BIOLOGY

biology.as.miami.edu

Dept. Code: BIL

Introduction

The Department of Biology offers undergraduate programs for students interested in a natural science education that will prepare them for careers in medicine and other health-related fields, biological research, teaching, conservation and environmental management, and other fields that require a broad base of biological knowledge.

Educational Objectives

The Department of Biology trains students to understand and use the scientific method, and to engage in critical thinking and experimental design. We strongly encourage original laboratory and/or field research under the mentorship of biology faculty. The Bachelor of Science in Biology prepares the student for further training in natural science, such as graduate school in biology, as well as medical, veterinary, dental or other health-care professions. The Bachelor of Arts degree prepares the student for careers that may overlap with the social sciences and humanities, including teaching, science policy and environmental law.

Degree Programs

Two undergraduate degrees are available in Biology: the **Bachelor of Science** and the **Bachelor of Arts**.

Both require a **major** in Biology consisting of 34 credit hours in BIL with a minimum grade of C- in each course and an overall GPA of 2.0.

Additional course requirements for each degree are listed under **Bachelor of Science** and the **Bachelor of Arts** elsewhere in this Bulletin.

Advanced placement, and in certain situations, course credit hours can be earned through the College Entrance Examination Board program, placement examinations, and departmental proficiency examinations.

For Graduate programs, consult the Graduate School section of this Bulletin.

Variations within the program described here may be permitted by the Department in special cases.

Advanced Writing and Communication Requirement

Degree candidates in the College of Arts and Sciences must complete at least four writing courses, and at least one such course must be in the student's major discipline. Candidates for the B.S. or B.A. degree in Biology should consult course listings to find writing-intensive courses in BIL. Writing credit on a per case basis may be available in other Biology electives. Interested students should ask the faculty instructor about this possibility. Transfer students may use a maximum of two transfer courses towards the writing requirement.

Honors in Biology

The Biology Department recognizes students who have achieved excellence in original research and coursework by awarding Honors in Biology. Biology Honors students work closely with faculty members first to design a research project and then conduct it for a minimum of two semesters. The centerpiece of the program is a written thesis that is submitted to the Biology Department, and presentation of the thesis research in a public forum.

Students seeking research experience are welcome to contact individual faculty in Biology, or contact the Office of Undergraduate Research for help in finding research mentors. Contact the Director of the Biology Honors Program for more information on the application, the application deadlines, and the program.

Curriculum requirements for Honors in Biology:

Code	Title	Credit Hours
Select a minimum of one of the following: [1]		2-6
BIL 495	Projects in Biology	
BIL 496	Projects in Biology	
BIL 497	Projects in Biology	
Complete a senior thesis, of superior quality, on the results of the research.		
BIL 498	Senior Thesis [2]	
Select research colloquium:		

BIL 499	Research Colloquium [2]
An overall GPA of at least 3.3 and a biology GPA of at least 3.5.	

[1] Projects in Biology involve a research project carried out under the supervision of a member of the Department of Biology faculty or alternative faculty approved by the Office of Undergraduate Research.

[2] Senior Thesis (BIL 498) and Research Colloquium (BIL 499) are taken in the spring semester of the last year of study.

BIL 101. Introductory Biological Science. 3 Credit Hours.
An introduction to life sciences for the non-major. Students with credit in BIL 150 may NOT take this course to fulfill the natural science requirement. Not for credit in the biology major or minor.
Components: LEC.
Grading: GRD.
Typically Offered: Fall, Spring, & Summer.

BIL 102. Humans and Biotechnology. 3 Credit Hours.
An introduction to the branch of biology that implements modern molecular tools to improve human health, lifestyle, and the environment. Explores tools and techniques that aid in the production of high yielding crops, livestock with desirable traits, environmentally friendly products including biofuels and transgenic organisms. Not for credit in the biology major or minor.
Components: LEC.
Grading: GRD.
Typically Offered: Fall & Spring.

BIL 103. Introduction to Ecology. 3 Credit Hours.
Overview of ecological and evolutionary principles; relationships of organisms to living and non-living aspects of the environment; human impact on ecosystems. Not for credit in the biology major or minor.
Components: LEC.
Grading: GRD.
Typically Offered: Fall.

BIL 104. Genetics and Society. 3 Credit Hours.
Genetics for non-science majors. The basics of DNA, genes, gene function, genomes and inheritance. Application of genetics to real-world issues, both personal and societal, from the history of life to challenges and opportunities we face in the modern times at the molecular level.
Components: LEC.
Grading: GRD.
Typically Offered: Fall.

BIL 105. Biology of Plants. 3 Credit Hours.
Evolution and diversity of the plant kingdom; economic and cultural importance of plants to humans. Not for credit in the biology major or minor.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 106. Biology of Animals. 3 Credit Hours.
Evolution and diversity of the animal kingdom and the relationship between humans and other animals. Not for credit in the biology major or minor.
Components: LEC.
Grading: GRD.
Typically Offered: Fall & Spring.

BIL 107. Introduction to Evolution. 3 Credit Hours.
Processes and mechanisms of evolution. A scientific approach to the study of evolution by natural selection, concepts of fitness and adaptation, genetic and developmental bases of evolutionary change, how new species arise, major trends in evolution, extinction and human evolution. Not for credit in the biology major or minor.
Components: LEC.
Grading: GRD.
Typically Offered: Fall & Spring.

BIL 108. Molecular Journey to Being Human. 3 Credit Hours.
With a focus on the human species, students will explore the nature of DNA and proteins, the origin of life, RNA World hypothesis, the origins of human ancestors and modern humans, the recently-completed Human Genome Project, the genetic basis human diversity, and the ethics of using genetic knowledge to improve the quality of human life.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 109. Human Biology. 3 Credit Hours.
Structure and function of the human body, and the relationship of our species to its environment and other species. Not for credit in the biology major or minor.
Components: LEC.
Grading: GRD.
Typically Offered: Spring.

BIL 112. Human Hereditary Disease. 3 Credit Hours.
An overview of genetics, emphasizing human traits and disorders and their effects on individuals, families, and society. Discover the beauty of human nature, and our knowledge of it, as you develop an understanding of human genetics.
Components: LEC.
Grading: GRD.
Typically Offered: Spring.

BIL 116. Introduction to Cancer Biology. 3 Credit Hours.
Basic concepts in cancer biology, including tumor cell proliferation, prevention and therapy (chemotherapy, radiation and immunotherapy). Discussions on lab diagnostic techniques such as DNA cell cycle, proliferation analysis, hormone and tumor marker receptor expression. Impact of research findings on the management and treatment of cancer. Not for credit in the biology major or minor.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 117. Introduction to Animal Behavior. 3 Credit Hours.
Introduction to the scientific study of how and why animals interact with each other and with their environment. Ecological, physiological, and evolutionary approaches to understanding the diversity of behaviors including neurobiology, learning, mating systems, cooperation, communication, habitat selection, and personalities. Not for credit in the biology major or minor.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 118. Introduction to Human Ecology. 3 Credit Hours.
An exploration of the interface between human biology and the science of ecology. Ecology is the branch of biology that studies the interactions of organisms with their environments, and our human species may have the most complex interactions of any species on Earth. Human Ecology will explore the evolutionary past, the economic present, and our imagined future, focusing on the life-support services that humans obtain from ecosystems and our increasingly powerful effects on those ecosystems. Not for credit in the biology major or minor.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 119. Drug Addiction and the Brain. 3 Credit Hours.
A comprehensive overview of current topics in the drugs and addiction field. Main topics will include basic drug pharmacology, an overview of how such studies are designed, insights into brain circuits driving addiction, and the cellular and molecular biology of major drug classes. Student will present in small groups about major publications in the field. Not for credit in the biology major or minor.
Components: SEM.
Grading: GRD.
Typically Offered: Spring.

BIL 120. Tree of Life: Introduction to Biodiversity. 3 Credit Hours.
An exploration of the diversity and evolution of life on Earth, including case studies drawn from throughout the Tree of Life that represent the thrilling and surprising ways in which species have evolved to survive, reproduce, and interact. Not for credit in the biology major or minor.
Components: LEC.
Grading: GRD.
Typically Offered: Fall.

BIL 149. First Year Information. 0-1 Credit Hours.
First year seminar for incoming Biology majors. Facilitation and encouragement of development of critical thinking skills, proficiency in oral and written expression, and an ability to solve problems by integrating knowledge from different disciplines in Biology.
Components: SEM.
Grading: GRD.
Typically Offered: Fall.

BIL 150. General Biology. 4 Credit Hours.
Principles of biology at the cellular, genetic, and organismal levels of organization. Cell structure and function, energy transduction, biological information transfer, genetics,physiology.
Components: LEC.
Grading: GRD.
Typically Offered: Fall, Spring, & Summer.

BIL 151. General Biology Laboratory. 1 Credit Hour.
A laboratory approach to applying the scientific method. Experimental design and hypothesis testing at the cellular and molecular level.
Corequisite: BIL 150.
Components: LAB.
Grading: GRD.
Typically Offered: Fall & Summer.

BIL 153. Introductory Biology/Chemistry Laboratory I. 1 Credit Hour.
Integrated biology and chemistry laboratory exercises for first year students.
Components: LAB.
Grading: GRD.
Typically Offered: Fall.

BIL 160. Evolution and Biodiversity. 4 Credit Hours.
Evolution and ecology of life on Earth. Systematics, biodiversity, evolutionary theory and mechanisms, with emphasis on the morphological, ecological, and behavioral adaptations of the diversity of life.
Prerequisite: BIL 150.
Components: LEC.
Grading: GRD.
Typically Offered: Fall, Spring, & Summer.

BIL 161. Evolution and Biodiversity Laboratory. 1 Credit Hour.
A laboratory approach to applying the scientific method. Experimental design and hypothesis testing at the organismal and ecological level.
Corequisite: BIL 160.
Components: LAB.
Grading: GRD.
Typically Offered: Spring & Summer.

BIL 163. Introductory Biology/Chemistry Laboratory II. 1 Credit Hour.
Integrated biology and chemistry laboratory exercises for first year students.
Corequisite: BIL 160 and CHM 112 or CHM 221.
Components: LAB.
Grading: GRD.
Typically Offered: Spring.

BIL 175. da Vinci Seminar in Biology. 3 Credit Hours.
Seminars on special topics in Biology for the da Vinci program.
Requisite: DaVinci Scholars Program.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 190. Studies in Biology. 1-5 Credit Hours.
Special topics taken at other institutions with no direct equivalents.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 194. Studies in Biology. 1-5 Credit Hours.
Special topics taken at other institutions with no direct equivalents.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 195. Studies in Biology. 1-5 Credit Hours.
Special topics taken at other institutions with no direct equivalents.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 213. HIV and Emerging Diseases: Sex, Science, and Society. 3 Credit Hours.
The importance and value of science in ameliorating human suffering. Students will hear from virologists, immunologists, cell biologistst behavioral scientists, primary care physicians, health care providers, drug discoverers) policy makers, vaccinologists, and HIV-infected individuals aiming to inspire and encourage students to be enthusiastic about science and scientific research on emerging diseases.
Prerequisite: BIL 150 and BIL 151 or BIL 101.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 220. Evolution and Disease. 3 Credit Hours.
Evolutionary perspectives on genetic disorders, cancer, virulence, drug resistance and diet. The role of biodiversity in understanding pathogens and parasites, emerging disease, natural products and drug discovery. How diseases have shaped human evolution.
Prerequisite: BIL 150 and BIL 160.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 222. Plant Diversity. 3 Credit Hours.
The diversity and evolution of seed plants, the most important plants on land that shape our physical environment, affect climate, and provide humans with food, medicines, and materials important in all aspects of our lives. Survey of major lineages of Gymnosperms and Angiosperms, their evolutionary history, adaptations to life on land, reproductive biology, ecology, and economic benefits. Techniques for the collection of plant specimens from the field, and their preparation and identification for museum collections.
Prerequisite: BIL 223 or BIL 226 or Consent of Instructor.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 223. Plants and People. 3 Credit Hours.
A multi-disciplinary survey of ethnobotany and economic botany, emphasizing the ecosystem services that plants provide to humans.
Prerequisite: BIL150 and BIL160 Or Consent of Instructor.
Components: LEC.
Grading: GRD.
Typically Offered: Fall Odd Years.

BIL 226. General Botany. 3 Credit Hours.
Survey of the plant kingdom, including evolution, plant diversity, reproduction, structure, function and ecology.
Prerequisite: BIL150 and BIL160 Or Consent of Instructor.
Components: LEC.
Grading: GRD.
Typically Offered: Fall Even Years.

BIL 227. General Botany Laboratory. 1 Credit Hour.
Laboratory exercises to accompany BIL 226.
Pre/Corequisite: BIL 223 or BIL 226 Or Consent of Instructor.
Components: LAB.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 228. Medical Botany. 3 Credit Hours.
History of medical botany, approaches to health by different cultures, seperation and identification of secondary compounds and mechanisms of action. Molecular and physiological action of different secondary compounds in the treatment of common western ailments. In vivo identification of local medicinal plants.
Prerequisite: BIL150 and BIL151 AND BIL160 and BIL161 for Biology Majors or Minors.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 230. Introduction to Marine Biology. 3 Credit Hours.
The sea as an environment. Marine life, its special problems and adaptations. Emphasis on Caribbean organisms. Lecture, 3 hours. Identical to Marine Science 230.
Components: LEC.
Grading: GRD.
Typically Offered: Fall & Spring.

BIL 231. Introduction to Marine Biology Laboratory. 1 Credit Hour.
Experimental laboratory exploring ecology, physiology and behavior of marine organisms in southern Florida marine habitats. Exercises cover laboratory techniques in behavior, functional morphology, productivity, fisheries research, osmoregulation and community ecology.
Pre/Corequisite: BIL 230.
Components: LAB.
Grading: GRD.
Typically Offered: Fall.

BIL 244. Hormones and Behavior. 3 Credit Hours.
A comparative approach to the relationship between hormonal mechanisms and behavior in both animal model systems and humans. An introduction to the endocrine system, sex differences in behavior, parental behavior, hormones and social behavior, learning and memory, stress and affective disorders, interactions between brain, hormones and behavior from a historical perspective viewing the emergence of key theories.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 250. Genetics. 3 Credit Hours.
The nature, organization, replication, expression, and evolution of the genetic materials.
Prerequisite: BIL 150 and BIL 160 and BIL 151 or BIL 153 and BIL 161 or BIL 163.
Components: LEC.
Grading: GRD.
Typically Offered: Fall, Spring, & Summer.

BIL 251. Genetics Laboratory. 2 Credit Hours.
Laboratory exercises in genetics.
Pre/Corequisite: BIL 250.
Components: LAB.
Grading: GRD.
Typically Offered: Fall & Spring.

BIL 255. Cellular and Molecular Biology. 3 Credit Hours.
Structure, molecules, and functions of cells.
Prerequisite: BIL 150 and BIL 160 and BIL 151 or BIL 153 and BIL 161 or BIL 163.
Components: LEC.
Grading: GRD.
Typically Offered: Fall & Spring.

BIL 256. Cellular and Molecular Biology Laboratory. 2 Credit Hours.
Laboratory exercises in cellular and molecular biology involving current research techniques and applications.
Pre/Corequisite: BIL 255 Or BIL 559.
Components: LAB.
Grading: GRD.
Typically Offered: Spring.

BIL 258. Core Laboratory Techniques. 2 Credit Hours.
Conceptual and applied "methods" course in modern analytical techniques. It will expose students to the Department of Biology's three best-developed core laboratory facilities for imaging, molecular biology, and element analysis.
Components: LAB.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 261. High Altitude Biology and Medicine. 3 Credit Hours.
Mechanisms of hypoxia resistance influencing the requirement to match oxygen supply and demand throughout the oxygen cascade. Topics drawn from genomics, integrated physiology, population genetics, biochemistry, gene expression, evolution, and alpine medicine. Taxonomic examples from the literature will include humans, other mammals, birds, reptiles, amphibians, and fish.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 267. Science Documentary: Autism. 3 Credit Hours.
This course brings together students in both science and communication to collaborate on content intended to reach audiences on multiple platforms. Students will be exposed to both history and cutting edge research surrounding Autism Spectrum Disorders. Students will connect with people in the local community, and collaborate on short documentary films as well as audio exercises.
Components: LEC.
Grading: GRD.
Typically Offered: Fall.

BIL 268. Neurobiology. 3 Credit Hours.
Neurons, organization of the nervous system, electrical properties of neurons, neurotransmitters, receptors, synaptic transmission, sensory and motor system, and complex brain functions.
Prerequisite: BIL 150.
Components: LEC.
Grading: GRD.
Typically Offered: Fall & Spring.

BIL 280. Writing in Biology. 0 Credit Hours.
Writing instruction by faculty using biological topics in BIL courses offered at the 200 level.
Components: IND.
Grading: SUS.
Typically Offered: Fall & Spring.

BIL 281. Undergraduate Learning Internship in Biology. 1 Credit Hour.
Undergraduate Learning Intern in Biology Students serve as peer mentors in a laboratory setting, assisting a graduate laboratory instructor in teaching basic biological concepts to first year undergraduates in BIL 151 and BIL 161.
Components: PRA.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 284. Special Laboratory Topics in Biology. 1-4 Credit Hours.
Topics relevant to the biological sciences, listed as subtitle. May be combined/co-listed with other departments or programs.
Prerequisite: BIL 150 and BIL 151 and BIL 160.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 285. Special Topics in Biology. 3 Credit Hours.
Topics relevant to the biological sciences, co-listed with other departments or programs.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 286. Clinical Medicine I. 3 Credit Hours.
Bi-weekly clinical rotations with physicians at Miller School of Medicine and simulation labs at the Gordon Center. Note: Credit / No Credit classes including this one will not count as a Biology elective toward the Biology major or minor.
BIL 150 and BIL 160 AND CHM 111 or 121 AND CHM 113 and CHM 112 or CHM 221 AND CHM 114.
Components: PRA.
Grading: SUS.
Typically Offered: Fall.

BIL 287. Clinical Medicine II. 3 Credit Hours.
A continuation of Clinical Medicine I; bi-weekly clinical rotations with physicians at Miller School of Medicine and simulation labs at the Gordon Center. Note: Credit / No Credit classes including this one will not count as a Biology elective toward the Biology major or minor.
Prerequisite: BIL 286.
Components: PRA.
Grading: CNC.
Typically Offered: Spring.

BIL 299. Seminar in Research Problems. 1 Credit Hour.
Discussion of current research of the Biology Faculty.
Prerequisite: BIL 150 and BIL 151 or BIL 153 and BIL 160 and BIL 161 or BIL 163.
Components: SEM.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 305. Biomedical Technology. 3 Credit Hours.
Non-mathematical introduction to technical and clinical aspects of biomedical engineering. Biomedical signals and instrumentation, sensors, transducers, physiological measurements, laboratory instrumentation, implants, cardiac assist devices, radiology, ultrasound, CT, MRI, and transmission and scanning electron microscopy. Not open to BME majors or non-STEM majors.
Prerequisite: BIL 150. And CHM 121.
Components: LEC.
Grading: GRD.
Typically Offered: Spring.

BIL 315. Marine Biota and Biogeochemical Cycles. 3 Credit Hours.
The diverse sources, transformations, and sinks of chemical constituents in the sea; distribution of dissolved and particulate materials in the sea. Role of marine organisms in marine biogeochemical cycling and the marine carbon cycle and its interaction with the terrestrial biosphere and atmosphere.
Prerequisite: MSC 215.
Components: LEC.
Grading: GRD.
Typically Offered: Fall.

BIL 316. Global Primary Production. 3 Credit Hours.
Photosynthesis supports the vast majority of life on planet earth. Although terrestrial and aquatic photoautotrophs share the same basic photosynthetic mechanisms, the physical environment and the fate of primary product on differ on land versus in the sea. This course reviews the magnitude and processes that shape primary production in terrestrial, oceanic, and freshwater habitats. It includes the fate of primary production in the earth's biomes, and the role of terrestrial and aquatic productivity in regulating, and responding to, variable climate.
Prerequisite: BIL 160.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 320. Evolutionary Biology. 3 Credit Hours.
History of the theory of evolution. Macroevolution, including the fossil record, the origin of life on Earth, phylogeny and biodiversity, human evolution, speciation and extinction. Microevolution and population genetics, including mutation and genetic variation, natural selection, genetic drift, gene flow, and nonrandom mating. Heritability and evolution of key traits. Evolutionary insights into behavior, including kin selection, sexual selection, co-evolution and co-speciation.
Prerequisite: BIL 150 and BIL 160.
Components: LEC.
Grading: GRD.
Typically Offered: Fall & Spring.

BIL 321. Invertebrate Zoology. 4 Credit Hours.
Biology of invertebrates, with emphasis on tropical and subtropical marine forms. Field work and combined lecture-laboratory sessions.
Prerequisite: BIL 250 or BIL 255.
Components: LEC.
Grading: GRD.
Typically Offered: Spring.

BIL 322. Biology of Fungi. 3 Credit Hours.
Fungi are often overlooked, but shape the world we live in. This course will introduce students to the fascinating kingdom of fungi, with a particular focus on those that directly or indirectly impact humans: we will discuss the biology of selected beneficial and pathogenic fungi and will explore their role in human health, agriculture, and ecology. We will also discuss modern biotechnological tools and applications that allow us to exploit fungi to advance medicine and promote agronomical and environmental sustainability.
Prerequisite: BIL 150 or BIL 160.
Components: LEC.
Grading: GRD.
Typically Offered: Spring.

BIL 324. The Biology of Fishes. 3 Credit Hours.
Selected topics on the ecology and physiology of fishes. Lectures on reproduction, respiration, osmoregulation, sense systems, hormonal control.
Prerequisite: BIL 255 and BIL 360.
Components: LEC.
Grading: GRD.
Typically Offered: Spring.

BIL 328. Biology of Birds. 4 Credit Hours.
General biology of birds. Lectures emphasizing avian behavior, evolution, ecology, and conservation. Field trips and laboratory emphasizing identification and systematics of South Florida birds. Lecture 3 hours, Laboratory one hour. Six weekend field trips, 6 hours each.
Prerequisite: At least one BIL course at the 200 - level.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 329. Marine Vertebrate Zoology. 3 Credit Hours.
The form and function of the vertebrate lineage of marine animals from early chordates to the evolution of cartilaginous and bony fish and the emergence of tetrapods, those that evolved from marine ancestors and have since returned to the seas. A comparative point of view will be used to assess the anatomy and physiology of each taxonomic group as well as behavioral and ecological adaptations related to their life history. Topics will include the emergence of the vertebrate body plan and the evolution of fish from agnathans through modern teleosts, as well as the tetrapod lineage of marine reptiles, marine birds, and marine mammals. Discussion of critical points in vertebrate evolution where genome-wide duplication events occurred as well as instances of convergent evolution in various lineages.
Prerequisite: MBE 230.
Components: LEC.
Grading: GRD.
Typically Offered: Spring.

BIL 330. Ecology. 3 Credit Hours.
The interactions of living organisms with each other and with their abiotic environment.
Prerequisite: BIL 250. or BIL 255. Calculus strongly recommended.
Components: LEC.
Grading: GRD.
Typically Offered: Fall & Spring.

BIL 331. Ecology Laboratory. 2 Credit Hours.
Lab and field exercises in ecology. Some Saturday field trips required.
Pre/Corequisite: BIL 330.
Components: LAB.
Grading: GRD.
Typically Offered: Fall & Spring.

BIL 333. Conservation Biology. 3 Credit Hours.
The challenges facing conservation practitioners and the toolkit that has been developed to face these threats. Examination of important conservation cases and how endangered species and ecosystems are distributed across the globe; common threats to biodiversity and methods that have been developed to face these threats at both species and landscape scales; government implementation of conservation strategies. Students will read papers from the primary literature on a weekly basis that provide examples of how conservation tools are developed and implemented. Biology 330 (Ecology) is recommended.
Prerequisite: BIL 150 and BIL 151 and BIL 160 and BIL 161. BIL 330 recommended.
Components: LEC.
Grading: GRD.
Typically Offered: Spring.

BIL 334. Biogeography and Conservation. 3 Credit Hours.
The modern science of biogeography and its implications for the design of spatial strategies to conserve biodiversity and ecosystem services. Examination of the history of biogeography and its geographical and ecological foundations. Study of the fundamental biogeographic processes and uses them to investigate the evolution of biotas and explain the current biogeographic patterns. Exploration of the emerging field of conservation biogeography and its applications.
Pre/Corequisite: BIL 330.
Components: LEC.
Grading: GRD.
Typically Offered: Fall & Spring.

BIL 335. Tropical Field Biology. 3 Credit Hours.
Intensive field study at various tropical sites, conducted during semester recesses with additional on-campus lectures. Requires payment of trip costs.

Pre-Requisite: BIL 150 and BIL 160.
Components: FLD.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 336. Hurricanes and Ecology. 2 Credit Hours.
The ecology of disturbance by looking at hurricane impacts on coastal communities of South Florida. The course includes reading journal articles, and understanding the ecological theory behind succession and fragmentation of communities after storms. Weekend trips are required.
Prerequisite: BIL 150 and BIL 160.
Components: SEM.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 337. Coastal Ecology. 3 Credit Hours.
Unprecedented pressure from population growth, tourism, and resource exploitation of coastal ecosystems provides a theme for an overview of current coastal ecology, especially within a conservation and management framework. Hands-on learning in ecohydrology, coastal oceanography, integration of biological communities, and coastal wetland classification for tropical Florida and the insular Caribbean. Students will review and actively participate in water quality and environmental monitoring.
Pre/Corequisite: BIL 330.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 340. Herpetology. 4 Credit Hours.
Biology of reptiles and amphibians. Their evolutionary history, a description of their current diversity, and how this diversity is distributed geographically. Physiology, including thermoregulation, reproduction, locomotion, and feeding. Spatial ecology, communication, sexual selection, predation, and community assembly.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 343. Animal Communication. 3 Credit Hours.
How communication evolves and functions across species, from invertebrates to humans, through a range of acoustic, visual, and chemical signals. How physical constraints shape animal signals, how animals convey information through signaling, and how honesty is maintained in communication systems. Signaling in a variety of contexts, including mate attraction, competition, and predation.
Prerequisite: At Least 3 Credits of BIL 200 Level or Higher.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 348. Climate Change and Public Health. 3 Credit Hours.
The mechanisms by which climate change adversely affects human health, and the policy options for mitigating our exposure.
Components: SEM.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 350. Survey of Marine Mammals. 3 Credit Hours.
The evolution and ecology of the cetaceans, pinnipeds, manatees, and allies: Natural history, zoo geography, physiology, husbandry, and biomedical aspects.
Prerequisite: BIL 150 and MSC 230.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 351. Molecular Genetics Laboratory. 2 Credit Hours.
Classical and molecular genetics experimental techniques. Content will include dominant and recessive mutations, regulation of gene expression, transgenes and transposons, DNA and RNA sequencing, and other essential molecular genetic methods and principles demonstrated through original experiments in model organisms.
Prerequisite: BIL 250.
Components: LAB.
Grading: GRD.
Typically Offered: Fall & Spring.

BIL 352. Techniques in Scanning Electron Microscopy. 3 Credit Hours.
Tissue preparation, use of the scanning electron microscope, photography, and analysis and manipulation of digital images. Lecture 1 hour; laboratory 5 hours.
Components: LAB.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 353. Projects in Scanning Electron Microscopy. 2 Credit Hours.
Individual research projects in scanning electron microscopy. Six hours of laboratory.
Prerequisite: BIL 352.
Components: PRA.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 354. Biology of Viruses. 3 Credit Hours.
The molecular biology, ecology, and clinical relevance of prokaryotic and eukaryotic viruses, the most abundant and diverse biological entities on the planet. Current and emerging topics in virus research, including the role of viruses in modulating carbon and nutrient cycles in the biosphere, viral therapy as a tool against emerging multi-drug resistant bacteria, and viral spillover, using the 2020 coronavirus outbreak as a case study.
Prerequisite: BIL 150 and BIL 160.
Components: LEC.
Grading: GRD.
Typically Offered: Spring.

BIL 360. Comparative Physiology. 3 Credit Hours.
How animals work and the physiological processes that allow for animal life. Fundamental aspects of physiology, such as homeostasis, metabolism, function of the nervous system, endocrine function, movement, gas and water transport. The relationship between structure and function through comparisons across diverse animal taxa. Emphasis on critical thinking and application of the scientific method.
Prerequisite: BIL 255.
Components: LEC.
Grading: GRD.
Typically Offered: Fall & Spring.

BIL 365. Endocrinology. 3 Credit Hours.
The endocrine glands and the chemistry, mechanisms of action, and physiological effects of hormones. Emphasis on vertebrate hormones, including clinical aspects of human endocrinology.
Components: LEC.
Grading: GRD.
Typically Offered: Fall.

BIL 369. Biology of Aging. 3 Credit Hours.
How and why we age. The biology of aging at the molecular, cellular, and organismal levels in a comparative and evolutionary context.
Prerequisite: BIL 250 or BIL 255.
Components: LEC.
Grading: GRD.
Typically Offered: Fall.

BIL 371. Readings in Biology. 1 Credit Hour.
Independent readings on selected topics in biology under the supervision of individual faculty.
Components: DIS.
Grading: GRD.
Typically Offered: Fall & Spring.

BIL 372. Readings in Biology. 1 Credit Hour.
Independent readings on selected topics in biology under the supervision of individual faculty.
Components: IND.
Grading: GRD.
Typically Offered: Spring.

BIL 374. Seminar in Biology. 1 Credit Hour.
Seminar in selected topics in biology.
Prerequisite: BIL150 and BIL160 and BIL151 or BIL153 and BIL161 or BIL163.
Components: SEM.
Grading: GRD.
Typically Offered: Fall & Spring.

BIL 375. Seminar in Biology. 1 Credit Hour.
Seminar on selected topics in biology.
Prerequisite: BIL150 and BIL160 and BIL151 or BIL153 and BIL161 or BIL163.
Components: SEM.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 376. Complementary and Integrative Medicine. 2 Credit Hours.
Almost 40% of Americans use health care approaches outside of mainstream Western medicine. These non-traditional approaches include acupuncture, meditation, massage therapy, reiki, yoga, hypnotherapy, chiropractic manipulation, and herbal medicine. Some of these approaches seem to hold promise in the healing process, while others have had little research to date. In this course, we will examine scientific evidence for the efficacy of these different approaches.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 380. Writing in Biology. 0 Credit Hours.
Writing instruction by faculty using biological topics in BIL courses offered at the 300 level.
Components: IND.
Grading: SUS.
Typically Offered: Fall & Spring.

BIL 381. Workshop Leaders in Biology I. 0-1 Credit Hours.
Peer-led Team Teaching of workshops for groups of BIL 150 students. May be taken once only for credit in the BIL major, but may be taken additional times for a general education credit. Students may serve as workshop leaders for a second time for a stipend if they (1) have taken the course once before and (2) are graduating seniors.
Components: DIS.
Grading: GRD.
Typically Offered: Fall.

BIL 382. Workshop Leaders in Biology II. 0-1 Credit Hours.
Peer-led Team Teaching of workshops for groups of BIL 160 students. May be taken once only for credit in the biology major, but may be taken additional times for general education credit. Students may serve as workshop leaders for a second time for a stipend if they (1) have taken the course once before and (2) are graduating seniors.
Components: DIS.
Grading: GRD.
Typically Offered: Spring.

BIL 384. Special Laboratory/Field Topics in Biology. 1-4 Credit Hours.
Topics relevant to the biological sciences, listed as subtitle. Maybe combined/co-listed with other departments or programs.
Prerequisite: BIL 150 and BIL 151 and BIL 160 and BIL 161.
Components: LAB.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 385. Special Topics in Biology. 2-6 Credit Hours.
Topics relevant to the biological sciences, listed as subtitle. May be co-listed with other departments or programs.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 386. Science Made Sensible Teaching Internship. 3 Credit Hours.
A teaching internship in which students spend at least 60 hours in Miami Dade County Public Schools assisting teachers with science education. Contributions to bimonthly workshops and group meetings, creation of lesson plans following Sunshine State Guidelines.
One BIL course at the 200 level or higher.
Components: PRA.
Grading: GRD.
Typically Offered: Fall & Spring.

BIL 389. Nonacademic Career in Biology. 2 Credit Hours.
Speakers recruited from local biotech companies, conservation organizations, science museums, the National Park Service, and Customs as well as invasive species specialists, medical dosimetrists, principals of schools seeking biology teachers, and others will give weekly seminars about their practice of science in their occupations. Following each seminar, students will meet with speakers in an informal setting to discuss the particulars and or prospects of the career in question. The express purpose of this course is to provide students with an idea of the utility of their biology degree in the workplace. Papers or writings that pertain to a particular career will be assigned prior to the seminar so that students will be ready with questions for the speaker.
Prerequisite: 1 Course in BIL 200 or Higher.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 390. Studies in Biology. 1-5 Credit Hours.
Special topics taken at other institutions with no direct equivalents.
Components: SEM.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 395. Studies in Biology. 1-5 Credit Hours.
Special topics taken at other institutions with no direct equivalents.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 399. DNA and the Changing World. 3 Credit Hours.
This is an online course, not intended for biology majors. It covers in-depth knowledge of DNA, gene, gene function, genome and inheritance with the focus on applying the knowledge to real-world issues; both personal and societal, from the history of life to challenges and opportunities in the modern times at the molecular level. Does not count towards a Biology major or minor.
Components: SEM.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 402. Seminar in Biology. 1 Credit Hour.
Seminar on selected topics in Biology.
Components: SEM.
Grading: GRD.
Typically Offered: Fall & Spring.

BIL 403. Neuroscience Laboratory. 4 Credit Hours.
Research methods and laboratory experiments in contemporary neuroscience from individual cells to behavior. Scientific writing and computer applications in experimental design and analysis. Combined lecture and laboratory.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 415. Coral Reef Science and Management. 3 Credit Hours.
Coral reefs as biophysical and socioeconomic systems. Coral reef typology, geomorphology; biotic and abiotic components of coral reef ecosystems.
Prerequisite: BIL 250 or BIL 255.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 426. Native and Introduced Plants of the Galapagos. 3 Credit Hours.
The unique vegetation and introduced flora of the Galapagos Islands in Ecuador. Current conservation measures used to control the threats affecting native flora, and future prospects for conserving indigenous plants and for ensuring their rational utilization. Taught in the Galapagos as part of the UGalapagos semester.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 430. Tropical Ecology. 3 Credit Hours.
Tropical ecosystems including world distribution of tropical climate biogeographical regions, deserts and environmental factors, grassland and primary production, savannah population dynamics, energy flow, biogeochemical cycling, succession, and biodiversity of tropical ecosystems.
Prerequisite: BIL 330.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 431. Landscape Ecology. 3 Credit Hours.
An in-depth exploration of landscape ecology, the interplay between spatial pattern and ecological process. How spatial patterns are characterized by scale, ecological communities, and elements of connectedness. Ecological classifications of landscapes, and how patterns develop on landscapes. How landscapes change through time, and how those changes can be detected, analyzed and simulated. Management of landscapes for conservation biology and ecosystem services. Taught in Ecuador as part of the UGalapagos program.
Prerequisite: BIL 150 and BIL 160.
Components: LAB.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 432. Ecology in the Galapagos. 3 Credit Hours.
Organisms in relation to their environment, with focus on interactive, hands-on learning that connects empirical nature with abstract thinking. Lectures, discussion and fieldwork on ecosystem ecology, plant dispersal and colonization; organisms' responses to spatial and temporal variability in their environments, plant/animal interactions. Origins and effects of invasive species and actions of bio-control agents. Taught in the Galapagos as part of the UGalapagos semester.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 433. Conservation in Practice. 3 Credit Hours.
Intersection between economic development, science and conservation in one of the world's most pristine and fragile ecosystems, the Galapagos Islands. Exploration of how tourism offers an alternative to unsustainable fisheries that once drove the local economy, yet has created a new set of pressures on the people and the environment. Mitigation efforts, science, and international conservation mesh with an understanding of local politics, customs and cultures. Taught in the Galapagos as part of the UGalapagos semester.
Prerequisite: BIL 432.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 434. Behavioral Ecology of the Galapagos. 3 Credit Hours.
Functional aspects of animal behavior, including topics such as animal communication, optimal foraging, mating systems, sexual selection, and the evolution of cooperation. Studies of the behavior of Galapagos organisms are emphasized.
Prerequisite: BIL 150 and BIL 151 or BIL 153 and BIL 160 and BIL 161 or BIL 163.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 435. UBrazil Tropical Cerrado Ecology. 3 Credit Hours.
Three-week field course in Brazilian Cerrado (savanna) systems. Immersive experience into the cultures, history and ecosystems of tropical Cerrado (savanna) of Brazil, while learning the approaches and techniques used by contemporary field ecologists for identifying, quantifying and comparing patterns of biodiversity at multiple spatial and temporal scales across different taxa. On-site field surveys and experiments. Combined lecture and laboratory/field course.
Components: FLD.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 436. Stable Isotope Ecology. 3 Credit Hours.
Stable isotopes of essential elements (Oxygen, Carbon, Nitrogen, Hydrogen and Sulfur) as natural tracers of ecological processes. Principles of Chemistry, Physics and Biology will be integrated to allow interpretation, via these tracers, of how fundamental elements are cycled through the biosphere.
Prerequisite: BIL 330.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 441. Animal Behavior. 3 Credit Hours.
Mechanistic and evolutionary aspects of animal behavior. A survey of systems that illustrate the control, development and function of behavior in a variety of animals.
Prerequisite: BIL 150 and BIL 160.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 442. Animal Behavior Laboratory. 2 Credit Hours.
An exploration of the amazing behaviors of animals from an explicitly evolutionary perspective. The study of the diversity of behavior in nature as shaped by natural and sexual selection. Topics will include: resource acquisition and defense, predator avoidance, mate choice and competition for mates, and cooperative behavior. Labs are inquiry based, with students designing, conducting and analyzing experiments to test hypotheses. Students will develop their scientific communication skills throughout the semester by gaining experience in oral presentations and writing manuscripts. Note that this course will involve two required field trips off campus.
Prerequisite: BIL 150 and BIL 160.
Components: LAB.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 450. The Biology of Symbiosis. 3 Credit Hours.
Symbiosis, interactions between species that live in close physical association, in particular those between microbes and multicelluar eukaryotic hosts is fundamental to almost all aspects of biology. Building discipline specific knowledge about symbiosis. The course includes engagement with the scientific literature as a professional researcher, and development of foundational skills for presentation and synthesis of scientific information in visual, oral and written form.
Prerequisite: BIL 250 Or BIL 330.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 452. Evolution and Conservation Genetics. 3 Credit Hours.
Integration of evolutionary theory and genetics to address conservation problems and their solutions. Theory and empirical information pertaining to evolution on islands and the impact of humans on endemic species. Natural selection, sexual selection, population genetics, niches, diversity, and conservation in the context of the Galapagos Islands.
Prerequisite: BIL 150 and BIL 151 or BIL 153 and BIL 160 and BIL 161 or BIL 163.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 454. Biological Core Concepts Through Medical Case Studies. 3 Credit Hours.
A capstone course in which students will complete a series of medically-oriented case studies. Knowledge of biology, chemistry, math, and physics will be applied to real-world issues. Critical thinking will be used to solve basic medical problems, and facilitate understanding of the interdisciplinary nature of medicine.
Requisite: BIL 150 And BIL 151 And BIL 160 And BIL 161 Or equivalent And one BIL 200 level or higher course.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 455. Developmental Biology. 3 Credit Hours.
A study of the process by which a fertilized egg gives rise to a multicellular organism with organs, tissues and cell types that are structurally and functionally distinct and are arranged in a characteristic three-dimensional body plan. This course will take a comparative approach using invertebrate and vertebrate models to cover the current understanding of the cellular, molecular and genetic mechanisms that regulate the development of animals. Evolutionary mechanisms and the biomedical relevance of developmental biology will be emphasized.
Prerequisite: BIL 250 or BIL 255.
Components: LEC.
Grading: GRD.
Typically Offered: Fall.

BIL 456. Developmental Biology Laboratory. 2 Credit Hours.
Experimental analysis of animal development using a variety of techniques including experimental embryology, microscopy, molecular biology, genetics and immunochemistry. Following a short series of introductory labs and lectures, students will develop an independent research proposal and will spend the remaining weeks of the semester working on their projects under the guidance of the instructors. This class is restricted to students who have taken cell and molecular biology, developmental biology OR genetics.
Pre/Co-Requisite: BIL 455 or Consent of Instructor.
Components: LAB.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 467. Biology of Cancer. 3 Credit Hours.
A multifaceted exploration of human cancer biology from molecular, cellular, genetic, and histological perspectives, highlighting cellular homeostasis as a precarious life-and-death balancing act.
Prerequisite: BIL 250 or BIL 255.
Components: LEC.
Grading: GRD.
Typically Offered: Fall.

BIL 468. Developmental Neuroscience. 3 Credit Hours.
Molecular, cellular, and physiological mechanisms controlling the proper development and function of neurons and neural circuits. Signaling mechanisms that regulate cell determination, proliferation, and differentiation. Neural migration and outgrowth, synaptic connectivity and plasticity, and neural basis of animal behavior.
Prerequisite: BIL 255.
Components: LEC.
Grading: GRD.
Typically Offered: Spring.

BIL 476. Science Made Sensible Teaching Internship. 3 Credit Hours.
Science Made Sensible (SMS) is a civic engagement, community-based learning course in which undergraduates are resident scientists in Miami-Dade County Public Schools science classrooms. During the internship, resident scientists spend 6 hours in the classroom each week teaching with their K-12 science teacher partners. Resident scientists also develop hands-on, inquiry-based lesson plans which can be implemented in their middle or high school science classes. They also contribute to two Saturday morning professional development workshops with the K-12 teacher partners. SMS provides undergraduates in STEM disciplines the opportunity to teach science in underserved public schools in Miami and be a mentor to middle and high school students by increasing their scientific curiosity and talking with them about college and STEM careers.
Components: PRA.
Grading: GRD.
Typically Offered: Fall.

BIL 480. Writing in Biology. 0 Credit Hours.
Writing instruction by faculty using biological topics in BIL courses offered at the 400 level.
Components: IND.
Grading: SUS.
Typically Offered: Fall & Spring.

BIL 481. Undergraduate Teaching Assistant Training in Biology. 1 Credit Hour.
Training and teaching assistance for undergraduate workshops or laboratories, under the direct supervision of faculty. This course may be taken no more than once for credit in the Biology major or minor. May be taken additional times for general elective credit only.
Components: PRA.
Grading: GRD.
Typically Offered: Fall & Spring.

BIL 482. PRISM Teaching Fellow. 2 Credit Hours.
Undergraduate mentors to PRISM students, and teaching fellows to PRISM course instructors in biology.
Components: PRA.
Grading: GRD.
Typically Offered: Fall & Spring.

BIL 484. Special Laboratory Topics in Biology. 1-4 Credit Hours.
Topics relevant to the biological sciences, listed as subtitle. May be combined/co-listed with other departments or programs.
Prerequisite: BIL 200 or Higher.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 485. Special Topics in Biology. 2-6 Credit Hours.
Topics relevant to the biological sciences. May be co-listed with other departments or programs.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 486. Advanced Science Made Sensible Teaching Internship. 3 Credit Hours.
A teaching internship in which students spend at least 60 hours in Miami Dade County Public Schools assisting teachers with science education. Contributions to bimonthly workshops and group meetings, development of problem-based lesson plans to promote critical thinking.
Prerequisite: BIL 476.
Components: PRA.
Grading: GRD.
Typically Offered: Spring.

BIL 491. Departmental Seminar in Biology. 1 Credit Hour.
Research seminars by distinguished biologists.
Components: SEM.
Grading: GRD.
Typically Offered: Fall.

BIL 492. Departmental Seminar in Biology. 1 Credit Hour.
Research seminars by distinguished biologists.
Components: SEM.
Grading: GRD.
Typically Offered: Spring.

BIL 494. Summer Research in Biology. 0 Credit Hours.
Individual, original laboratory or field research supervised by a member of the Department of Biology faculty conducted during the summer in UM facilities. This course does not count towards the BIL BS lab/field course requirement.
Components: LAB.
Grading: SUS.
Typically Offered: Summer.

BIL 495. Projects in Biology. 2 Credit Hours.
Individual, original research supervised by a member of the department faculty and concluded by a formal written report.
Components: LAB.
Grading: GRD.
Typically Offered: Fall & Spring.

BIL 496. Projects in Biology. 2 Credit Hours.
Individual, original research supervised by a member of the department faculty and concluded by a formal written report.
Components: LAB.
Grading: GRD.
Typically Offered: Fall & Spring.

BIL 497. Projects in Biology. 2 Credit Hours.
Individual, original research supervised by a member of the department faculty and concluded by a formal written report.
Components: LAB.
Grading: GRD.
Typically Offered: Fall & Spring.

BIL 498. Senior Thesis. 2 Credit Hours.
Formal thesis preparation supervised by a member of the departmental faculty including a public presentation and submission of the written document to the department.
Components: THI.
Grading: GRD.
Typically Offered: Fall & Spring.

BIL 499. Research Colloquium. 1 Credit Hour.
Discussion of current research done by undergraduate students.
Components: SEM.
Grading: GRD.
Typically Offered: Spring.

BIL 508. Research in Progress Seminar. 1 Credit Hour.
Students will explore current research by Biology Department graduate students, postdoctoral fellows, and faculty through weekly research seminar presentations.
Components: SEM.
Grading: CNC.
Typically Offered: Fall & Spring.

BIL 511. Advanced Biostatistics. 4 Credit Hours.
Statistical analyses needed to understand, present, and publish biological research. Examples will primarily be drawn from the biomedical and ecological fields. The course will begin with a review of descriptive statistics, probability theory, and univariate distributions, followed by an overview of experimental design and analysis of categorical data using contingency tables. This will be followed by a unit on parametric analysis of univariate data including both simple and multiple linear regression, model selection, and analysis of variance. The final unit will cover non-parametric versions of these analyses and more advanced multivariate statistical methods. Lectures will be accompanied by a computer lab in which students learn hands-on statistical analysis in SAS JMP.
Prerequisite: At least one BIL course at the 300 level.
Components: LEC.
Grading: GRD.
Typically Offered: Fall.

BIL 514. Advanced Biological Writing. 3 Credit Hours.
A crucial part of being a biologist is sharing one's scientific discoveries with the broader community of researchers and users of this knowledge (industry, NGOs, government agencies, etc). One of the most important ways scientists exchange information with one another is through publication of journal articles, theses, and dissertations. This class provides advanced undergraduate and graduate students with guided, hands-on experience writing scientific papers. Over the course of the semester, students in this class will write up a scientific paper from their research into a manuscript for journal publication or thesis/dissertation chapter submission. In addition, the students will learn to critically evaluate what underpins successful scientific writing and develop a toolbox of skills for successful scientific writing in the future.
Components: DIS.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 515. Object-Oriented Programming and Agent-Based Modelling. 3 Credit Hours.
Hands-on training in object-oriented programming using Java, including Java statistical packages, and in the development of agent-based and individual-based simulation models for ecological, physiological, social, economic and physical sciences. Introductions to cellular automatons and modes based on social and behavioral networks. No prior programming experience required.
Prerequisite: At least one BIL course at the 200 level.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 520. Evolution. 3 Credit Hours.
Evidence for evolution; microevolution including natural selection, kin selection, genetic drift, gene flow, mutation, and evolutionary game theory; macroevolution including speciation, adaptation, phylogenetics, origin of life, and extinction.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 521. Phylogenetics. 3 Credit Hours.
Concepts and methods in phylogenetic systematics. The importance of phylogenetic trees in biology. Use of phylogenies in taxonomy, trait evolution (including homology, adaptations and key innovations), biogeography, speciation, diversification rates, molecular evolution, molecular clocks, and gene duplication.
Prerequisite: BIL 250.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 523. Advanced Biology of Marine Invertebrates. 4 Credit Hours.
Detailed study of major phyla of marine invertebrates. Special emphasis on taxa found in waters off southern Florida. Field course. Lectures, laboratory, special projects, and seminars.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 526. Analyses in R. 3 Credit Hours.
Hands-on use of statistical analyses and graphics with the package R and version control with GitHub. Different statistical techniques in R, coding, and interpretation of output from analyses.
Components: SEM.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 531. Advanced Field Ecology. 5 Credit Hours.
Principles of and practical experience in quantitative sampling of community structure, plant and animal populations, and animal activities. Emphasis on individual projects. Lecture, 3 hours; laboratory/field, 10 hours on alternate Saturdays, plus research projects.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 535. Molecular Ecology. 3 Credit Hours.
Molecular markers and analyses, and their applications to different problems in biology. Appropriate sampling, methods for assessing genetic diversity and differentiation. Approaches to studying gene flow, tools for behavioral ecology, remote sampling, tracking individuals, and paternity analysis, hybridization and speciation, DNA bar codes, and gene expression from a population biological perspective.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 536. Molecular Ecology Laboratory. 1 Credit Hour.
Laboratory techniques, molecular tools, applications, and analysis methods commonly used by researchers in the areas of molecular ecology and population genetics.
Prerequisite: BIL 150 and BIL 160 and BIL 250.
Components: LAB.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 537. Ecosystem Ecology. 3 Credit Hours.
Concepts and models of energy and nutrient flow, food webs, successional processes, human influences and effects of spatial heterogeneity.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 539. Conservation and Protected Areas. 3 Credit Hours.
The science and policy of park planning and management will be explored through four case studies. The case studies will explore key concepts in ecology and population biology relating to loss of habitat, habitat fragmentation, invasive species, pollution and declines in population size.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 551. Population Genetics and Genomics. 3 Credit Hours.
Introduction to population genetics, which examines the evolutionary processes that affect the genetic composition of natural populations: mutation, genetic drift, natural selection, and gene flow. Theoretical and empirical aspects will be examined via mathematical models, methods of measuring genetic variation, and readings of published case studies. Taxonomic focus will be broad and will include both model organisms (e.g., Drosophila), and non-model organisms.
Prerequisite: BIL 250.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 552. Bioinformatics Tools. 3 Credit Hours.
Databases and tools of bioinformatics as relevant to research in genomics and molecular biology. Bioinformatics applications. Information retrieval, analytical tools, BLAST searches, promoter analysis, protein structure- function analysis and various applications.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 553. Biomedical Data Science. 3 Credit Hours.
The computational skills needed for analysis of genomic and biomedical data sets, including: The basics of a command line interface; programming in (bio-)python; running programs on Pegasus2; writing scripts for downloading, manipulating, and analyzing data; file sharing and version control using github; analyzing a Next Generation Sequencing data set, and interpreting the results; and responsible conduct of research.
Prerequisite: CSC 120 and BIL 150.
Components: LEC.
Grading: GRD.
Typically Offered: Fall.

BIL 554. Electron Microscopy. 4 Credit Hours.
Techniques in transmission electron microscopy (TEM) including tissue preparation, use of the electron microscope, photography, and interpretation of micrographs. Lecture, 1 hour; laboratory, 6 hours.
Components: LAB.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 555. Projects in Electron Microscopy. 2 Credit Hours.
Individual research projects in transmission electron microscopy, 6 hours.
Components: PRA.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 556. Ecological and Evolutionary Genomics. 3 Credit Hours.
The evolution of genomes, and the ecological interactions that drive their evolution.
Components: LEC.
Grading: GRD.
Typically Offered: Spring.

BIL 559. Life in the Cell. 3 Credit Hours.
A comprehensive, advanced overview of the molecular biology of the cell, cells, and genomes.
Prerequisite: BIL 255.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 565. Evolution and Development. 3 Credit Hours.
Exploration of the relationship between common descent and biological diversity, principally changes in organismal development through time.
Prerequisite: BIL 250 or BIL 255.
Components: LEC.
Grading: GRD.
Typically Offered: Spring.

BIL 568. Evolution and development of Nervous Systems. 3 Credit Hours.
Mechanisms/pathways/modules underlying formation of the nervous system during embryo development. How some properties of nervous systems have resisted change while others have diverged dramatically during evolution.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 575. Advanced Special Studies in Biology. 1-6 Credit Hours.
Content of course will vary by semester. Content in any semester will be indicated via subtitle in the class schedule.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 580. Writing in Biology. 0 Credit Hours.
Writing instruction by faculty using biological topics in BIL courses offered at the 500 level.
Components: IND.
Grading: SUS.
Typically Offered: Fall & Spring.

BIL 591. Studies in Biology. 1-5 Credit Hours.
Special topics taken at other institutions with no direct equivalents.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 592. Studies in Biology. 1-5 Credit Hours.
Special topics taken at other institutions with no direct equivalents.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.