BIOLOGY (BY)

BY-101  Issues and Methods of Biology  Credits: 3
Prerequisite(s): SC-100
Term Offered: All Terms
Course Type(s): None
Major concepts in biological science and their importance in current society. Methods and approaches to questions in biology. Cannot be used in satisfaction of a major requirement in the Biology program.

BY-102  Applications in Biotechnology  Credits: 3
Term Offered: All Terms
Course Type(s): NS
Introduction for non-science majors. The focus is on basic principles of biotechnology along with an exploration of associated ethical issues. The laboratory component serves to familiarize students with scientific practice.

BY-103  Environmental Science  Credits: 3
Term Offered: All Terms
Course Type(s): NS
Examines society's effects on the natural environment and current efforts to address environmental issues in a sustainable manner. Stresses the interdisciplinary nature of environmental issues, and that resolution of environmental problems sustainably involves the application of sound scientific information, but at the same time involves social, political, cultural, and economic values as well.

BY-104  Human Biology  Credits: 3
Term Offered: All Terms
Course Type(s): NS
Introductory course for non-science majors. Focus is on basic structure and function of human body systems and diseases of these systems. The laboratory component serves to familiarize students with scientific practice.

BY-105  Introductory Biology and Human Development  Credits: 3
Term Offered: All Terms
Course Type(s): NS
An introductory-level survey of biology with an emphasis on human biology that includes human development, aging, genetics and other topics selected to support the social work program. An introduction to neurobiology will be provided with applications in mental health. Not for credit towards a major in biology. For Social Work majors only.

BY-106  The Brain - Highs and Lows  Credits: 3
Term Offered: Spring Term
Course Type(s): NS
An introductory neurobiology course designed for non-science majors. The focus is the study of the human brain from the highs of intelligence and creativity to the lows of depression. The brain will also be examined for its roles in drug use, from the highs of euphoria to the lows of dependence. Topics will include the interplay between genetic and environmental influences that shape the brain and its responses. Not for credit towards a major in Biology.

BY-107  Microbiology in Health and Disease  Credits: 4
Term Offered: All Terms
Course Type(s): None
Microorganisms pathogenic for man; emphasizing etiology, modes of transmission and control. Laboratory includes proper collection of specimens, aseptic technique, cultivation, identification, and disposal of microbes. Three hours of class, two hours of laboratory per week.

BY-108  Evolution and the History of Life on Earth  Credits: 3
Term Offered: Spring Term
Course Type(s): NS
Examines evolution both as a process and as a phenomenon. Students will examine how evolutionary processes occur in time, both very short and geological time scales, and how both are studied. Students will review the history of life on earth with emphasis on major lineages such as vertebrates, mollusks, insects and plants, as well as basic geological processes and continental drift during these time periods. Bacterial evolution will be examined in the context of the importance of understanding natural selection and evolution and their impacts on society and medicine. Emphasis will be placed on understanding evolution of groups and processes often cited in creationist arguments, to help students be prepared to enter civil discourse as informed citizens. Evidence of evolutionary change from the fossil record and DNA sequences of organisms will be compared and reviewed.

BY-109  Introduction to Biodiversity and Evolution  Credits: 4
Term Offered: All Terms
Course Type(s): NS
An introductory course for biology majors. Focus is on evolution, phylogeny, taxonomy, origin and diversity of life, physiology of plant and animal systems, and ecological principles. Three hours of lecture and two hours of laboratory per week. Limited to students who are majors in Biology, Chemistry, Mathematics, Computer Science and Software Engineering.

BY-110  Introduction to Cell and Molecular Biology  Credits: 4
Term Offered: All Terms
Course Type(s): NS
For biology majors and other students needing an introduction to the cellular and molecular levels of biology. Includes an introduction to cell structure and function, biochemistry and metabolism, bioenergetics, genetics and cell division, and molecular biology. Three hours of lecture and two hours of laboratory per week. Limited to majors in Biology, Chemistry, Clinical Science, Medical Laboratory Science, Mathematics, Computer Science, Software Engineering, Criminal Justice, Health Studies, and Health and Physical Education.

BY-111  Anatomy and Physiology I  Credits: 4
Term Offered: All Terms
Course Type(s): NS
Study of human systems: structure, function and integration, including chemical and cellular base, integumentary, skeletal, muscular and nervous systems. Laboratory covers human anatomy, microscopy of tissues and organs, and physiological study of living organisms. Three hours of lecture, two hours of laboratory per week. Open to Health Studies, Health Promotion, Health and Physical Education and Education, and Nursing majors only. This course is a non-major level Biology course and cannot be used to fulfill the Biology minor. Students pursuing professional graduate health programs should register for BY-211. Students who take BY-111 are not eligible to take BY-211.
and chemicals (BHA, BHT, DMSO, etc.) and other supplements (L-acids, nucleic acid derivatives, lipids and derivatives, pharmaceuticals). Sound, medically reliable evaluation of widely promoted nutritional conclusions) and how to use resources and research material in science. BY-202 does not count towards the Biology major or minor requirements.

**BY-118 The Mighty Microbes**  
Term Offered: Fall Term  
Prerequisite(s): BY-110 passed with a grade of C- or higher  
Course Type(s): MC, ME, MEBP  
Introduction to recent advances in biotechnology: the use of living organisms to create products, applications or processes that improve the quality of life for humans and other species. Presents historical and modern applications of biotechnology that impact our everyday lives. An overview of current developments and applications of microbial, agricultural, animal, marine and forensic biotechnology, bioremediation, and medical biotechnology will be presented. Regulatory agencies and policies that govern the biotechnology industry will be discussed, and students will also learn to formulate opinions about ethical, legal and social issues associated with biotechnology.

**BY-201 Introduction to Biotechnology**  
Term Offered: Spring Term  
Prerequisite(s): BY-110 passed with a grade of C- or higher  
Course Type(s): MC, ME, MEBP  
Introduction to recent advances in biotechnology: the use of living organisms to create products, applications or processes that improve the quality of life for humans and other species. Presents historical and modern applications of biotechnology that impact our everyday lives. An overview of current developments and applications of microbial, agricultural, animal, marine and forensic biotechnology, bioremediation, and medical biotechnology will be presented. Regulatory agencies and policies that govern the biotechnology industry will be discussed, and students will also learn to formulate opinions about ethical, legal and social issues associated with biotechnology.

**BY-112 Anatomy and Physiology II**  
Term Offered: All Terms  
Course Type(s): NS  
Study of human systems: structure, function and integration, including special senses, digestive, endocrine, cardiovascular, lymphatic and immunity, respiratory, urinary and reproductive. Laboratory covers human anatomy, microscopy of tissues and organs, and physiological study of living organisms. Three hours of lecture, two hours of laboratory per week. Open to Health Studies, Health Promotion, Health and Physical Education and Education, and Nursing majors only. This course is a non-major level Biology course and cannot be used to fulfill the Biology minor. Students pursuing professional graduate health program should register for BY-212. Students who have taken BY-112 are not eligible to take BY-212.

**BY-113 Introduction to Structure and Function of Living Systems**  
Term Offered: Fall Term  
Course Type(s): NS  
Examines the characteristics of living organisms. Intended primarily for future elementary teachers to provide them with a better understanding of the life sciences they will teach. Content will focus on the structure and function of cells, tissues and organs and life processes. There is an emphasis on understanding heredity, including patterns of inheritance of traits and the molecular basis of heredity, and growth and development. This is an activity-centered/lab course to demonstrate scientific inquiry (questioning, developing hypotheses, gathering data, and drawing reasonable conclusions) and how to use resources and research material in science. BY-113 does not count towards the Biology major or minor requirements.

**BY-114 Unity and Diversity of Life**  
Term Offered: Fall Term  
Course Type(s): None  
Intended primarily for future elementary school teachers to provide them with a better understanding of the life sciences they will teach. Examining the interdependence and individuality of organisms in ecosystems, populations and communities and how these organisms change over time due to life cycles, mutations, adaptations and natural selection. Classification of organism will also be covered. This is an activity-centered/lab course to demonstrate scientific inquiry (questioning, developing hypotheses, gathering data, and drawing reasonable conclusions) and how to use resources and research material in science. BY-114 does not count towards the Biology major or minor requirements.

**BY-116 The Biology of Nutrition, Aging, and Anti-Aging Nutrition**  
Term Offered: Summer Term  
Course Type(s): None  
Discussions of the theories of aging and the role of nutrition in delaying aging and preventing degenerative disease. Analysis of the scientifically sound, medically reliable evaluation of widely promoted nutritional supplements, including the anti-aging nutrients: vitamins, minerals, amino acids, nucleic acid derivatives, lipids and derivatives, pharmaceuticals and chemicals (BHA, BHT, DMSO, etc.) and other supplements (L-Carnitine, ginseng, etc.)
BY-209  Environment and Human Health  Credits: 3
Prerequisite(s): BY-109 and BY-110, both passed with a grade of C- or higher
Term Offered: All Terms
Course Type(s): MC, MEBP
Human activities are adversely affecting ecosystems throughout the world. Some of these changes may be deleterious to human health. The purpose of this course is to provide students with an understanding of the relationship between the environment and human health. Specific topics that will be covered are the importance of biodiversity to human health, the relationships between global warming and vector-borne diseases, microbial evolution and resistance of pathogenic organisms, persistent pollutants and toxicity, and the effect of environmental disasters on human health. A focus of this course will be to integrate several areas of biology including microbiology, toxicology, and environmental science.

BY-210  Forensic Genetics and DNA Analysis  Credits: 3
Prerequisite(s): BY-110 and CJ-211
Term Offered: Spring Term
Course Type(s): None
Focus on fundamental principles of DNA and genetic analysis and their applications in forensics. Designed for criminal justice majors who have had an introduction to Mendelian and molecular genetics and to DNA structure, but who need more background in the underlying biology of forensic DNA analysis and interpretation. Sources of DNA will be presented along with methods for DNA extraction, amplification of DNA by polymerase chain reaction, analysis of restriction fragment length polymorphisms and short tandem repeats. Open only to Criminal Justice majors.

BY-211  Physiology with Anatomy I  Credits: 4
Prerequisite(s): BY-110, CE-111, and CE-112 all passed with a grade of C- or higher
Term Offered: All Terms
Course Type(s): None
Lecture and laboratory course Study of Human Systems: Their structure, function and integration. Laboratory covers gross human anatomy and physiology. Three hours of lecture and two hours of laboratory per week. Open only to Biology, Chemistry, Medical Lab Science, Clinical Lab Science, Health, and Psychology majors. Students who have taken BY-211 are not eligible to take BY-111.

BY-212  Physiology with Anatomy II  Credits: 4
Prerequisite(s): BY-110, BY-211, CE-111, and CE-112 all passed with a grade of C- or higher
Term Offered: All Terms
Course Type(s): None
Lecture and laboratory course Study of Human Systems: Their structure, function and integration. Laboratory covers gross human anatomy and physiology. Three hours of lecture and two hours of laboratory per week. Open only to Biology, Chemistry, Medical Lab Science, Clinical Lab Science, Health, and Psychology majors. Students who have taken BY-212 are not eligible to take BY-112.

BY-214  Botany  Credits: 3
Prerequisite(s): BY-109 passed with a grade of C- or higher
Term Offered: All Terms
Course Type(s): None
Characteristics of the major plant groups, principles of plant taxonomy, considerations of evolutionary and ecological relationships. Two hours of class, two hours of laboratory per week.

BY-216  Introduction to Genetics  Credits: 4
Prerequisite(s): BY-110 passed with a grade of C- or higher
Term Offered: All Terms
Course Type(s): MEBP
Focuses on one of the core concepts of biology; the flow, exchange, and storage of hereditary information. Topics will include principles of classical and molecular genetics, including transmission, arrangement, and alteration of genetic information; structure, function, and regulation of the genetic material; biological variation resulting from recombination, mutation, and population genetics; applications to human heredity. Two 80-minute lectures and one 3-hour lab per week.

BY-220  Environmental Biology and Policy  Credits: 3
Prerequisite(s): BY-109
Term Offered: All Terms
Course Type(s): ME, SUS
Focuses on human use of natural resources and the environment and the problems and impacts that result from those uses. By taking an interdisciplinary perspective, students will gain an understanding of the scientific, political and socioeconomic factors that underlie resolution of these problems.

BY-221  Introduction to Global Sustainability  Credits: 3
Term Offered: Fall Term
Course Type(s): MEBP, SUS
Introduces students to the global, environmental, economic and social foundations of sustainability and the policy and scientific challenges involved with accommodating population growth, development, and resources used while assuring that future generations will have the natural and economic resources to support an enhanced quality of life. An emphasis will be placed on understanding of sustainability principles from multiple perspectives and cross-disciplinary application of sustainable practices. Also listed as PS-223.

BY-223  General Microbiology  Credits: 4
Prerequisite(s): BY-110 passed with a grade of C- or higher
Term Offered: All Terms
Course Type(s): MEBP
Morphology, taxonomy, physiology, genetics, and control of microorganisms; history of microbiology. Three hours of class, three hours of laboratory per week.

BY-250  Research in Molecular Cell Physiology  Credits: 1-3
Prerequisite(s): BY-110 passed with a grade of C- or higher
Term Offered: All Terms
Course Type(s): EX5, MC
Faculty-student collaborative research lab course designed to introduce students to the research process. Students will work in small groups under faculty supervision to conduct research on a project in molecular cell physiology determined by the directing faculty member. Students will be involved in the research process by developing hypotheses, planning and carrying out experiments using modern lab techniques, analyzing data, and evaluating resource information. Research may be extended in detail in BY-450. Limited to sophomore Biology majors.
BY-250A Research in Molecular Cell Physiology Credits: 3
Prerequisite(s): BY-110
Term Offered: Summer Term
Course Type(s): MC
Faculty-student collaborative research lab course designed to introduce students to the research process. Students will work in small groups under faculty supervision to conduct research on a project in molecular cell physiology determined by the directing faculty member. Students will be involved in the research process by developing hypotheses, planning and carrying out experiments using modern lab techniques, analyzing data, and evaluating resource information. Research may be extended in detail in BY-450. Limited to sophomore Biology majors. (BY-250A is for students who do not need experiential education credit. Students who need experiential education credit should register for BY-250.)

BY-251 Field Research Methods in Marine Science Credits: 3
Prerequisite(s): BY-109, CE-111, and CE-111L, all passed with a grade of C- or higher
Term Offered: All Terms
Course Type(s): MEBP
Provides students with hands on experience in marine and coastal research by working on-board small research vessels under real field conditions. Students become familiar with the use and application of standard marine science instruments and sampling devices, as well as data handling, management and analysis techniques.

BY-262 Primate Behavior, Evolution, and Ecology Credits: 3
Term Offered: Spring Term
Course Type(s): NS
The study of primatology, which examines the lifeways, biology, and behavior of our closest living relatives. Various topics will be explored including taxonomy and classification, diet, behavior, grouping patterns, locomotion, and land usage patterns of monkeys, apes and prosimians. These topics will be explored within the frameworks of natural selection, sexual selection, and evolution. Also listed as AN-262.

BY-290 Open Water Scuba Certification Course Credits: 2
Term Offered: Spring Term
Course Type(s): OUTDR
The Open Water Scuba Certification course entails completion of the Professional Association of Diving Instructors (PADI) Open Water Diver course, the world's most popular scuba course. Completion of this course leads to PADI scuba certification as an open water diver. Limited to 8 students. Skills course: Outdoor Pursuits (Individual). This is a pass/fail course. Also listed as PE-290.

BY-298 Special Topics in Biology (200 Level) Credits: 1-3
Term Offered: All Terms
Course Type(s): MC, ME
An intensive study of a particular subject or problem in biology to be announced prior to registration. May be conducted in a lecture, seminar, or laboratory format. Please note: when Scuba is offered as BY 290 it does not carry a course type of MC. If there is a prerequisite it will be announced in the course schedule.

BY-299 Independent Study in Biology Credits: 1-3
Term Offered: All Terms
Course Type(s): None
Principles of independent study and research; critical review of published work on a designated topic in the biological sciences or original research; preparation of a research paper or review article in publishable format or oral presentation of research results. Laboratory or field work arranged as needed. Requires submission and approval of an "Application for Independent Study" (an e-form is available on WEBadvisor) with a faculty mentor. To register for this course, students need prior permission of the directing professor and department chair and Sophomore or higher standing in Biology. (Total of all independent study credits to be counted towards the degree may not exceed six, unless approved by the Dean).

BY-301 Vertebrate Histology Credits: 3
Prerequisite(s): BY-205 passed with a grade of C- or higher
Term Offered: Fall Term
Course Type(s): MC
Microscopic structure of vertebrate cells, tissues, and organs, emphasizing microscopic anatomy of the human body. Laboratory identification of vertebrate tissues. Two hours of class, three hours of laboratory per week.

BY-303 Biological Oceanography Credits: 3
Prerequisite(s): BY-205 and BY-214 both passed with a grade of C- or higher
Term Offered: All Terms
Course Type(s): MEBP
Biological Oceanography provides an introduction to the biology of life in the sea. Biological Oceanography emphasizes the fundamental oceanographic processes that control the distribution and abundance of living organisms in the sea. Two hours of lecture and two hours of lab per week.

BY-305 Ichthyology Credits: 3
Prerequisite(s): BY-205 and BY-214 both passed with a grade of C- or higher
Term Offered: All Terms
Course Type(s): MEBP
A survey of the major principles of biochemistry with attention to the structures and functions of proteins, carbohydrates and fats; the major pathways for metabolism of proteins, carbohydrates and fats; and the biochemical basis of DNA replication and gene expression. Laboratory provides hands-on experience in selected biochemical techniques with an emphasis on protein characterization. Designed to provide practice and critique in effective writing and appropriate writing style and format.

BY-310 Biochemistry and Lab Credits: 4
Prerequisite(s): CE-242 passed with a grade of C- or higher; and EN-101 and EN-102 or permission of the instructor
Term Offered: All Terms
Course Type(s): MEBP, WT
A survey of the major principles of biochemistry with attention to the structures and functions of proteins, carbohydrates and fats; the major pathways for metabolism of proteins, carbohydrates and fats; and the biochemical basis of DNA replication and gene expression. Laboratory provides hands-on experience in selected biochemical techniques with an emphasis on protein characterization. Designed to provide practice and critique in effective writing and appropriate writing style and format.

BY-314 Topics in Horticulture Credits: 3
Term Offered: All Terms
Course Type(s): MC, ME, MEBP
Principles and practices of plant culture; practical experience through greenhouse projects; the horticulture industry and career possibilities; field trips to places of horticultural interest. Two hours of class, three hours of laboratory per week. Field trips arranged.
BY-317  Tropical Island Ecology  Credits: 3
Term Offered: Spring Term
Course Type(s): EX5, ME, MEBP, NS
A field course focusing on investigations of plants, animals, and natural ecosystems of the Bahamas with emphasis on marine ecosystems, island ecology, resource management, and sustainable development.

BY-324  Applied Microbiology  Credits: 4
Prerequisite(s): BY-223 passed with a grade of C - or higher
Term Offered: Spring Term
Course Type(s): MC, ME, MEBP
Microorganisms of food, water, soil, dairy products, industrial processes, disease, and genetic engineering. Three hours of class, three hours of laboratory per week.

BY-341  Marine Biology  Credits: 4
Prerequisite(s): BY-205 and BY-214, both passed with a grade of C- or higher
Term Offered: Fall Term
Course Type(s): None
Biota of the oceans and inshore waters with an emphasis on ecology, functional morphology, and marine and estuarine habitats. Basic oceanography is also included. Marine biology is a laboratory course supported by lectures and field projects. Field trips outside of class time may be required.

BY-342  Coastal Zone Management  Credits: 3
Prerequisite(s): BY-220 passed with a grade of C- or higher, and EN-101 and EN-102
Term Offered: Spring Term
Course Type(s): ME, WT
Focus on the impact of increased demand on the coastal environment based on the theme that management of an environment for multiple purposes requires an understanding of the effects of use and exploitation throughout that environmental system and how decisions can be made in an effective, equitable manner.

BY-370  Cell Biology  Credits: 3
Prerequisite(s): BY-310 passed with a grade of C- or higher
Term Offered: All Terms
Course Type(s): None
In-depth study of biology at the cellular and subcellular levels. Integrates principles of biochemistry into an understanding of cell structure and physiology.

BY-375L  Laboratory in Molecular and Cellular Biology  Credits: 3
Prerequisite(s): BY-310 passed with a grade of C- or higher; and EN-101 and EN-102 or permission of the instructor
Term Offered: All Terms
Course Type(s): MEBP, RD, WT
Designed to introduce biology majors to basic laboratory techniques used in molecular and cellular biology. Students will develop proficiency in modern techniques in molecular and cellular biology including micro pipetting, bacterial culturing and sterile technique, solution preparation, DNA extraction, restriction digestion of DNA, DNA sub cloning, gel electrophoresis of nucleic acids and proteins, nucleic acid blotting and analysis with molecular probes, DNA sequencing, polymerase chain reaction (PCR), immunological techniques for analysis of proteins, mammalian cell culture and transfection, and DNA sequence analysis on the Internet. The use of traditional and Internet information resources for molecular and cellular biology will also be emphasized. The presentation of data in both oral and written form will be emphasized. Partially fulfills the reasoned oral discourse requirement for biology and biology/molecular cell physiology.

BY-388  Cooperative Education: Biological Sciences  Credits: 1-4
Prerequisite(s): 6 credits in Biology
Term Offered: All Terms
Course Type(s): EX2
Provides an opportunity for students to fulfill the Experiential Education requirement by pursuing a short-term cooperative work experience in biology or for students who, are currently employed in a biological or medical field, to integrate the work with a related academic component. May be repeated for credit. This is a pass/fail course.

BY-389  Internship in Biological Science  Credits: 1-3
Prerequisite(s): Overall GPA of 2.00; Junior status, and at least six credits in biology courses
Term Offered: All Terms
Course Type(s): EX1
Complements the practical experience gained by students at internship sites, such as hospitals, clinics, private practices, research laboratories, environmental agencies, museums, botanical gardens, and zoos with a significant set of academic goals. May be repeated once for credit. This is a pass/fail course.

BY-395  Seminar in Marine and Environmental Biology  Credits: 3
Term Offered: Spring Term
Course Type(s): MEBP, RD
A seminar-style course for juniors in the Marine and Environmental Biology and Policy (MEBP) major.

BY-398  Special Topics in Biology (300 Level)  Credits: 1-3
Prerequisite(s): BY-110
Term Offered: All Terms
Course Type(s): MC, ME
An intensive study of a particular subject or problem in biology to be announced prior to registration. May be conducted in a lecture, seminar, or laboratory format. If there is a prerequisite it will be announced in the course schedule.
BY-399  Independent Study in Biology  Credits: 1-3
Term Offered: All Terms
Course Type(s): None
Principles of independent study and research; critical review of published work on a designated topic in the biological sciences or original research; preparation of a research paper or review article in publishable format or oral presentation of research results. Laboratory or field work arranged as needed. Requires submission and approval of an "Application for Independent Study" an e-form is available on WEBadvisor) with a faculty member. Students must have prior permission of the directing professor and department chair; and Junior standing in Biology to register for this class. (Total of all independent study credits to be counted towards the degree may not exceed six, unless approved by the Dean.)

BY-404  Animal Behavior  Credits: 3
Prerequisite(s): PY-103 or BY-103 or above, passed with a grade of C- or higher
Term Offered: All Terms
Course Type(s): None
Why and how animals (vertebrates and invertebrates) do the things they do. Emphasizes rules governing the evolution of behavior rather than mere description of how animals behave. Focus includes behavioral ecology, habitat selection, feeding strategies, predator-prey tactics, mating systems and strategies, social behavior (conflict and cooperation) and population dynamics. The course begins with an historical overview and ends with the evolution of human behavior. Also listed as PY-404.

BY-404L  Animal Behavior Laboratory  Credits: 1
Prerequisite(s): PY-311 and PY-320 passed with a grade of C or higher
Co-requisite(s): BY-404 or PY-404
Term Offered: Spring Term
Course Type(s): None
Methods in the study of animal behavior. Projects on instinctive behavior, early experience, learning, dominance relationships, territoriality, behavioral ecology, and sociobiology. One all-day field trip and an independent project will be required.

BY-406  Introduction to Neurosciences  Credits: 3
Prerequisite(s): 6 credits of Biology or Chemistry courses
Term Offered: Spring Term
Course Type(s): MC, ME
The organization of the nervous system in terms of its anatomy, physiology, neurochemical correlates, and evolution; behavioral processes such as attention, sleep, motivation, instinct, learning, and languages.

BY-406L  Neurosciences Laboratory  Credits: 1
Co-requisite(s): BY-406
Term Offered: Fall Term
Course Type(s): MC
Human and animal neuroanatomy; surgical techniques, including lesion, stimulation, and perfusion; histology; drug and hormone administration; physiological recording techniques. Three hours per week.

BY-410  Molecular Biology  Credits: 3
Prerequisite(s): BY-310 or BY-423 passed with a grade of C- or higher, or CE-331 passed with a grade of C- or higher
Term Offered: Spring Term
Course Type(s): None
Provides a detailed examination of the central dogma of molecular biology - DNA replication, transcription, reverse transcription, and translation - in viruses, prokaryotes, and eukaryotes. Standard techniques of biotechnology used to study molecular biology will be emphasized. Additional topics, including eukaryotic chromosome structure and regulation of gene expression, will also be discussed.
BY-431 Immunology  Credits: 3
Prerequisite(s): BY-110 passed with a grade of C- or higher
Term Offered: Spring Term
Course Type(s): MC
Components of the immune system; biological individuality and the recognition of "foreignness"; structure of antibodies; cellular immunity and graft rejection; blood group antigens; the immune system and cancer development; immunogenetics; clinical and experimental applications. Two hours of class, two hours of laboratory per week.

BY-440 Ecology  Credits: 4
Prerequisite(s): BY-205 or BY-214, and BY-220 all passed with a grade of C- or higher, and EN-101 and EN-102 and Senior standing
Term Offered: Fall Term
Course Type(s): MEBP, WT
Lecture and laboratory course examining the concepts of ecology and evolutionary biology, the interaction of organisms and their environment, population ecology, community ecology, and ecosystems dynamics. 3 hours of lecture and 3 hours of lab/field work per week.

BY-442 Natural Resource Conservation and Management  Credits: 3
Prerequisite(s): BY-220 and BY-440, both passed with a grade of C- or higher, and EN-101 and EN-102
Term Offered: All Terms
Course Type(s): ME, MEBP, SUS, WT
The principles of ecology and resource management are used to analyze contemporary environmental problems and highlight legislative, technological, and methodological solutions to environmental problems that move us toward a sustainable society.

BY-450 Research in Molecular Cell Physiology  Credits: 1-3
Prerequisite(s): BY-310 passed with a grade of C- or higher
Term Offered: All Terms
Course Type(s): EX, MC
A faculty-student collaborative research lab course. Students will work in small groups under faculty supervision to conduct comprehensive research on a project in molecular cell physiology determined by the directing faculty member. Students will experience all aspects of the research process, from developing hypotheses, planning and carrying out experiments using modern lab techniques, and analyzing data, to preparing research results for publication. May be taken to extend research initiated in BY-250. May be repeated for a maximum of six credits. Limited to Junior or Senior biology majors.

BY-450A Research in Molecular Cell Physiology  Credits: 3
Prerequisite(s): BY-310
Term Offered: Summer Term
Course Type(s): MC
A faculty-student collaborative research lab course. Students will work in small groups under faculty supervision to conduct comprehensive research on a project in molecular cell physiology determined by the directing faculty member. Students will experience all aspects of the research process, from developing hypotheses, planning and carrying out experiments using modern lab techniques, and analyzing data, to preparing research results for publication. May be taken to extend research initiated by BY-250A. (Students who do not need experiential education credit should register for BY-450A. Students who need experiential education credit should register for BY-450.) This course is repeatable for credit. Limited to Junior or Senior biology majors.

BY-475 Endocrinology  Credits: 3
Prerequisite(s): BY-310 or twelve credits in Biology
Term Offered: Spring Term
Course Type(s): MC, ME
Introduction to biochemical, molecular, and physiological aspects of the vertebrate endocrine system and mechanisms by which hormones maintain homeostasis in animals, including humans. Topics to be studied include: molecular structures: biochemical properties and interactions of different categories of hormones and their receptors; major endocrine systems that regulate reproduction, growth, development, and metabolism; neuroendocrinology, and pathophysiology of the endocrine system. Hormones and organs that influence processes such as calcium homeostasis, digestion, salt balance, carbohydrate metabolism, and sex differentiation and development will be examined. Endocrine regulation of male and female reproductive organs and reproduction will also be discussed, including the hormonal control of fertilization, implantation, placental function, pregnancy, parturition, lactation, and contraception.

BY-488 Cooperative Education: Biological Sciences  Credits: 1-3
Prerequisite(s): 6 credits in Biology, overall GPA of 2.00, and Junior standing
Term Offered: Spring Term
Course Type(s): EX
Provides an opportunity for students to fulfill the experiential education requirement by pursuing a short-term cooperative work experience in biology or who are currently employed in a biological or medical field to integrate the work with a related academic component. May be repeated for credit.

BY-489 Internship in Biological Science  Credits: 3
Prerequisite(s): 6 credits in Biology, Junior standing and a minimum GPA of 2.00
Term Offered: All Terms
Course Type(s): EX
Complements the practical experience gained by students at internship sites, such as hospitals, clinics, private practices, research laboratories, environmental agencies, museums, botanical gardens, and zoos with a significant set of academic goals. May be repeated once for credit. This is a pass/fail course.

BY-495 Senior Seminar  Credits: 1
Prerequisite(s): completion of 90 credits; for Biology majors only
Term Offered: All Terms
Course Type(s): RD
A seminar course with presentations by guest scientists as well as students. Gauges students' abilities to draw upon a broad background of coursework and experience to organize, present, discuss, and evaluate topics of current interest in biology.

BY-498 Special Topics in Biology (400 Level)  Credits: 1-3
Term Offered: All Terms
Course Type(s): MC, ME
An intensive study of a particular subject or problem in biology to be announced prior to registration. May be conducted in a lecture, seminar, or laboratory format. If there is a prerequisite for this course it will be announced in the course schedule.
**BY-499  Independent Study in Biology**  
*Credits: 1-3*

Term Offered: All Terms  
Course Type(s): None

Principles of independent study and research; critical review of published work on a designated topic in the biological sciences or original research; preparation of a research paper or review article in publishable format or oral presentation of research results. Laboratory or field work arranged as needed. Requires submission and approval of an "Application for Independent Study" (an e-form is available on WEBadvisor) with a faculty member. Students are required to have prior permission of the directing professor and department chair and Senior standing in Biology to register for this course. (Total of all independent study credits to be counted towards the degree may not exceed six, unless approved by the Dean.)

**BY-499T  Independent Study in Biology with Thesis**  
*Credits: 1*

Term Offered: Spring Term  
Course Type(s): None

Preparation and submission of a thesis in science journal format. The thesis will contain results from the completion of independent study and research and will include appropriate description of the background and methods for the project and discussion of the results and its significance. It is designed specifically for students desiring Biology departmental honors. Students are required to have permission of the course advisor and Senior standing in Biology, Biology with a concentration in Cell and Molecular Physiology, or Marine and Environmental Biology and Policy in order to register for this course.