology. 3 Hours

An overview of the basic principles of Pharmacology, including pharmacodynamics and pharmacokinetics, with emphasis on the mechanisms of drug action and the pharmacotherapeutic effects of major clinically important drug classes. Prerequisites: Graduate Status, OR Instructor's Permission.

BIO 521. General Microbiology. 3 Hours

A graduate level introduction to general microbiology covering fundamental topics, such as structures and functions, genetics, physiology, and metabolism. This course includes weekly journal club discussions to immerse students in current microbiology research. Students are also responsible for providing one guest lecture in the BIO 411 General Microbiology class to demonstrate their learning. Prerequisite(s): Graduate level or instructor's approval.

BIO 522. Immunology. 3 Hours

Study of innate and acquired immunity, cells and organs of the immune system, antigens and immunoglobulins. Specific emphasis on the organization and expression of immunoglobulin genes; genetic restriction; cytokines and immune regulation including hypersensitivity, immune tolerance, transplantation and autoimmunity. Biochemistry recommended.

BIO 535. Problems in Field Biology. 1-3 Hours

Course designed to acquaint students with field-oriented problems in biology.

BIO 540. Cell Biology. 3 Hours

A study of the fundamental principles of cell biology and human biology with emphasis on the function, structure, composition, heredity and growth of cells. This course focuses on the analysis of cell concepts in biochemical terms. Prerequisite(s): Graduate status.

BIO 545. Evolution & Development. 3 Hours

Molecular and population genetic examination of the evolution of animal form. Topics include comparative developmental biology, population genetics, and molecular evolution. Prerequisite(s): Student status in Biology or permission of instructor.

BIO 550. Biometrics. 3 Hours

Design and analysis of experiments in quantitative biology. Parametric and nonparametric analyses of both laboratory and field-generated data sets.

BIO 551. Laboratory Skills in the Biological Sciences. 2 Hours

Laboratory Skills in the Biological Sciences (BIO 552-P3), taught in the Department of Biology, is tailored to introduce our graduate students to this fast changing field of research by teaching shared methodologies and techniques involved in biology.

BIO 552. Research Methods in Biomedical Science. 4 Hours

Theory and applications of protein and nucleic acid techniques designed to acquaint students with advanced laboratory techniques used in biological research.

BIO 553. Research Methods in Ecology. 4 Hours

Advanced research techniques and instrumentation in Ecology and Field Biology. Prerequisite(s): Graduate Student Standing.

BIO 554. Scientific Practice. 2 Hours

Students are prepared for practicing aspects of a scientific profession. Scientific ethics, grant and manuscript writing, internal regulatory boards, and intellectual properties are covered. This course also covers topics in the responsible conduct of research drawing from case studies from the Association of American Medical Colleges and the NIH. Students will review case studies in preparation for class discussion. Graduate Student Standing.

BIO 555. Laboratory Techniques (Topic). 1-3 Hours

Advanced treatment of new techniques and instrumentation used in specialized areas of biology. Changes with advances in a specialty are reflected in the course title.

BIO 566. Biology of Infectious Disease. 3 Hours

The nature of infectious diseases, host-parasite relationships in resistance and infection, defense mechanism (antigen-antibody response); survey of the bacteria causing disease in humans; in-depth discussion of current infectious disease research.

BIO 594. Molecular Biology - Theory & Practice. 3 Hours

Introduction to the theory and practice of molecular biology techniques. Topics and laboratory exercises include the enzymatic manipulation of DNA and RNA, Southern and Northern blotting, library screening, DNA sequencing, DNA amplification, and gene promoter structure and function.

BIO 595. Neuroscience. 3 Hours

Introduction to the interdisciplinary field of Neuroscience with a focus on the integrated cellular, molecular, neurophysiological and neurochemical mechanisms governing complex brain functions. Prerequisite(s): Graduate status Or Instructor's Permission.

BIO 596. Current Biology Problems. 1-3 Hours

Consideration of recent developments in biological thought and procedure. Prerequisite(s): Permission of department chairperson.

BIO 597. Neuroscience of Brain Disorders. 3 Hours

An integrated approach to understanding the neuroscientific basis of brain disorders with emphasis on the neuronal circuits, the neurochemical and molecular neurobiological pathways underlying the pathophysiology of nervous system diseases, and available pharmacotherapies. Prerequisite(s): BIO595 (OR upper-level course in Neurobiology/Neuroscience) AND Graduate Status, OR Instructor's Permission.

BIO 599. Thesis. 1-6 Hours

Research for the master's degree.

BIO 600. Graduate Research Experience in Biology. 1 Hour

In this course, students will engage in faculty mentored research experience in Biology. These experiences may be related to biology research activity in a field or laboratory setting.

BIO 601. Special Topics. 1 Hour

Development, presentation, and discussion of topics in specialized areas of biology. Required of graduate students each semester.

BIO 699. Dissertation. 1-9 Hours

Research for the doctoral degree.