**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 their environment; human impact on ecosystems. Not for credit in the biology major or minor.
Components: LEC.
Grading: GRD.
Typically Offered: Fall & Spring.

**BIL 104. Genetics and Society. 3 Credit Hours.**
The impact of new knowledge in genetics and heredity on society, including a consideration of questions about the inheritance of I.Q. and behavior, racial differences, genetic screening, control of reproduction, genetic engineering, forensic applications. Not for credit in the biology major or minor.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

**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.**
A survey of human anatomy and physiology 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: Fall.

**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.
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 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.
Prerequisites: ENG 105 or MTH 107 or higher. Or Corequisites: ENG 105 or MTH 107 or higher.
Components: LEC.
Grading: GRD.
Typically Offered: Fall & 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 160. Evolution and Biodiversity. 4 Credit Hours.
Mechanisms of evolution from an organismal perspective. Systematics, biodiversity, evolutionary theory and mechanisms with emphasis on the morphological, ecological, and behavioral adaptations of selected representatives of the Domains of living organisms.
Corequisite: BIL 161 or BIL 162.
Components: LEC.
Grading: GRD.
Typically Offered: 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 175. First Year Seminar in Biology. 1 Credit Hour.
Components: LEC.
Grading: GRD.
Typically Offered: Fall & Spring.

BIL 178. Community Science: Autism. 3 Credit Hours.
Student citizens in both science and communication will collaborate on content intended to reach audiences on multiple platforms. Students will be exposed to both history and cutting edge research surrounding Autism Spectrum Disorder, as well as the neuroscience and genetic basis of autism spectrum disorders. Students will connect with people in the local community, to lend these issues a face and context. Information from readings, experts at the University of Miami, and the larger South Florida Community. Students will work in teams to share expertise from their fields of study to generate content for community consumption.
Components: LEC.
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 212. Human Genetics. 3 Credit Hours.
A review of genetics, emphasizing human traits and disorders and their effects on individuals, families, and society. After briefly reviewing cellular and reproductive biology, we will explore genetics more deeply while examining the implications of genetic processes and heredity patterns for human health. We will then examine the genetic basis of human evolution, finishing the semester with a discussion of genetic technologies and their implications for human welfare.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 220. Evolution and Disease. 3 Credit Hours.
Evolutionary insights on the origins and emergence of diseases, drug resistance, and how diseases have shaped human evolution.
Components: LEC.
Grading: GRD.
Typically Offered: Fall & Spring.

BIL 221. Biology of Birds. 4 Credit Hours.
General biology of birds, field identification, natural history and migrations of southern Florida species. Lecture, 2 hours; laboratory, 3 hours; 4 field trips, 6 hours each. Binoculars required.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

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: Offered by Announcement Only.

BIL 227. General Botany Laboratory. 1 Credit Hour.
Laboratory exercises to accompany BIL 226.
Prerequisite: BIL 226. Or 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.
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.
Corequisite: BIL 231.
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.
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.
Prerequisites: BIL 150, BIL 151, BIL 160, BIL 161.
Components: LEC.
Grading: GRD.
Typically Offered: Fall, Spring, & Summer.

BIL 251. Principles of Genetics Laboratory. 1 Credit Hour.
Laboratory exercises in genetics.
Prerequisite: BIL 250. Or Corequisite: BIL 250.
Components: LAB.
Grading: GRD.
Typically Offered: Fall & Spring.

BIL 252. HON: Honors Laboratory in Genetics. 2 Credit Hours.
Laboratory exercises in genetics.
Prerequisite: BIL 250. Or Corequisite: BIL 250.
Components: LAB.
Grading: GRD.
Typically Offered: Spring.

BIL 255. Cellular and Molecular Biology. 3 Credit Hours.
Structure, molecules, and functions of cells.
Prerequisites: BIL 150, BIL 151, BIL 160, BIL 161.
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 Corequisite: BIL 255.
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 259. Life In The Cell. 3 Credit Hours.
A comprehensive overview of the molecular biology of the cell, cells, and genomes.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 267. Community Science: Autism. 3 Credit Hours.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

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

BIL 281. Undergraduate Learning Intern 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 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 299. Seminar in Research Problems. 2 Credit Hours.
Discussion of current research of the Biology Faculty.
Components: DIS.
Grading: GRD.
Typically Offered: Fall & Spring.

BIL 311. Biostatistics. 3 Credit Hours.
Descriptive and inferential univariate and bivariate statistics applied to biological data. Probability, probability distributions, data description and presentation, hypothesis testing, decision making and experimental design.(Not open to students with credit in MTH 224, PSY 204 or equivalent).
Components: LEC.
Grading: GRD.
Typically Offered: Fall & Spring.

BIL 312. Biostatistics Laboratory. 1 Credit Hour.
Computer laboratory exercises to complement BIL 311.
Prerequisite: BIL 311. Or Corequisite: BIL 311.
Components: LAB.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

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 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.
Prerequisite: BIL 330. Or 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: 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: Spring.

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.
Communication evolves and functions across species - from invertebrates to humans - to a vast range of acoustic, visual, and chemical signals. Investigate how physical constraints shape animal signals, how animals convey information through signaling, and how honesty is maintained in communication systems. Learn about signaling in a variety of behavioral contexts, including mate attraction, competition, and predation.
Components: LEC.
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: Spring.

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: Fall.

BIL 360. Comparative Physiology. 3 Credit Hours.
Animal and plant physiological processes such as homeostasis, energy budget, movement, sensation, and reproduction with emphasis on the organismal level.
Prerequisite: BIL 250 or BIL 255 or BIL 259.
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 and clinical aspects of human endocrinology.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 367. Biology Of Cancer. 3 Credit Hours.
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: Spring.

BIL 372. 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 374. Seminar in Biology. 1 Credit Hour.
Seminar on selected topics in biology.
Components: SEM.
Grading: GRD.
Typically Offered: Fall & Spring.

BIL 375. Seminar in Biology. 1 Credit Hour.
Seminar on selected topics in biology.
Components: SEM.
Grading: GRD.
Typically Offered: Fall & Spring.

BIL 376. Complementary and Alternative 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 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.

BIL 391. Workshop Leaders in Biology II. 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.
BIL 382. Workshop Leaders in Biology II. 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 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 Topics in Biology. 1-3 Credit Hours.
Topics relevant to the biological sciences, listed as subtitle. May be co-listed with other departments or programs.
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 389. "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: Fall, Spring, & Summer.

BIL 402. Seminar In Biology. 1 Credit Hour.
Components: LEC.
Grading: GRD.

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.
Introduction to 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.
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 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 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 250 or BIL 255.
Components: LEC.
Grading: GRD.
Typically Offered: Fall & Spring.

BIL 451. Ethics and Genetics. 3 Credit Hours.
Pressing social, ethical, and legal issues raised by our constantly increasing knowledge of genetics, and the applications of this knowledge already available or being proposed. Access to and use of personal genetic information; race and genetics; the diagnosis and treatment of inherited diseases; new modalities of healthcare delivery through genetics; the current state of stem cell research; genetically modified animals and plants as sources of food, medicines, and fuel; and the use of genomics.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 454. Biological Core Concepts Through Medical Case Studies. 2 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.
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 458. 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 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 483. Civic Engagement In The Galapagos. 3 Credit Hours.
Biological and/or conservation projects in cooperation with citizens of the Galapagos.
Components: LEC.
Grading: GRD.
Typically Offered: Fall.

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 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. Biometry. 3 Credit Hours.**
Descriptive and analytical statistics as used in biology. Emphasizes sampling, presentation of quantitative data, probability theory applications, distributions, parametric and non-parametric test procedures.

**Components:** LEC.

**Grading:** GRD.

**Typically Offered:** Offered by Announcement Only.

**BIL 520. Evolution. 3 Credit Hours.**
Evolutionary mechanisms and pathways: sources of hereditary variation, evolutionary forces, origins of adaptations, speciation, macro-evolution, origin of life and humankind.

**Components:** LEC.

**Grading:** GRD.

**Typically Offered:** Offered by Announcement Only.

**BIL 521. Systematics. 3 Credit Hours.**
Concepts and methods in phylogenetic systematics. Lectures, discussions, and computer labs, 3 hours.

**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. 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 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 532. 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 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.
Prerequisite: BIL 250.
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: Fall.

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

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 555. 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 558. 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 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.

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. 2 Credit Hours.
Weekly seminar meeting for discussion of research projects and other academic issues in graduate faculty research laboratories. (Spring semesters)
Components: DIS.
Grading: GRD.
Typically Offered: Spring.

BIL 612. Graduate Core. 3 Credit Hours.
A two-term sequence of modules addressing core principles across Biology in a format based on and fostering trans-disciplinary thought. Each module is one credit, taught dually by two faculty for 15 hours per module over a period of three weeks, and graded independently of other modules. Five modules are taught sequentially each term, for a total of ten credits for the academic year. Different modules may be offered in different years. (Fall semesters)
Components: LEC.
Grading: GRD.
Typically Offered: Fall.
BIL 613. Graduate Core Module. 1 Credit Hour.
A two-term sequence of modules addressing core principles across Biology in a format based on and fostering trans-disciplinary thought. Each module is one credit, taught dually by two faculty for 15 hours per module over a period of three weeks, and graded independently of other modules. Five modules are taught sequentially each term, for a total of ten credits for the academic year. Different modules may be offered in different years. (Spring semesters)
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

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 621. Systematics. 3 Credit Hours.
Concepts and methods in phylogenetic systematics. Lectures, discussions, and computer labs, 3 hours.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 622. Evolution. 3 Credit Hours.
Evolutionary mechanisms and pathways: sources of hereditary variation, evolutionary forces, origins of adaptations, speciation, macro-evolution, origin of life and humankind.
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. 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 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 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.
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: Fall.

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 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 666. 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. 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: LEC.
Grading: GRD.
Typically Offered: Fall, Spring, & Summer.

BIL 680. Research Ethics. 0 Credit Hours.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

BIL 810. Master's Thesis. 1-6 Credit Hours.
The student working on his/her Master's thesis enrolls for credit, in most departments not to exceed six, as determined by his/her advisor. Credit is not awarded until the thesis has been accepted.
Components: THI.
Grading: SUS.
Typically Offered: Fall, Spring, & Summer.

BIL 820. Research in Residence. 0 Credit Hours.
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 BIL 710 (usually six credits). Credit not granted. May be regarded as full time residence.
Components: LEC.
Grading: GRD.
Typically Offered: Fall, Spring, & Summer.
**Biology (BIL)**

**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 his/her advisor, but not for less than a total of 12. Not more than 12 hours of BIL 730 may be taken in a regular semester, nor more than six in a summer session.

**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 his/her advisor, but not for less than a total of 12. Not more than 12 hours of BIL 740 may be taken in a regular semester, nor more than six in a summer session.

**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. Credit not granted. May be regarded as full-time residence as determined by the Dean of the Graduate School.

**Components:** THI.

**Grading:** SUS.

**Typically Offered:** Fall, Spring, & Summer.