Biology (BIO)

BIO 101. Biotechnology: Coming of Age in the 21st Century. (3)
An introduction to biotechnology. The course provides an in-depth examination of new developments in biotechnology. Scientific concepts, applications, and social, ethical, and legal issues are emphasized. IVA. PA-2B. CAS-D.

BIO 104. Developing skills and Approaches for Science Success. (1-2; maximum 2)
Teaches effective study strategies to enable comprehension of basic biology concepts emphasized in the introductory biology course, BIO/MBI 115/116; Explores the relationship of these concepts to current endeavors such as scientific research; Emphasizes development of skills and habits of mind that will ensure success for biological science majors.

BIO 115. Biological Concepts: Ecology, Evolution, Genetics, and Diversity. (4)
Integrated study of microbes, plants, and animals emphasizing biological diversity and interdependence of life and environment. IVA, LAB. PA-2B. CAS-D/LAB.
3 Lec. 1 Lab.
Cross-listed with MBI.

BIO 116. Biological Concepts: Structure, Function, Cellular, and Molecular Biology. (4)
Biological principles common to microbes, plants, and animals, including interactions between organism and environment. IVA, LAB. PA-2B. CAS-D/LAB. CAS-QL.
3 Lec. 1 Lab.
Cross-listed with MBI.

BIO 121. Environmental Biology. (3)
Local, regional, and global environmental issues examined in the context of current ecological theory and principles of resource use and management. IVA.PA-2B. CAS-D.

BIO 126. Evolution: Just a theory?. (3)
An introduction to the principles of evolutionary theory and the nature of science that emphasizes the relevance of evolutionary biology to our lives and society as a whole. CAS-D.

BIO 131. Plants, Humanity, and Environment. (3)
Introduction to fundamental concepts in plant biology, ecology, and scientific perspective as they relate to issues of social concern. IVA. PA-2B. CAS-D.

BIO 147. Biology Introductory Seminar. (1)
Introduction to the majors offered by Department of Biology as well as the requirements of the College of Arts and Science and the Miami Plan. Students learn about departmental, College, and University resources available to help decide what courses to take to achieve their academic goals. Includes discussion of effective learning strategies, how to be involved in independent research, and provides information to help students develop their career goals by providing interactions with first year faculty advisors, undergraduate and graduate students, and alumnae. Finally, the seminar will provide students with opportunities to develop a more thorough understanding of how they can become successful scholars and members of the Miami community and any other community of professionals.

BIO 155. Field Botany. (3)
Field/laboratory-oriented, interpretive introduction to botany in the regional out-of-doors. Emphasis given to identification, uses, habit, habitat and communities of plants, and fungi in the context of local terrestrial and aquatic environments. IVA, LAB. PA-2B. CAS-D/LAB.
1 Lec. 2 Lab.

BIO 159. Seminar in Neuroscience. (1)
Provides an introduction to the field of neuroscience and includes discussions of experimental techniques and methodology and career opportunities in neuroscience, the interdisciplinary nature of the field, and the scientific method and the development and testing of hypotheses; will expose students to the synthesis of scientific literature in the field of neuroscience and to ways to effectively communicate this information to a broad audience.
Cross-listed with PSY 159.

BIO 161. Principles of Human Physiology. (4)
Examines physiological systems of the human body. Lecture provides basic information regarding function of these systems from an integrative perspective. In laboratory, use hands-on approach and work in small groups to conduct experiments and/or carry out projects to illustrate the physiological concepts presented in lecture. Not open to Biology, Botany, or Zoology majors. IVA, LAB. CAS-D/LAB. PA-2B. CAS-QL.
3 Lec. 1 Lab.

BIO 171. Human Anatomy and Physiology. (4)
Study of the structure and function of the human body including basic cellular principles, embryology, reproductive system, endocrine system, and nervous system. Does not count toward Biology, Botany or Zoology majors. IVA, LAB. CAS-D/LAB. PA-2B.
3 Lec. 1 Lab.

BIO 172. Human Anatomy and Physiology. (4)
Study of the structure and function of the human body including respiratory, digestive, urinary, skeletal, muscular, and circulatory systems. Does not count toward Biology, Botany or Zoology majors. CAS-D/LAB.
3 Lec. 1 Lab.
Prerequisite: BIO 171.

BIO 176. Ecology of North America. (3)
Basic principles of ecology, major biomes of North America, and pertinent environmental issues. Biomes range from tundra to tropical rain forest. Environmental issues include biodiversity, deforestation, desertification, and other land management problems, each analyzed from a scientific perspective but involving social, economic, and humanistic factors as well. CAS-D.

BIO 177. Independent Studies. (0-6; maximum 10)

BIO 191. Plant Biology. (4)
Consideration of how plant structure, chemical composition, and genetic makeup interact with growth, development, evolution, and metabolic processes of living plants. IVA. CAS-D/LAB. PA-2B.
3 Lec. 1 Lab.

BIO 201. Human Anatomy. (4)
The study of structure and function of human tissues, organs, and organ systems. Designed for pre-professional health sciences students and those preparing for graduate study. Lab fee required. CAS-D/LAB.
3 Lec. 1 Lab.

BIO 203. Introduction to Cell Biology. (3)
Introductory study of eukaryotic cell structure and function.
Prerequisite: BIO 116/MBI 116, or BIO 191.

BIO 204. Evolution of Plant Biodiversity: Genes to Biosphere. (4)
Along with BIO 203, provides a foundation for botany majors. Covers genetic basis of evolution, heredity and genetic continuity, processes of evolution, and systematic and ecological end-products of evolution with an emphasis on plants, algae, and fungi. Students may not receive credit toward the major for both BIO 204 and BIO 206.
Prerequisite: BIO/MBI 115 or BIO 191.

BIO 205. Dendrology. (4)
Identification and distribution of native and introduced trees, characteristics and use of their woods, and an introduction to forestry practice. CAS-D/LAB.
2 Lec. 2 Lab.

BIO 206. Evolutionary Biology. (3)
Development of major evolutionary concepts and application of such concepts within the biological sciences and related scientific fields are examined. Students cannot receive credit toward the major for both BIO 204 and 206.
Prerequisite: one year of biological science.

BIO 209. Fundamentals of Ecology. (3)
Interrelationships between organisms and their environments.
Prerequisite: One course in the biological sciences (BIO or MBI); or permission of the instructor.

BIO 221. Plant Propagation. (4)
Provides students with knowledge of the scientific and applied aspects of plant propagation in a closed system including basic plant production, watering, fertilization, crop management, insect and disease control, and problem solving.
Prerequisite: BIO/MBI 115, BIO/MBI 116, BIO 131, BIO 176 or BIO 191.

BIO 232. Human Heredity. (3)
Introduction to the basic principles of genetics and their relevance to human society. Not open to Biology, Botany, or Zoology majors.
Prerequisites: (BIO 114) or (BIO 116 or MBI 116 or MBI 116H) or (MBI 161 or BIO 161) or BIO 172.

BIO 241. Botanical Principles in Landscape Gardening. (3)
Plant materials in relation to home, garden, and landscape uses.

BIO 244. Viticulture and Enology. (3)
Botanical description of the grape (Vitis) and the principles of viticulture (grape growing) and enology (wine making). Various horticultural techniques used throughout the world in these disciplines. Tastings and lab fee.

BIO 256. Introduction to Programming for the Life Sciences. (3)
This course serves as an introduction to programming designed specifically for life science majors, targeting the specific skills and techniques commonly needed and explaining the fundamental methods of working with biological data while centering programming assignments around topics of interest to those studying the life sciences. Topics covered include basic programming techniques, representation and manipulation of genomic and protein sequence data, and the automated interface with BLAST and the NCBI GenBank database.
Cross-listed with CSE/MBI.

BIO 277. Independent Studies. (0-6; maximum 10)

BIO 302. Plant Taxonomy. (4)
Identification of flowering plants in field and laboratory, including local flora and majors critical plant families. Additional topics include nomenclature, history of taxonomy, methods of systematics, phylogeny of plants.

BIO 305. Human Physiology. (4)
Study of general physiological principles necessary for basic understanding of life processes. CAS-D/LAB.
3 Lec. 1 Lab.
Prerequisite: one year of chemistry, junior standing, and BIO 203 or MBI 365, or permission of instructor.

BIO 306. Basic Horticulture. (3)
Principal factors involved in the production of vegetables and fruits. Senior standing recommended.

BIO 311. Vertebrate Zoology. (4)
Taxonomy and life histories with emphasis on local fauna. CAS-D/LAB.
2 Lec. 2 Lab.

BIO 312. Invertebrate Zoology. (4)
Morphology and taxonomy with emphasis on local fauna. CAS-D/LAB.
2 Lec. 2 Lab.

BIO 314. Plant Diversity. (4)
Overview of plant diversity considering all major groups of plants. Although primarily a survey of structural and biochemical characteristics that define each group, the course also examines evolutionary themes among these organisms with particular emphasis on land plant evolution and the polyphyletic nature of the algae. CAS-D.
Prerequisite: a course in biological science.

BIO 320. Directed Research. (1-3)
Problems involving library, field, or laboratory work. Only three semester hours of BIO 320 can be used to fulfill advanced hour requirement.

BIO 325. Pathophysiology. (4)
Study of relationship between normal body functioning and physiologic changes that occur as the result of illness.
Prerequisite: BIO 171 and 172; or BIO 201 and 305.

BIO 340. Internship. (0-20)

BIO 342. Genetics. (3)
Introduction to basic principles of genetic organization, function, and inheritance.
Prerequisite: one year of chemistry, junior standing, and at least one 200-level biology course, or permission of instructor.

BIO 351. Environmental Education: Focus on Natural History. (4)
Introduction to the field of environmental education emphasizing the natural history and interpretation of natural habitats of southwestern Ohio. Recommended prerequisite: BIO 115.
2 Lec. 2 Lab.

BIO 361. Patterns in Development. (4)
Cellular, molecular and genetic analysis of developmental processes by which a single celled zygote is transformed into a multi-cellular organism, comparative analyses of the mechanisms across animals, and an understanding of classical and modern experimental approaches in Developmental Biology. CAS-D/LAB.
3 Lec. 1 Lab.
Prerequisite: BIO 203.

BIO 377. Independent Studies. (0-6; maximum 10)

BIO 395. Primate Biology and Behavior. (3)
Taxonomic survey of the primate order including anatomy, distribution, adaptation, and morphological characteristics of various taxa. Selected primatological topics including primate conservation, reproduction and development, manipulation, and tool use. Recommended prerequisite: ATH 255 or BIO 206; junior or senior status; or permission of instructor.
Cross-listed with ATH.

BIO 400. Capstone Seminar: Contemporary Issues in Biology. (3)
Requires seniors to critically evaluate and form positions on current biological issues of national interest. Format, theme, and topics change from term to term. Examples of themes include the management and use of natural resources, preservation of biological diversity, nature of the medical profession, and issues raised by advances in biotechnology. Faculty as well as other recognized authorities participate. SC.

BIO 402/BIO 502. Plant Anatomy. (4)
Study of structural characteristics of plant cells organized into functional tissue groups within organs comprising plant bodies. Emphasis placed on the developmental origin and identification of plant cell types using histochemistry and light microscopy, how various combinations of cell types form functional vegetative tissues, and how these functional tissues are organized within leaves, stems, and roots to form integrated plant bodies that are able to survive in diverse environments. (3 Lec. 1 Lab). CAS-D.
Prerequisites: (BIO 191 or BIO 116 or BIO 115) and (BIO 204 or BIO 206) or alternatively, instructor permission.

BIO 408/BIO 508. Ornithology. (4)
General biological principles of birds, their classification, evolution, adaptations, ecology, behavior, and relationship to humans. CAS-D/LAB.
2 Lec. 2 Lab.
Prerequisite: two advanced courses in biological sciences or permission of instructor.

BIO 409. Herpetology. (4)
Classification, speciation, morphological adaptations, mode of life, history, and ecology of amphibians and reptiles; emphasis on recent advances in the field. CAS-D/LAB.
2 Lec. 2 Lab.

BIO 410/BIO 510. Mammalogy. (4)
Examines the evolution, taxonomy, morphology, behavior and distribution of mammals. Emphasis is on placing modern mammal species in an evolutionary and comparative context. 2 Lec, 2 Lab. CAS-D/LAB.
Prerequisite: at least 14 hours of biology.

BIO 411/BIO 511. General Entomology. (4)
This course serves as both a single, concise introduction to basic entomology and as a foundation for advanced work in entomology (systematics, ecology, conservation). Lectures cover all fundamental aspects, but emphasize diversity, classification, structure, function, development, reproduction, behavior, and ecology. Laboratory component is slanted towards creating a working knowledge of Ohio insect diversity, sampling methodologies, and skills/knowledge essential for insect-related fieldwork. 2 Lec 2 Lab.
Prerequisite: BIO 115 or equivalent.

BIO 419R. Independent Research Capstone. (3)
Provides students with an in-depth research experience. Requires that students understand scientific literature in a specific area, develop a research proposal, perform research, write a summary report, and orally present the research findings. SC.
Prerequisite: permission of instructor and department chair or chair designate.

BIO 422/BIO 522. Evolutionary and Population Genetics. (4)
Detailed examination of evolutionary and biosystematic concepts that have promoted advances in understanding the origins, structure, function, behavior, and distribution of present-day organisms and taxa.
Prerequisite: BIO 342 or equivalent.

BIO 423/BIO 523. Synthetic and Systems Biology. (3)
Design principles and applications of microbial cells. Topics include synthetic pathway design, artificial photosynthesis, repurposing genetic codons, genome synthesis and editing, and genetic circuit design among others. CHM 432/CHM 532, MBI 425/MBI 525, and MBI 445/MBI 545 are highly recommended before taking this course.
Cross-listed with: MBI 423/MBI 523/523 and CHM 423/CHM 523/523.
Prerequisite: MBI 201, or equivalent, or permission of instructor.

BIO 425/BIO 525. Environmental Plant Physiology. (4)
Examines the structure and function of plants from the cellular to the whole plant level focusing on plant-environment interactions.
Prerequisite: a course in biological science.

BIO 431/BIO 531. Global Plant Diversity. (3)
Research-focused seminar on floristic, ecological, and cultural influences on global patterns of plant diversity, especially in tropical regions. Comparative topics include the role of disturbances and global environmental change.
Prerequisites: BIO/MBI 115, BIO 191, or higher, GEO 121 or higher, or permission of instructor.
Cross-listed with GEO 431/GEO 531/531.

BIO 433. Field Ecology. (3)
Practical experience in the collection, analysis, and interpretation of ecological data, and communicating with other scientists. 1.5 Lec. 1.5 Lab.
Prerequisites: BIO 209 and STA 261 or equivalent.
Cross-listed with MBI.

BIO 438/BIO 538. Soil Ecology and Sustainable Use. (3)
Introduces processes of soil formation and consequent physical, chemical, and biological properties. Analyzes soil functions related to plant growth, agricultural productivity, water quality, and biodiversity, and evaluates sustainability of the soil resource in the context of environmental change and ecosystem management.
Prerequisite: CHM 141 or equivalent.

BIO 444/BIO 544. Molecular Biology. (3)
Emphasis on molecular biology of the gene and the molecular basis of gene action. Recommended prerequisite: organic or physical chemistry and BIO 342; or equivalent.

BIO 449/BIO 549. Biology Of Cancer. (3)
Study of cancer in animals at the molecular, cellular, and physiological levels. Causes, development, and treatment of cancer are examined as well as the characteristics of the 10 most common cancers in humans. Recommended prerequisite: BIO 203 and organic chemistry.

BIO 451/BIO 551. Conservation Education and Community Engagement. (3)
Theory and practice of participatory education, collaborative research, and conservation action for positive ecological, educational, and social change. Includes community engagement projects and case studies in diverse local and global contexts.
Prerequisite: at least one course in the life sciences at the 200 level or above, or permission of instructor.

BIO 452/BIO 552. Neuromodulation:Cells to Circuits. (3)
Examines neural plasticity due to neuromodulation of neurons, synapses, and circuits across invertebrate and vertebrate nervous systems, including the consequences of dysfunction in neuromodulatory systems. Emphasizes critical evaluation of current literature, and scientific communication. SC. CAS-W.
Prerequisite: BIO 305 or both BIO 161 and BIO 203.

BIO 453/BIO 553. Animal Physiological Ecology. (4)
Study of physiological and behavioral adaptations of organisms. Topics include discussions of flying, diving, and swimming adaptations as well as consideration of specific environments such as deserts, caves, and estuaries. Recommended prerequisite: BIO 209, 305, or equivalent, and permission of instructor.
3 Lec. 1 Lab.

BIO 454/BIO 554. Endocrinology. (3)
Study of the role of chemical messengers and hormones from endocrine and neural origin, in control of physiological processes. Includes review and discussion of current techniques and methodologies in the literature. Prerequisite: BIO 305, or both BIO 161 and BIO 203.

BIO 457/BIO 557. Neuroanatomy. (3)
Study of structural and functional organization of the mammalian central nervous system. Emphasis on organization of and current methodologies used in study of major neuroanatomical pathways and neurotransmitters of mammalian brain and spinal cord. Includes computer-assisted imaging of brain structures and methods of data analysis.
Prerequisite: BIO 305, or both BIO 161 and BIO 203.

BIO 463/BIO 563. Limnology. (4)
Physical, chemical, and biological characteristics of freshwater ecosystems. CAS-D/LAB.
3 Lec. 1 Lab.
Prerequisite: BIO 209 or equivalent, a year of chemistry, or permission of instructor.

BIO 464/BIO 564. Laboratory in Cell and Molecular Biology. (3)
An in-depth, hands-on laboratory experience that supplements any of the 400 level cell, developmental, genetic, or molecular biology courses. Emphasis is on techniques used in modern cell and molecular biology.
Prerequisite or Co-requisite: BIO 342; or permission of instructor.

BIO 465/BIO 565. Animal Behavior. (4)
Evolutionary approach to the study of animal behavior with emphasis upon the description, measurement, and interpretation of behavior of animals. Emphasizes a problem-solving approach to help students understand how and why behavior influences the ways in which animals live and reproduce. Emphasizes examination of behavior using a combination of lectures, discussions, and laboratory experiences. Students gain experience in evaluating published scientific research as well as data gathered in lab exercises and an independent research project. CAS-D/LAB.
2 Lec. 2 Lab.
Prerequisite: nine hours of advanced courses in biological science and a course in statistics or permission of instructor.

BIO 466/BIO 566. Bioinformatics Computing Skills. (3)
Study of the core computational and biological concepts in bioinformatics, with programming in Python, MySQL and Ubuntu OS. You will gain hands-on experience in popular bioinformatics applications, including BLAST, sequence alignment, genome browser, and gene annotation, among others.
Prerequisites: BIO 256; or CSE 174; or permission of instructor.
Cross-listed with CHM/CSE/MBI.

BIO 467/BIO 567. Conservation Biology. (3)
Principles of ecology and organismal biology applicable to conservation of uncommon plant and animal populations or ecosystems as related to anthropogenic influences and relevant legislation. SC.
Prerequisite: BIO 209 or BIO 401; or equivalent.

BIO 469/BIO 569. Neurophysiology. (3)
Study of the physiology of the central nervous system with emphasis on the cellular and molecular basis of signal transmission in the brain. Includes a review of current techniques and topics in the literature.
Prerequisite: BIO 305, or both BIO 161 and BIO 203; graduate standing for 569.

BIO 471/BIO 571. Molecular Physiology. (3)
Emphasis on how modern biological techniques are applied to the understanding of molecular physiology in both the normal and abnormal disease states. Specific topics will be complemented with current literature to illustrate investigations into physiology at the cellular and molecular level.
Prerequisite: BIO 305 and a 200-level (or higher) course in molecular/cell biology.

BIO 477. Independent Studies. (0-6; maximum 10)

BIO 480. Departmental Honors. (1-6; maximum 6)
Departmental honors may be taken for minimum of 4 credit hours and maximum of 6 credit hours, in one or more semesters of student's senior year.

BIO 481/BIO 581. Theory of Electron Microscopy. (3)
Principles and theory of scanning and transmission electron microscopy and advanced microscopies.

BIO 482/BIO 582. Scanning Electron Microscopy Laboratory. (2)
Practical course providing training in scanning electron microscopy (SEM). Sample preparation, SEM operation, darkroom work, manuscript preparation, and an individual research project.
Prerequisite or Co-requisite: BIO 481/BIO 581 and permission of instructor.

BIO 483/BIO 583. Transmission Electron Microscopy Laboratory. (3)
Practical course in transmission electron microscopy: specimen preparation microscope usage, data collection, and photographic plate preparation.
Prerequisite or Co-requisite: BIO 481/BIO 581 and permission of instructor.

BIO 485/BIO 585. Bioinformatics Principles. (3)
Concepts and basic computational techniques for mainstream bioinformatics problems. Emphasis placed on transforming biological problems into computable ones and seeking solutions.
Prerequisites: (BIO/CSE/MBI 256 or CSE 174) and (BIO/MBI 116 or MBI 201 or BIO 342) or permission of instructor.
Cross-listed with CSE 456/CSE 556 and MBI 485/MBI 585.

BIO 491. Seminar in Biology. (1; maximum 2)
Review and discussion of topics in biology.
Prerequisite: senior biology, botany or zoology major; or permission of instructor.

BIO 497/BIO 597. Socio-Ecology of Primates. (3)
Ethology and ecology of living prosimians, monkeys, and apes, from comparative and evolutionary perspectives, emphasizing field studies of natural populations.
Prerequisite: junior or senior status; nine advanced hours in BIO; for others, permission of instructor.
Cross-listed with ATH.

BIO 498. Evolution of Human Behavior. (3)
Ethology and ecology of Homo sapiens, from comparative and evolutionary perspectives, drawing on primatology, paleoanthropology, and sociocultural studies of traditional societies. SC.
Prerequisite: junior or senior status; nine advanced hours of BIO; permission of instructor.
Cross-listed with ATH 498.

BIO 601. Seminar for Graduate Students. (1)
Introduction to methods of searching literature, preparation of audiovisual materials, preparation of grant applications and manuscripts, good teaching practices, and other aspects of the profession. Seminar for beginning graduate students in the biological sciences.

BIO 605. Advanced Molecular Biology. (3)
In-depth study of genome organization, rearrangement, replication, and expression in prokaryotic and eukaryotic cells and their viruses, with an emphasis on regulatory mechanisms.
Prerequisite: graduate status, a course in molecular genetics, biochemistry, or cell biology, and permission of instructor.
Cross-listed with MBI.

BIO 606. Advanced Cell Biology. (3)
Advanced level study of molecular basis of prokaryotic and eukaryotic cell structure/function relationships.
Prerequisite: graduate status, course in molecular genetics, cell biology, or biochemistry, and permission of instructor.
Cross-listed with MBI.

BIO 620. Graduate Research. (1-12; maximum 14)
Special problems in the biological sciences.

BIO 622. Urban Ecology. (3)
As urbanization increases globally, it is important to understand how natural resources can best be managed within and around cities. In this course, students explore the growing field of urban ecology and investigate how diverse stakeholders in cities can work together to increase urban sustainability and livability. The course includes a project whereby students collaborate to design a comprehensive urban land use management vision for the future of an urban system of their choice. This course occurs in Dragonfly's web-based learning community.

BIO 623. Human Dimensions of Conservation. (3)
Conserving wildlife is a complex endeavor that requires the integration of sound science from both the social and natural sciences. This course explores how social sciences can inform conservation. Students consider how current conservation issues can be addressed through an understanding of human thought and action. This course occurs in Dragonfly's web-based learning community.

BIO 624. Pollinator Biology & Conservation. (2)
Pollinators are critically important to global ecosystems. This course explores the diversity of pollinators, from relatively well-known honey bees to wild bee species and non-insect pollinators such as bats and hummingbirds. Participants implement a project that involves creating a pollinator garden or submitting a pollinator-focused research paper, lesson plan, or grant application. This course occurs in Dragonfly's web-based learning community.

BIO 625. Environmental & Informal Science Education. (3)
This course explores pedagogical approaches used in environmental and informal science education. Students conduct an analytic review of the literature related to an area of interest and then put the knowledge to work by designing, facilitating, and assessing a learning activity conducted with a target audience. This course occurs in Dragonfly's web-based learning community.

BIO 627. Global Biomes. (2-3)
This course investigates the biomes of the world with a focal biome being explored in-depth each semester. Students discuss topics such as gradients/ecoclines, trends in biodiversity, and differences among marine, terrestrial and anthropogenic biomes. This course occurs in Dragonfly's web-based learning community.

BIO 631. Conservation Science & Community. (3)
This course explores the theory and practice of conservation science, including discussion of threats to biodiversity as well as methods to collaboratively address social-ecological problems. Vital to this course is a project in which students work directly with their local community to better understand and address real ecological problems. This course occurs in Dragonfly's web-based learning community.

BIO 632. Biology in the Age of Technology. (3)
This course explores the beneficial and negative impacts of technology for conservation biology and environmental action. Topics include wildlife mapping via GPS and GIS, use of drones, satellite imagery, radio-collars, citizen/community science, social media, impacts of media on children including Nature Deficit Disorder. Through projects, students research a biological problem of interest and design a participatory media product to engage community members in that topic. This course occurs in Dragonfly's web-based learning community.

BIO 634. Issues in Evolution. (3)
An understanding of evolution is critical for those seeking to better protect life on earth. In this course, students learn and discuss foundational evolutionary concepts as well as emerging topics. Students design a project that presents information on an evolutionary topic of choice in the form of a lesson plan, infographic or review paper. This course occurs in Dragonfly's web-based learning community.

BIO 636. Science Leadership & Media Workshop. (3)
This course focuses on science writing for many purposes, including peer-reviewed literature, grants, and general community outreach. Students provide critical peer review of others' work and are challenged to explore a leadership dimension within their professional careers. This course occurs in Dragonfly's web-based learning community.

BIO 637. Master's Capstone. (2)
Master's Capstone is the cornerstone exit course of the Advanced Inquiry Program (AIP) and the Global Field Program (GFP) master's degrees from Miami University. Students synthesize, analyze, share, discuss, and make final reflections about the projects and artifacts they have created throughout their master's experience and how those projects have helped lead them to a deeper understanding of the master's program core tenets of local, regional and global understanding; inquiry; environmental stewardship; and community participation/voice. This course occurs in Dragonfly's web-based learning community.

BIO 638. Climate Change. (3)
Global warming is irrevocably altering our polar ice caps, our oceans, our forests, and the world's plant and animal life. In this course, participants study the science of climate change, the diverse causes of climate change, and the impact of climate change at local, regional, and global scales. Topics include global warming's effect on weather and climate, ice caps, deforestation, and species conservation. Because the public plays a central role in how the world responds to climate change, students also investigate the factors that guide public perception, ranging from media to social interaction. Students explore the effect of climate change specific to the biology of their local region and consider what actions they and their communities can take locally. Through project assignments and research, at the end of this course participants not only have a solid understanding of current issues surrounding climate change but will also have considered and developed strategies for taking action. This is a hybrid course with interaction on-site and in Dragonfly's web-based learning community.

BIO 639. Master's Capstone: MAT. (2)
A required exit course for students earning a Master of Arts in Teaching (MAT) in the Biological Sciences as part of the Advanced Inquiry Program (AIP) or the Global Field Program (GFP) master's degrees from Miami University. Students review, analyze, and synthesize their own work throughout the degree and create a master’s portfolio. They share their portfolio with peers and discuss their academic and personal progress through their master’s experience. Student portfolios must demonstrate relevance to learning and teaching in formal education settings.

BIO 640. Internship. (0-12; maximum 6)

BIO 641. Earth Expeditions: Advanced Field. (5)
The Earth Expeditions: Advanced Field course allows students to more fully and deeply explore community-based conservation, participatory education, and inquiry at an international conservation site they have previously visited during a past Earth Expeditions course. Possible field sites for the Advanced Field course include Baja, Belize, Borneo, Costa Rica, Guyana, Hawai'i, Kenya, Mongolia, Namibia, and Thailand (see EarthExpeditions.org for detailed descriptions of each field site). Prior to and following the field experience, students complete coursework via Dragonfly's Web-Based Learning Community as they apply experiences to their home institutions.

BIO 642. Amazon: Avian & Tropical Ecology. (5)
In the Amazonian Neotropical regions of Peru, reality has attained mythic proportions: more than 400 species of mammal, 1,300 bird species, 3,000 fish, 40,000 plants, and 2.5 million insect species. And still counting. Why is this area of South America the most diverse on the planet? How have the varied human groups that inhabit this region adapted to their unique environments? And perhaps the most relevant question for life on Earth, what is the future of the Amazon? Students travel to the Peruvian Amazon rainforest and work with educators, researchers, and local communities to better understand the evolution and maintenance of biodiversity in this region, and to experience firsthand the effects of human interventions in the Amazon, from deforestation and urbanization to restoration efforts by local groups. Prior to and following the field experience in the Amazon, students complete coursework via Dragonfly's Web-Based Learning Community as they apply experiences to their home institutions.
Cross-listed with IES.

BIO 643. Australia: Great Barrier Reef. (5)
One of the seven wonders of the natural world, the Great Barrier Reef lies in the clear blue waters off the northeast coast of Australia. This complex reef system is not only the world's greatest expanse of coral, it is the Earth's largest living structure, a massive, beautiful, and ancient biological phenomenon of bewildering diversity and immense ecological significance. This graduate course is offered jointly with Reef HQ Aquarium, Australia's National Education Centre for the Great Barrier Reef. We sleep near the corals in the aquarium itself, venturing forth on several excursions for direct research on the Great Barrier Reef, and hiking in some of Australia's unique terrestrial habitats. Discussion topics include marine science issues, citizen engagement in marine science and environmental stewardship. Prior to and following the field experience in Australia, students complete coursework via Dragonfly's Web-Based Learning Community as they apply experiences to their home institutions.
Cross-listed with IES.

BIO 644. Baja: Field Methods. (5)
Students discover the rich waters and terrestrial ecosystems of Baja's UNESCO World Heritage site and biosphere reserve on the Sea of Cortez. Bahia de los Angeles is a unique ecoregion with remarkable marine and terrestrial environments. Students also explore Rancho San Gregorio, a family-owned ranch located in a small canyon where its isolation and climate make it a hotspot for desert investigations. Students gain proficiency in applying field methods to ecological questions and conservation practice. A premise of this course is that field methods are not only essential for ecological research, they can serve as the basis for participatory education, public engagement in science, and community-based environmental stewardship. Many groups, from teachers leading schoolyard ecology to parataxonomists involved in ethnobotanical research, share a need for reliable information obtained through robust field methods to build understanding and to promote informed action. Prior to and following the field experience in Baja, students complete coursework via Dragonfly's Web-Based Learning Community as they apply experiences to their home institutions.
Cross-listed with IES.

BIO 645. Belize: Approaches to Environmental Stewardship. (5)
Students join our partner, the Belize Zoo, and explore diverse terrestrial, coastal, and coral reef communities of Belize, while learning about conservation programs on such species as harpy eagles, jaguars, manatees, and howler monkeys. Possible investigations include monitoring manatee population dynamics, human influence on coral reefs, aquatic mangrove species sampling, and species behavior studies at the Belize Zoo. Discover the power of inquiry to generate knowledge and inspire conservation. All students will have the chance to conduct an investigation of the local ecosystem, asking their own questions, collecting data, and presenting conclusions. Prior to and following the field experience in Belize, students complete coursework via Dragonfly's Web-Based Learning Community as they apply experiences to their home institutions.
Cross-listed with IES.

BIO 646. Borneo: Primate Conservation. (5)
Borneo's primate community is exceptionally rich, including proboscis monkeys, which occur only in Borneo, leaf monkey, macaque, gibbons, tarsier and slow loris. Of greatest conservation concern is the orangutan, which occurs naturally on only two islands in the world, Borneo and Sumatra, and is under increasingly severe pressure, primarily from habitat loss. The orangutan, the only great ape in Asia, may completely vanish from the wild within two decades. Partnered with the Woodland Park Zoo, we will join researchers from the NGO Hutan and the Danau Girang Field Centre, and villagers of the Kinabatangan region who are responsible for model community-based efforts to preserve orangutans, Bornean pygmy elephants, and other species. In addition to exploring primatological field methods, students will work with local groups and develop new ways to engage communities worldwide in saving orangutans and other wildlife. Prior to and following the field experience in Borneo, students complete coursework via Dragonfly's Web-Based Learning Community as they apply experiences to their home institutions.
Cross-listed with IES.

BIO 647. Guyana: Local Wisdom & Conservation. (5)
Guyana's rain forests are part of the Guiana Shield considered one of the last four Frontier Forests in the world. Guyana is famous for its relative abundance of iconic Amazonian species such as jaguars, arapaima (a "living fossil" and one of the largest freshwater fishes in the world), harpy eagles, giant anteaters, giant river otter, and the giant water lily. Guyana is also culturally and ethnically diverse. We will spend most of our time with the Makushi, an indigenous group that has lived in these forests and savannas for thousands of years. The Makushi and their lands face a striking transition as the forces of development provide new opportunities and challenges, the greatest perhaps being the rapid extinction of traditional knowledge. Conscious of the value of indigenous and non-indigenous knowledge, Guyana's Makushi people are becoming masters of straddling both worlds. Prior to and following the field experience in Guyana, students complete coursework via Dragonfly's Web-Based Learning Community as they apply experiences to their home institutions.
Cross-listed with IES.

BIO 648. Hawai'i: Saving Species. (5)
The extraordinary island ecosystems of Hawai'i evolved in isolation over millions of years, and the islands have long been home to species that occur nowhere else on the planet. However, since the arrival of humans, native species have been under tremendous threat, and by many measures Hawai'i is becoming one of the United States' most profound conservation failures. Habitat destruction, environmental degradation, introduced species, and other forces have made Hawai'i a global center for extinction. Students in this course will join with San Diego Zoo Global (SDZG), Project Dragonfly, and Hawaiian partners to explore what it takes to save species in the wild. We will focus especially on the inspirational work of SDZG's Institute for Conservation Research, which uses science, education, and community programs to rescue species from the brink of extinction. We expect Earth Expedition's Hawai'i program to immerse graduate students and local partners in developing and testing site-specific methods of community engagement to sustain ecological and social health. Prior to and following the field experience in Hawai'i, students complete coursework via Dragonfly's Web-Based Learning Community as they apply experiences to their home institutions.
Cross-listed with IES.

BIO 649. Kenya: Wildlife & People in Integrated Landscapes. (5)
The South Rift Valley of Kenya is one of the most spectacular wildlife areas on the planet. Project Dragonfly has partnered with the Cincinnati Zoo & Botanical Garden and the African Conservation Centre to advance community-based conservation in this dynamic landscape. This effort builds on the decades-long research of Dr. David Western, former head of the Kenya Wildlife Service, and the centuries-long research of the Maasai pastoralists, who have long co-existed with wildlife in an open grassland ecosystem populated by elephants, lions, giraffes, zebra, wildebeests, and a remarkable diversity of other species. With the rise of nontraditional lifestyles, private ranches, and fenced lands that prevent needed wildlife migrations, communities of the South Rift have recognized the need to understand the impact of these changes and to work together for a better future. Join Kenyan conservationists, educators, community leaders, and youth to study sustainable approaches to human-wildlife coexistence. Prior to and following the field experience in Kenya, students will complete coursework via Dragonfly's Web-Based Learning Community as they apply experiences to their home institutions.
Cross-listed with IES.

BIO 650. Seminar in Molecular Biology. (1; maximum 3)
Discussion of current literature in molecular biology.
Prerequisite: graduate standing.
Cross-listed with CHM 650 and MBI 650.

BIO 651. Mongolia: Steppe Ecology & Civic Media. (5)
Students travel to Mongolia, the "Land of Blue Sky." The birthplace of the Mongol Empire, the largest contiguous empire in human history, Mongolia is now a vibrant democracy and home to an open wilderness that has few parallels in the modern world. We will explore the great steppes, and especially engage in the conservation story of two key steppe species: Pallas' cats and Przewalski's horse. Pallas' cats are important steppe predators whose conservation provides insights into the challenges facing the survival of small wild cats worldwide. Przewalski's horse, also called takhi, are considered to be the only true wild horse left in the world. We will join research on an ambitious reintroduction project based in Mongolia that has returned this remarkable species to its former homeland after being driven to extinction in the wild. Prior to and following the field experience in Mongolia, students will complete coursework via Dragonfly's Web-Based Learning Community as they apply experiences to their home institutions.
Cross-listed with IES.

BIO 652. Thailand: Buddhism & Conservation. (5)
Students travel to Thailand to investigate this country's astonishing Old World rain forests and diverse cultural environments. This course will address key topics in ecology while exploring emerging models of conservation and education. Possible research projects include Buddhism and the environment, indigenous ecological knowledge, spiritual connections to nature, and community forests. Discover the power of inquiry to generate knowledge and inspire conservation. All students conduct an investigation of the local ecosystem, asking their own questions, collecting data, and presenting conclusions. Prior to and following the field experience in Thailand, students complete coursework via Dragonfly's Web-Based Learning Community as they apply experiences to their home institutions.
Cross-listed with IES.

BIO 653. India: Species, Deities & Communities. (5)
Students journey to India through the rich ecological, cultural, and spiritual landscapes of the Western Ghats, exploring sacred groves and forest temples where the fate of wildlife, people, and deities meet. The Western Ghats region is well known to conservationists as a biodiversity hotspot, home to diverse local ecosystems with an abundance of plant and animal species found nowhere else. The existence of sacred groves in the Western Ghats predates recorded history. For social scientists, sacred groves are valued as centers for community life. For the spiritually inclined, sacred groves transcend earthly bounds, allowing people to commune with gods and other powerful beings that offer protection, enlightenment, absolution, or guidance. In this course, we seek to better understand the multifaceted relationship between people and nature, and we address specific questions about a sustainable future. Prior to and following the field experience in India, students complete coursework via Dragonfly's Web-Based Learning Community as they apply experiences to their home institutions.
Cross-listed with IES.

BIO 654. Foundations of Inquiry. (3)
This course engages students in exploring the foundations of inquiry-based teaching and learning while students gain a new familiarity with Advanced Inquiry Program (AIP) Master Institution (MI) facilities as informal science education settings. Through making observations on zoo grounds, developing comparative questions, devising investigations to answer those questions and communicating results, participants will experience the full process of inquiry and will learn how to guide this process with their own students and in their own communities. This type of firsthand, experiential learning encourages independent and critical thing, increasing the communities' awareness and concern for the local environment and its inhabitants. We will engage in activities that demonstrate the applications of inquiry in the classroom, on zoo grounds, in the schoolyard and other settings. Through this course, students will develop the investigation, critical reflection, and collaboration skills needed to lead inquiry-driven learning for diverse communities. This is a hybrid course with interaction on-site and in Dragonfly's web-based learning community.

BIO 655. Master Plan in Action. (1-3)
This course is specifically designed for students enrolled in the Project Dragonfly Master's programs at Miami University. Through the course, students plan and reflect on community-embedded projects including a publication project, community-based leadership challenge, overall Master Plan for the program, and creation of a culminating portfolio. This course occurs in Dragonfly's web-based learning community.

BIO 656. Environmental Stewardship in My Community. (3)
Students in this course investigate environmental stewardship, research science and conservation opportunities and solutions in their local communities, practice inquiry-based learning, develop a conservation project to be used in their classroom or community, and reflect on ecological and carbon footprints. At the end of this course, students will have a solid understanding of community-based conservation, with a particular emphasis on current issues facing local habitats in the communities where they live. Students will also explore and begin to design stewardship strategies for empowering their own students or community members to generate solutions and take action. This is a hybrid course with interaction on-site and in Dragonfly's web-based learning community.

BIO 657. Regional Ecology. (3; maximum 6)
Through both zoo-based and field-based experiences, this course explores regional wildlife conservation issues, as well as field investigation techniques that scientists and citizens can use to study and conserve local ecoregions and wildlife. Students will be exposed to observational and experimental approaches and will practice field investigation techniques that can provide rigorous, engaging inquiry experiences for students. Student-conducted investigations will be used to contribute to local ecological knowledge by describing natural systems, noting differences in habitats, and identifying environmental trends and issues. This course focuses on different ecoregions in the area and highlights different conservation issues or themes based on that ecoregion. This is a hybrid course with interaction on-site and in Dragonfly's web-based learning community.

BIO 658. Ecophysiology. (3)
Students in this course will explore the ways in which humans can (and do) emulate systems and designs found in nature to create materials, medicines, social systems, computers and so much more. Students will fine tune their observation skills and complete a design challenge using nature as their guide. Through this course, students will develop their observation and collaboration skills and will acquire research experience in the life sciences on such topics as the principles of ecophysiology, form and function of organismal adaptations, phenotypic and behavioral plasticity, and maintenance of homeostasis. Students will think critically and scientifically about the ways in which nature can benefit humankind through technological inspiration and solutions to environmental problems. Students will apply what they have learned as they develop curricula and create design challenges for professional use. This is a hybrid course with interaction on-site and in Dragonfly's web-based learning community.

BIO 659. Great Lakes Ecosystems. (3)
The focus of this course is the study of the biology of the Great Lakes watershed, combining classroom work with field science inquiry and research. In addition to exploring the general function of watersheds, students become familiar with historical and contemporary human influences on ecosystems within the watershed basin, and they discuss and understand negative human impacts including point and non-point source pollution, multiple-stressors, "urban stream syndrome," and local sewage treatment and its relationship to the basin. Students gain skills observing and describing biotic and abiotic characteristics of area watershed ecosystems and understand the status of threatened and endangered species in the watershed basin. This is a hybrid course with interaction on-site and in Dragonfly's web-based learning community.

BIO 661. Global Connected Conservation. (5)
This course explores the applied theories and professional skills required to develop meaningful conservation action. Working with a network of global conservation advocates and non-profit organizations, students collaborate to identify needs, design, and implement conservation campaigns. Students gain skills in community science, stakeholder engagement, conservation behavior change, and inclusion of place-based and cultural values. Throughout the term, diverse leaders in wildlife conservation and environmental education share their strategies, recommendations, and inspiration. This course is particularly suited for current or future professionals seeking leadership experience in the wildlife, non-profit, green-business, informal science, or education sectors.

BIO 662. Animal Behavior & Conservation. (3)
This course provides a foundation for understanding ethological research methods that can be applied to promote animal welfare and wildlife conservation. The course involves a community -based research project and direct observation of diverse animal species in a variety of settings such as zoos, botanical gardens, parks, and more. This course occurs in Dragonfly's web-based learning community.

BIO 663. Project Design & Assessment. (3)
This course instructs students about one of the most important scientific endeavors: evaluation to indicate whether their own work or the work of others is showing a trend and, thus, having an impact. The course is focused on two main sets of evaluation, natural science and social science studies. The course will review statistical thinking and discuss how to construct successful studies that will open students to accurate and effective evaluation. We will discuss how to choose between different statistical tests and the consequences for their experimental design. Students will be engaged in the different ways researchers and others apply statistics to natural science and social science studies. Students conducting social science research will determine whether to conduct qualitative or quantitative studies and will parse out the differences and values of each approach. This is a hybrid course with interaction on-site and in Dragonfly's web-based learning community.

BIO 667. Conservation Research at Living Collection Institutions. (3)
This course provides students with an overview of conservation research conducted in zoological, reserve, aquaria and other ex situ settings. Students will explore key science concepts within the contexts of wildlife conservation, the imperative of in-situ conservation, the multi-disciplinary nature of science, and hands-on conservation research. Participants will learn about current research in the fields of genetics, reproductive physiology, disease diagnostics, ecology, and animal behavior. Course themes explore sustainable population maintenance, wildlife health, bioresource banking, restoration ecology, reintroduction biology, and the role of zoos, reserves and aquaria in conservation. This is a hybrid course with interaction on-site and in Dragonfly's web-based learning community.

BIO 668. Biology Through Inquiry. (3)
This course will explore fundamental topics in biology from a student-driven, inquiry-based perspective. Course topics include cell biology, plant biology, DNA and gene expression, evolution, diversity of life and classification, populations, communities, and ecosystems. Students will conduct mini-inquiries throughout the course, helping to link core concepts to their everyday lives. Through collaborative discussions, students will further their understanding of these key concepts and articulate relationships between biology and many of the major challenges currently facing humanity. Finally, students will conduct their own biological investigation, developing skills in experimental design, data collection, and communication of findings. This course occurs in Dragonfly's web-based learning community.

BIO 671. Population and Community Ecology. (4)
Principles and applications of population and community ecology: population dynamics, direct and indirect species interactions, food webs, species diversity.
Prerequisite: at least one course in general ecology; calculus recommended.
Cross-listed with MBI.

BIO 672. Ecosystem and Global Ecology. (4)
Structure, dynamics and management of ecosystems and the biosphere, including food web interactions, nutrient cycling, ecosystem functioning, and biogeochemical cycles at local, regional and global scales.
Prerequisite: at least one course in general ecology and general chemistry.
Cross-listed with MBI.

BIO 675. Inquiry & Action. (2; maximum 6)
A follow-on course to summer Earth Expeditions global field courses, BIO 675 enables students to work with faculty, peers, and their local communities to address key ecological and education issues through hands-on investigation and action. Each student conducts a semester-long Inquiry Action Project (IAP) that requires scientific research in a community context as well as shared action or a plan of shared action addressing a focus issue.
Prerequisites: Earth Expeditions field course, or permission of instructor.

BIO 677. Independent Studies. (0-6; maximum 10)

BIO 681. Galápagos: Islands of Change. (5)
Biologically, geologically, and culturally, the Galápagos are one of the best places on Earth to study the forces of change. Here, in 1835, Charles Darwin noted how giant tortoises, finches, and other taxa evolved different forms across the archipelago. Species on the islands have transformed in response to other species and the physical environment, through periods of isolation and connection, as new islands were created and old islands submerged over time, The most powerful changes now are of human origin. People are an increasing source of habitat destruction, overexploitation, and introduced species. But they are also a source of hope, with government agencies, researchers, NGOs, educators, and other informed citizens designing promising new approaches. Students will explore multifaceted forces of change in the Galápagos and contribute directly to sustainable solutions to current issues. Before and after the field experience, students complete coursework in Dragonfly's web learning community.
Cross-listed with IES.

BIO 682. Paraguay: Eco-Leadership. (5)
The presence of conservation organizations in Paraguay is limited, and a critical need exists to better understand and build on the traditionally close relationship between local people and the land on which they depend. Cultivating the next generation of leaders is essential to a sustainable future for Paraguay's unique ecosystems and cultures, which are under increasing threat from population growth, agriculture, cattle ranching, hunting, and construction. Students in this course will co-develop an Eco-Leadership program for Paraguay, working in partnership with Para La Tierra (PLT), a nonprofit conservation organization devoted to scientific research, conservation, and community engagement. Students will learn with Paraguayan youth and others the diverse skills required for effective eco-leadership. Before and after the field experience, students complete coursework in Dragonfly's web learning community.
Cross-listed with IES.

BIO 683. Brazil: Saving Golden Lion Tamarins. (5)
Golden lion tamarins live in only one small region of Brazil. By 1969, habitat destruction and forest fragmentation reduced the wild population to just 200 individuals. Since then, zoos worldwide have carefully managed the captive population, ecologists have studied habitat and population requirements, and educators have worked with local communities to increase knowledge of tamarins and their forest. Since 1969, the wild population has increased nearly tenfold, making this a landmark case of species recovery. This course focuses on multi-faceted wildlife conservation, including biological issues relevant to species reintroductions and translocations, management of wild and zoo-based populations, community-based habitat restoration, and participatory conservation education. We will explore the next generation of learning programs and public engagement campaigns through zoos and schools in Brazil, the U.S., and other countries. Before and after the field experience, students complete coursework in Dragonfly's web learning community.
Cross-listed with IES.

BIO 689. Pedagogy For Graduate Students. (1)
Introduction to teaching for new graduate students. Role of the graduate teaching assistant, teaching methodology and good teaching practices are covered. Summer only.
Prerequisite: acceptance into one of the graduate programs associated with the department.

BIO 691. Costa Rica: Ecology & Ecotourism. (5)
Students join a summer field course in Costa Rica to explore Neotropical systems, including lowland rain forest and cloud forest; engage in inquiry and action projects on vital issues in education and conservation. Prior to and following the field experience in Costa Rica, students complete coursework via Dragonfly's Web-Based Learning Community as they apply experiences to their home institutions.
Cross-listed with IES.

BIO 692. Namibia: Great Cat Conservation. (5)
Students join a summer field course in Namibia, Africa, to connect with the Cheetah Conservation Fund, the global center of cheetah conservation worldwide; engage in inquiry and action projects on vital issues in education and conservation. Prior to and following the field experience in Namibia, students complete coursework via Dragonfly's Web-Based Learning Community as they apply experiences to their home institutions.
Cross-listed with IES.

BIO 694. Habitats, Adaptations, & Evolution. (1-3)
This course explores the biology and conservation of species and habitats. Students implement a research project and investigate how local environmental conditions shape species' adaptations. This course occurs in Dragonfly's web-based learning community.

BIO 695. Plants & People. (3)
This course explores the ecological roles of plants as well as the history of human-plant relationships (e.g., cultural context, ethnobotany, symbolism). Students implement a research project that engages their community in environmental action. This course occurs in Dragonfly's web-based learning community.

BIO 696. Primate Behavior & Conservation. (3)
Students will complete a semester-long research project to investigate primate conservation and behavior through direct observation of prosimians, monkeys, and apes at the Cincinnati Zoo & Botanical Garden. This is a hybrid course with interaction on-site and in Dragonfly's web-based learning community.
Cross-listed with IES.

BIO 700. Research for Master's Thesis. (1-12; maximum 12)
Research in biology for those who successfully defend their master's thesis proposal.
Prerequisite: undergraduate biological science major and related scientific subjects.

BIO 704. Non-Thesis Project. (0-12; maximum 12)
This repeatable course is for non-thesis culminating experiences. Permission of the instructor is required.

BIO 710. Advanced Seminar. (1-4; maximum 8)
Discussion of current problems and literature.

BIO 720. Doctoral Research. (1-12; maximum 36)
Research performed by doctoral student prior to successful completion of doctoral comprehensive examination.

BIO 750. Advanced Topics in Biology. (1-5; maximum 20)
Study of specialized topics from current research.

BIO 850. Research for Doctoral Dissertation. (1-16)