BIOLOGY (BIL)

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. Elementary Biotechnology. 3 Credit Hours.
Major aspects of the biotechnology field for the non-science major. Food biotechnology, enzymes, environmental biotechnology, transgenic animals and plants, analytical biotechnology and more. Not for credit in the biology major or minor.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

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: Offered by Announcement Only.

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.

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:** Offered by Announcement Only.

**BIL 113. General Biology Honors Seminar. 1 Credit Hour.**
Special topics in biology correlated with BIL 150.

**Corequisite:** BIL 150.

**Components:** SEM.
**Grading:** GRD.
**Typically Offered:** Fall.

**BIL 114. General Biology Honors Seminar. 1 Credit Hour.**
Special topics in biology correlated with BIL 160.

**Components:** DIS.
**Grading:** GRD.
**Typically Offered:** Spring.

**BIL 149. First Year Information. 1.00 Credit Hour.**
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.

Pre/Corequisite: ENG 105 or ENG 106 or ENG 107 Or AP ENG COMP =>5 Or SAT 700 or higher Evidence Base Read and Write Or 32 or higher ACT ENG And ALEKS MTH =>55 Or AP Cal AB score =>3 Or AP Cal BC score =>3 Or SAT Math Section Score 600 or higher.

**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 152. HHMI General Biology Laboratory.. 1 Credit Hour.**
Laboratory exercises to accompany BIL 150. Students teams engage in two inquiry-based laboratory research projects, each lasting six weeks, per semester.

**Components:** LAB.
**Grading:** GRD.
**Typically Offered:** Fall.

**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 162. HHMI Evolution and Biodiversity Laboratory.. 1 Credit Hour.
Laboratory exercises to accompany BIL 160. Student teams engage in two inquiry-based laboratory research projects, each lasting six weeks, per semester.
**Components:** LAB.
**Grading:** GRD.
**Typically Offered:** Spring.

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:** Fall.

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

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

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

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 biologists, 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:** Fall.

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:** Spring.

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. (BIL150/151) OR (BIL160/161) OR (BIL101 or BIL105).
**Components:** LEC.
**Grading:** GRD.
**Typically Offered:** Fall.

BIL 226. General Botany. 3 Credit Hours.
Survey of the plant kingdom, including evolution, plant diversity, reproduction, structure, function and ecology.
**Components:** LEC.
**Grading:** GRD.
**Typically Offered:** Fall.
BIL 227. General Botany Laboratory. 1 Credit Hour.
Laboratory exercises to accompany BIL 226.
Pre/Corequisite: BIL 226.
Components: LEC.
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, separation 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.
Components: LEC.
Grading: GRD.
Typically Offered: Fall.

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. BIL 151 or BIL 152 or BIL 153. BIL 161 or BIL 162 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. BIL 151 or BIL 152 or BIL 153. BIL 161 or BIL 162 or BIL 163.
Components: LEC.
Grading: GRD.
Typically Offered: Fall, Spring, & Summer.

BIL 256. Cellular and Molecular Biology Laboratory. 2 Credit Hours.
Laboratory exercises in cellular and organismal biology involving current research techniques and applications.
Prerequisite: 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 and BIL 160 and BIL 151 or BIL 152 or BIL 153 and BIL 161 or BIL 162.
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: LEC.
Grading: GRD.
Typically Offered: Fall & Spring.

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.
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.
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.
Prerequisite: BIL 286.
Components: PRA.
Grading: SUS.
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 152 or BIL 153 and BIL 160 and BIL 161 or BIL 162 or BIL 163.
Components: SEM.
Grading: GRD.
Typically Offered: Fall & 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 320.
Components: LEC.
Grading: GRD.
Typically Offered: Spring.

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 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: Offered by Announcement Only.

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: Offered by Announcement Only.

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: Spring.

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: MSC 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 332. Tropical Ecology. 3 Credit Hours.
Tropical ecosystem 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 ecosystem.
Prerequisite: BIL 250 or BIL 255.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

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.

BIL 335. Tropical Field Biology. 3 Credit Hours.
Intensive field study in the Costa Rican rainforest conducted during semester recesses with additional pre-trip lectures. Requires payment of trip costs.
Components: LEC.
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.
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: Fall.

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 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 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.
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: Offered by Announcement Only.

BIL 367. 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: Offered by Announcement Only.

BIL 369. Fundamentals of the 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: Offered by Announcement Only.
BIL 371. Readings in Biology. 1 Credit Hour.
Independent readings on selected topics in biology under the supervision of individual faculty.
Components: THI.
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: Fall & Spring.

BIL 374. Seminar in Biology. 1 Credit Hour.
Seminar in selected topics in biology.
Prerequisite: BIL150 and BIL160 and BIL151 or BIL152, or BIL153 and BIL161 or BIL162 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 BIL152, or BIL153 and BIL161 or BIL162 or BIL163.
Components: SEM.
Grading: GRD.
Typically Offered: Fall & Spring.

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. 1.00 Credit Hour.
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 & Spring.

BIL 382. Workshop Leaders in Biology II. 1.00 Credit Hour.
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: Fall & 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.

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

BIL 399. DNA and the Changing World. 1 Credit Hour.
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: Offered by Announcement Only.

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: Spring.

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 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.
Prerequisite: BIL 332.
Components: LEC.
Grading: GRD.
Typically Offered: Fall.

**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: Fall.

**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 152 or BIL 153 and BIL 160 and BIL 161 or BIL 161 or BIL 162 or BIL 163.
Components: LEC.
Grading: GRD.
Typically Offered: Fall.

**BIL 435. Origins, Ecology and Conservation of Insular Diversity. 1-3 Credit Hours.**
Three-week field course in the Solomon Islands. Ecological and evolutionary processes that maintain and create biological diversity in tropical islands. Natural selection, island biogeography, phylogenetics, community assembly, predator-prey interactions, sexual reproduction, mating systems, and social behavior. On-site field surveys and experiments. Combined lecture and laboratory/field course.
Components: LEC.
Grading: GRD.
Typically Offered: Fall & Summer.

**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 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 152 or BIL 153 and BIL 160 and BIL 161 or BIL 161 or BIL 162 or BIL 163.
Components: LEC.
Grading: GRD.
Typically Offered: Fall.

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.
Principles of differentiation, morphogenesis and development. Critical analysis of the methods used to study these problems.
Prerequisite: BIL 250 or BIL 255.
Components: LEC.
Grading: GRD.
Typically Offered: Fall.

BIL 456. Developmental Biology Laboratory. 2 Credit Hours.
Exploration of developmental genetics by exposing students to a variety of developmental biology experiments using microscopy, molecular biology, genetics and immunohistochemical techniques in three distinct model animals. Following a short series of introductory labs and lectures, students will develop a research proposal with the instructors and spend the remaining weeks of the semester working to complete their proposal under the guidance of the instructors. This class is restricted to students that have taken cell and molecular biology, developmental biology AND genetics.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

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.
Components: LEC.
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. 1-3 Credit Hours.
Training and teaching assistance for undergraduate workshops or laboratories, under the direct supervision of faculty. Specific topic is indicated by course subtitle. This course may be taken no more than twice for credit in the Biology major or minor, and if taken twice, teaching assistance must be for two different BIL courses. May be taken multiple times for general elective credit only.
Components: LAB.
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: THI.
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, co-listed with other departments or programs.
Components: DIS.
Grading: GRD.
Typically Offered: Fall & Spring.

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 386.
Components: PRA.
Grading: GRD.
Typically Offered: Fall & 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: LAB.
Grading: GRD.
Typically Offered: Spring.

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

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

BIL 497. Projects in Biology. 2 Credit Hours.
Individual, original laboratory or field research supervised by a member of the department faculty and concluded by a formal written report.
Components: THI.
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 oral defense 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: 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 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 models 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.

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 525. Herpetology. 3 Credit Hours.
Systematics, biogeography, and evolutionary biology of amphibians and reptiles, with emphasis on modern families. Combined lecture and laboratory.
Components: LEC.
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.

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.

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.**
Computational skills for analysis of genomic data sets. Basics of using a command line interface (text editor, Unix/Linux/iOSX), and logging into and getting started on Pegasus2. Python will be used to write scripts for downloading, manipulating, and analyzing data. File sharing and version control using github will be introduced at this stage, which will include RCR training. Analysis, interpretation, and presentation of Next Generation Sequencing data set (RNAseq, exome, or whole genome; public or their own. Interpreting and presenting results, to enable students to extract information from the data rather than just statistically analyze it.

Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

**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: Offered by Announcement Only.

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: Fall & Spring.

BIL 560. Evolution and Development. 3 Credit Hours.
Exploration of the relationship between common descent and biological diversity, principally changes in organismal development through time.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 565. 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 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.

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

BIL 610. Lab Group Meeting. 1 Credit Hour.
Weekly seminar meeting for discussion of research projects and other academic issues in graduate faculty research laboratories. (Fall semesters)
Components: DIS.
Grading: GRD.
Typically Offered: Fall.

BIL 611. Lab Group Meeting. 1 Credit Hour.
Weekly seminar meeting for discussion of research projects and other academic issues in graduate faculty research laboratories. (Spring semesters)
Components: DIS.
Grading: SUS.
Typically Offered: Spring.

BIL 612. Graduate Core I. 3 Credit Hours.
Foundations of genome structure and how the information encoded in genomes is regulated by intrinsic and extrinsic factors during development and evolution. Major topics include genome structure, gene regulation, cells, development, physiology and EvoDevo.
Components: LEC.
Grading: GRD.
Typically Offered: Fall.
BIL 613. Graduate Core II. 3 Credit Hours.
Foundations of key ecological and evolutionary theory. Major topics in Ecology include population, community, physiological and ecosystem ecology. Major topics in Evolution include principles of natural selection, speciation, biodiversity, population genetics, neutral theory, molecular evolution, phylogenetics, and systematics.
Components: LEC.
Grading: GRD.
Typically Offered: Spring.

BIL 614. Professional Writing and Grantsmanship. 3 Credit Hours.
Elements of argumentative writing, reader-oriented writing strategies, fundability of submitted grants, and techniques for mastering presentation venues such as posters and talks.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 615. 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. Course includes introductions to cellular automatons and models 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.

BIL 618. Advanced Biostatistics. 4 Credit Hours.
This course will provide an overview of 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.
Requisite: Graduate Standing.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 620. 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: Fall.

BIL 621. 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.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 622. Plant Identification in an Evolutionary Context. 3 Credit Hours.
An exploration of the plants in the on-campus Gifford Arboretum as well as other plants that students interact with in their daily environment (foods, beauty products, fibers, medicines, poisons, etc.)
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 623. 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 625. Advanced Herpetology. 3 Credit Hours.
Systematics, biogeography, and evolutionary biology of amphibians and reptiles, with emphasis on modern families. Combined lecture and laboratory.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 630. Population and Community Ecology: Theory. 3 Credit Hours.
Classical and contemporary theory in population and community ecology including population dynamics, matrix models, life tables, predator-prey models and food webs.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 631. 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 632. Population and Community Ecology: Theory II. 3 Credit Hours.
Classical and contemporary theory in population and community ecology including population dynamics, matrix models, life tables, predator-prey models and food webs.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 633. Conservation Biology. 3 Credit Hours.
Challenges facing conservation practitioners and the toolkit that has been developed to face them. Distribution and value of biodiversity, threats to biodiversity, and methods that have been developed to face these threats at both species and landscape levels. Government implementation of conservation strategies.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 634. Stable Isotope Ecology. 3 Credit Hours.
Stable isotope analysis applied to ecological questions such as nutrient cycling, photosynthesis and trophic level studies.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 635. 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 636. Tropical Biology: An Ecological Approach. 8 Credit Hours.
The tropical environment and biota; ecologic relations, communities and evolution in the tropics. Conducted in Costa Rica under the Organization for Tropical Studies. Lecture, laboratory, and fieldwork.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 637. Ecologia de Poblaciones. 7 Credit Hours.
Components: DIS.
Grading: GRD.
Typically Offered: Offered by Announcement Only.
BIL 638. Tropical Managed Ecosystems. 8 Credit Hours.
Application of ecological principles to problems in agriculture, forestry, conservation and natural resource management in the tropics. Conducted in Costa Rica under the Organization for Tropical Studies.
Components: THI.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 639. 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 641. Animal Behavior. 3 Credit Hours.
Amazing behaviors of animals from an evolutionary perspective, including how the diversity of behavior in nature is shaped by natural and sexual selection.
Components: LEC.
Grading: GRD.
Typically Offered: Fall & Spring.

BIL 649. Seminar in Behavior. 1 Credit Hour.
Discussion of current literature in animal behavior. This course may be repeated for credit.
Components: SEM.
Grading: GRD.
Typically Offered: Fall & Spring.

BIL 651. Population Genetics and Genomics. 3 Credit Hours.
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 and BIL 255.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 652. 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 653. Bioinformatics Algorithms. 3 Credit Hours.
The complexity of bioinformatics computations. Introduction to Perl and Bioperl. Pattern matching and sequence homology. Genome assembly. Transcription factor binding site recognition and motif finding, gene prediction, phylogeny, micro array analysis, RNA folding, gene design and synthesis.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 654. 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 655. Techniques in Scanning Electron Microscopy. 3 Credit Hours.
Tissue preparation, use of the scanning electron microscope (SEM), 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 656. 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: Offered by Announcement Only.

BIL 661. High Altitude Biology and Medicine. 3 Credit Hours.
High altitude biology and medicine: Mechanisms of hypoxia resistance influencing the requirement to match oxygen supply and demand throughout
the oxygen cascade. Topics draw 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 665. Evolution and Development. 3 Credit Hours.
Exploration of the relationship between common descent and biological diversity, principally changes in organismal development through time.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 668. 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 675. Advanced Study in Plant or Animal Sciences. 1-6 Credit Hours.
Content of course will vary by semester. Content in any semester will be expressed as course subtitle.
Components: SEM.
Grading: GRD.
Typically Offered: Fall, Spring, & Summer.

BIL 678. Current Topics in Biological Research - DVP. 1 Credit Hour.
Content will vary by semester. Readings and discussions with eminent scholars temporarily resident in the department's Distinguished Visiting
Professor program.
Components: SEM.
Grading: SUS.
Typically Offered: Offered by Announcement Only.

BIL 680. Research Ethics. 0 Credit Hours.
principles of scientific integrity that forms an integral part of the proposed research training effort.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 689. Nonacademic Careers 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: BIL 200 or Higher.
Components: DIS.
Grading: GRD.
Typically Offered: Offered by Announcement Only.
BIL 711. 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 nonparametric 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.
Requisite: Graduate Standing.
Components: LEC.
Grading: GRD.
Typically Offered: Fall.

BIL 810. Master's Thesis. 1-6 Credit Hours.
The student working on their Master’s thesis enrolls for credit, in most departments not to exceed six, as determined by the student’s advisor. May be regarded as full time residence.
Components: THI.
Grading: SUS.
Typically Offered: Fall, Spring, & Summer.

BIL 820. Research in Residence - Master's Thesis. 1 Credit Hour.
Used to establish research in residence for the thesis for the Master’s degree after the student has enrolled for the permissible cumulative total in BIL810 (usually six credits). Credit not granted. May be regarded as full time residence.
Components: LEC.
Grading: GRD.
Typically Offered: Fall, Spring, & Summer.

BIL 830. Doctoral Dissertation. 1-12 Credit Hours.
Required of all candidates for the Ph.D. The student will enroll for credit as determined by their advisor. Not more than 12 credits of BIL830 may be taken in a regular semester, nor more than six credits in a summer session. May be regarded as full time residence.
Components: THI.
Grading: SUS.
Typically Offered: Fall, Spring, & Summer.

BIL 840. Post-Candidacy Doctoral Dissertation. 1-12 Credit Hours.
Required of all candidates for the Ph.D. who have advanced to candidacy. The student will enroll for credit as determined by their advisor. Not more than 12 credits of BIL840 may be taken in a regular semester, nor more than six credits in a summer session. May be regarded as full time residence.
Components: THI.
Grading: SUS.
Typically Offered: Fall, Spring, & Summer.

BIL 850. Research in Residence. 1 Credit Hour.
Used to establish research in residence for the Ph.D., after the student has been enrolled for the permissible cumulative total in appropriate doctoral research. May be regarded as full time residence.
Components: THI.
Grading: SUS.
Typically Offered: Fall, Spring, & Summer.