BIOL 5099G  Selected Topics/Biology
3 Credit Hours.  3 Lecture Hours.  0 Lab Hours.
A course taught of a one-time basis. Lecture only courses will be three credit hours while courses with a laboratory will be four credit hours.
Cross Listing(s): BIOL 5099, BIOL 5099S, BIOL 5099H.

BIOL 5131G  Cell Biology
3 Credit Hours.  3 Lecture Hours.  0 Lab Hours.
Examines the structure and physiology of cells and subcellular organelles. Topics include the cell membrane and membrane transport, the extracellular matrix of the cell, the cell cytoskeleton, DNA structure and replication, transcription, translation and the regulation of gene expression. Graduate students will be given an extra assignment or an extra section on tests, as determined by the instructor, that undergraduates will not be required to do.
Cross Listing(s): BIOL 5131, BIOL 5131H, BIOL 5131S.

BIOL 5132G  Molecular Genetics
3 Credit Hours.  3 Lecture Hours.  0 Lab Hours.
Examines aspects of inheritance of organisms at the molecular, biochemical, cytological, organismic and population levels. Graduate students will be given an extra assignment or additional section of questions on tests that undergraduates will not be required to complete.
Cross Listing(s): BIOL 5132.

BIOL 5134G  Population/Quantitative Genetics
3 Credit Hours.  3 Lecture Hours.  0 Lab Hours.
Introduction to the dynamics of evolutionary change for qualitative and metric characters. Hardy-Weinberg equilibrium will provide a basis for further analysis of microevolutionary "forces" of selection, drift, gene flow, and mutation. Methods for estimating heritability of metric traits and predicting the course of selection will also be introduced.
Cross Listing(s): BIOL 5134.

BIOL 5142G  Molecular Biotechniques
0,4 Credit Hours.  0,3 Lecture Hours.  0,3 Lab Hours.
Highlights modern discoveries in molecular genetics and their application in today's world. In addition to the body of facts associated with molecular methodology, the course will introduce students to experimental techniques such as PCR, electrophoresis, restriction enzyme digest analysis, and DNA sequencing.
Cross Listing(s): BIOL 5142.

BIOL 5148G  Human Genetics
4 Credit Hours.  3 Lecture Hours.  3 Lab Hours.
Basic principles of Mendelian inheritance and molecular genetics are applied to a systematic review of human disorders. Included are disorders of blood, connective tissue, muscles, lysosomes, lipoproteins, transport membrane and mechanisms, amino acid metabolism and the immune system. Special attention is given to diseases caused by chromosomal abnormalities. Sex determination, genetic markers, gene mapping and population genetics are also covered.
Cross Listing(s): BIOL 5148, BIOL 5148H.

BIOL 5210G  Comparative Animal Physiology Laboratory
1 Credit Hour.  0 Lecture Hours.  3 Lab Hours.
Laboratory study of the basic physiological processes of animals, with integrated studies of molecular, cellular, metabolic and organ-system functions.
Cross Listing(s): BIOL 5210.

BIOL 5230G  Comparative Animal Physiology
3 Credit Hours.  3 Lecture Hours.  0 Lab Hours.
A comparative review of the function and regulation of the major organ systems in animals. Topics include homeostasis, membrane transport, osmoregulation, and energetics.
Cross Listing(s): BIOL 5230, BIOL 5230H.

BIOL 5237G  Physiological Ecology
3 Credit Hours.  3 Lecture Hours.  0 Lab Hours.
Examines how physiological adaptations of animals and plants to abiotic environmental factors (e.g., temperature, salinity, moisture, ultraviolet radiation) contribute to the understanding of local species diversity, biogeographic patterns, and habitat exploitation. Emphasis is placed on how physiological function (e.g., osmoregulation, thermoregulation, gas exchange, energy use) interfaces with ecology and evolutionary biology. Graduate students will be given an extra assignment determined by the instructor that undergraduates will not be required to do.
Cross Listing(s): BIOL 5237.

BIOL 5239G  Neurobiology
3 Credit Hours.  3 Lecture Hours.  0 Lab Hours.
Introduction to the mechanisms of neural responses, neural integration, neural development, and environmental effects on developing mature nervous systems.
Cross Listing(s): BIOL 5239, BIOL 5239H, BIOL 5239S.

BIOL 5240G  Histology
4 Credit Hours.  3 Lecture Hours.  3 Lab Hours.
Examines the origin, development, structure and function of vertebrate groups.
Cross Listing(s): BIOL 5240.

BIOL 5241G  Comparative Vertebrate Anatomy
4 Credit Hours.  3 Lecture Hours.  3 Lab Hours.
A comparative and functional study of the morphological systems of vertebrates. Laboratory emphasizes dissection of representative vertebrate groups.
Cross Listing(s): BIOL 5241.

BIOL 5242G  Developmental Biology
4 Credit Hours.  3 Lecture Hours.  3 Lab Hours.
This course is an introduction to the principles of animal and plant development. The focus is on how male and female gametes fuse to form a zygote and how a single-celled zygote develops into an animal with multiple organs with specialized function. This course will cover the molecular and cellular mechanisms involved in fertilization and early embryonic development, molecular signaling involved in development of organs and organ systems, the concept of stem cells and regeneration, and cellular and molecular signaling mechanisms in plant development. Students will see the fundamental conservatism of molecular and cellular mechanisms across animals and plants during development as an important example of evolution. Graduate students will be required to complete advanced-level assignments beyond the scope of the undergraduate requirements. These assignments require a higher level of mastery in the subject matter with additional required deliverables representative of graduate-level work, as determined by the instructor.
Cross Listing(s): BIOL 5242.

BIOL 5243G  Toxicology
4 Credit Hours.  3 Lecture Hours.  3 Lab Hours.
An introduction to the principles of toxicology with a focus on the toxicology of aquatic organisms. Topics include risk assessment, regulatory toxicology, mutagenesis, teratology, and toxicology of the nervous and reproductive systems.
Cross Listing(s): BIOL 5243.

BIOL 5244G  Insect Physiology
4 Credit Hours.  3 Lecture Hours.  3 Lab Hours.
An introduction to insect physiology. Topics include ingestion and utilization of food, reproduction, water balance, muscles, sensory systems and pheromones.
Cross Listing(s): BIOL 5244.
BIOL 5246G Human Pathophysiology
4 Credit Hours. 3 Lecture Hours. 3 Lab Hours.
A selective survey of causes and effects of disease in humans at the molecular, cellular, and systemic level. Selected topics include cellular malfunctions, altered cell environments, cancer biology, and the pathophysiology of the nervous, endocrine, cardiovascular, pulmonary, and renal organ systems.
Cross Listing(s): BIOL 5246.

BIOL 5247G Endocrinology
4 Credit Hours. 3 Lecture Hours. 3 Lab Hours.
A study of endocrine mechanisms, including their evolution and importance at various levels of biological organization.
Cross Listing(s): BIOL 5247.

BIOL 5248G Immunology
4 Credit Hours. 3 Lecture Hours. 3 Lab Hours.
A detailed study of the mammalian immune system emphasizing the experimental basis of current immunological theories. Topics include antigen-antibody interactions, organization and expression of immunoglobulin genes, complement, major histocompatibility complex, antigen processing and presentation, and generation of humoral and cellular immune responses.
Cross Listing(s): BIOL 5248.

BIOL 5333G Emerging Diseases
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
Study of the epidemiology of emerging and re-emerging human diseases throughout the world, but with emphasis on the situation in North America. New and resurging diseases caused by prions, viruses, bacteria, protozoa, fungi, arthropods, and helminths will be discussed, including some vector-borne and tropical diseases.
Cross Listing(s): BIOL 5333, BIOL 5333H.

BIOL 5340G Plant Pathology
4 Credit Hours. 3 Lecture Hours. 3 Lab Hours.
A broad introduction to representative common plant diseases and disorders with emphasis on diagnoses, causes, epidemiology, and methods of control. Graduate students will be given an extra assignment determined by the instructor that undergraduates will not be required to do.
Cross Listing(s): BIOL 5340.

BIOL 5341G Parasitology
4 Credit Hours. 3 Lecture Hours. 3 Lab Hours.
A study of the general principles of parasitism, with emphasis on morphology, classification, identification, and life cycles of parasites of vertebrates. Graduate students will be given an extra assignment determined by the instructor that undergraduates will not be required to do.
Cross Listing(s): BIOL 5341.

BIOL 5343G Medical-Veterinary Entomology
4 Credit Hours. 3 Lecture Hours. 3 Lab Hours.
An intensive study of the role of arthropods in the transmission, dissemination, and causation of diseases of humans and animals. Topics include identification of vector arthropods and associated diseases, ecology, and control. Graduate students will be given an extra assignment determined by the instructor that undergraduates will not be required to do.
Cross Listing(s): BIOL 5343.

BIOL 5345G Systematic Biology
4 Credit Hours. 3 Lecture Hours. 3 Lab Hours.
Introduces the principles and methods of biosystematics. Speciation, bio-nomenclature, hierarchical taxonomic categories, systematic characters, molecular systematics, and phylogenetic analyses are discussed. Laboratories involve use of modern molecular techniques and computational analysis with a variety of software packages. Graduate students will be given an extra assignment determined by the instructor that undergraduates will not be required to do.
Cross Listing(s): BIOL 5345.

BIOL 5346G Agroecology
4 Credit Hours. 3 Lecture Hours. 3 Lab Hours.
Agroecology provides the theoretical and conceptual framework for sustainable agriculture with an emphasis on underlying environmental factors, crop plants and animals. Topics include biotic and abiotic factors influencing biodiversity, interaction and stability of agroecosystems, organic farming, agroforestry, energy-use in agriculture and ways to transition towards sustainability. Graduate students will be required to complete advanced-level assignments beyond the scope of the undergraduate requirements. These assignments require a higher level of mastery in the subject matter with additional required deliverables representative of graduate-level work, as determined by the instructor.
Cross Listing(s): BIOL 5346.

BIOL 5431G Virology
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
A survey of the biology of viruses, with emphasis on viral diversity, virus-host interactions, viral diseases of humans, animals and plants and uses of viruses in medicine, research and biocontrol. Graduate students will be given an extra assignment determined by the instructor that undergraduates will not be required to do.
Cross Listing(s): BIOL 5431.

BIOL 5432G Deep Sea Environments
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
This course examines the current knowledge about hydrothermal systems in terms of their deep-sea environment and their geological and chemical makeup. Emphasis is placed on studying symbiotic relationships, reproductive biology, larval dispersal, thermal tolerances, sulfide and sensory adaptations by organisms found in non-vent, vent, and cold seep environments. Graduate students will be assigned extra readings from the current and classical peer-reviewed literature pertaining to the deep sea environment.
Cross Listing(s): BIOL 5432.

BIOL 5441G Mycology
4 Credit Hours. 3 Lecture Hours. 3 Lab Hours.
Broad introduction to various taxonomic groups of Fungi, emphasizing morphology, taxonomy, evolution, physiology, and economic importance. Selected mycotic diseases and symbiotic relationships in nature will be explored. Graduate students will be given an extra assignment determined by the instructor that undergraduates will not be required to do.
Cross Listing(s): BIOL 5441.

BIOL 5442G Entomology
0.4 Credit Hours. 0.3 Lecture Hours. 0.3 Lab Hours.
Examines the phylogeny, morphology, life history, and ecology of insects. Identification of local species will be emphasized. Field trips required. Graduate students will be given an extra assignment determined by the instructor that undergraduates will not be required to do.
Cross Listing(s): BIOL 5442.

BIOL 5443G Identification and Taxonomy of Vascular Plants
4 Credit Hours. 3 Lecture Hours. 3 Lab Hours.
A taxonomic/biosystematic approach to the study of Georgia’s plants. Primary emphasis is on vascular plants (ferns and seed plants), including methods of plant analysis, identification, classification, collection and preservation. Students will also learn how to recognize some non-vascular plants in Georgia’s ecosystems. Field trips are required with at least some on Saturdays. Graduate students are given extra assignments not required of undergraduates.
Cross Listing(s): BIOL 5443.

BIOL 5444G Ichthyology
4 Credit Hours. 3 Lecture Hours. 3 Lab Hours.
Emphasizes the systematics, evolution, biology, ecology, and behavior of recent and extinct fishes. Laboratory emphasizes the identification, morphology, and natural history of fishes. Field trips required. Graduate students will be given an extra assignment determined by the instructor that undergraduates will not be required to do.
Cross Listing(s): BIOL 5444.
Examines the phylogeny, morphology, life history and ecology of reptiles and amphibians. Field identification of local species will be emphasized. Field trips required. Graduate students will be given an extra assignment determined by the instructor that undergraduates will not be required to do.

Cross Listing(s): BIOL 5445.

BIOL 5446G Ornithology
4 Credit Hours. 3 Lecture Hours. 3 Lab Hours.
A comprehensive study of the biology of birds. Lectures will emphasize the evolution, classification, structure, physiology, behavior, and ecology of birds. Laboratories will give hands-on experience with bird morphology, and field trips will emphasize finding and identifying birds in their natural habitats. Graduate students will be required to complete advanced level assignments in an area beyond the scope of the undergraduate requirements that demonstrates a higher level of mastery in the subject matter with additional required deliverables representative of graduate level work, as determined by the instructor.

Cross Listing(s): BIOL 5446.

BIOL 5530G Wildlife Management
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
A survey of the principles and practices used to manage wildlife populations. The emphasis is on populations of importance to humans, particularly game animals. Students will explore the factors, both biotic and abiotic, that influence wildlife populations and how these factors can be managed to sustain game and nongame wildlife populations. Graduate students will be required to complete advanced level assignments in an area beyond the scope of the undergraduate requirements that demonstrates a higher level of mastery in the subject matter with additional required deliverables representative of graduate level work, as determined by the instructor.

Cross Listing(s): BIOL 5530.

BIOL 5532G Evolution
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
Covers the historical development of evolutionary thought and focuses on current issues in evolution. Emphasis is placed on the perceived importance of natural selection, mechanisms of speciation, the history of life on Earth, and human evolution. Graduate students will be given an extra assignment determined by the instructor that undergraduates will not be required to do.

Cross Listing(s): BIOL 5532, BIOL 5532H.

BIOL 5534G Conservation Biology
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
Explores the causes and consequences of the loss of biodiversity, as well as methods for conserving rare species and ecosystems. Graduate students will be given an extra assignment determined by the instructor that undergraduates will not be required to do.

Cross Listing(s): BIOL 5534.

BIOL 5535G Sex and Evolution
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
Focuses on the evolution of sex and the subsequent conflict that arises between sexes. Models for the evolution and maintenance of sexual reproduction are compared. Sex allocation theory is reviewed and special attention is drawn to genetic mechanisms that permit sex ratio of offspring to be manipulated. Sexual selection and mate choice tactics are evaluated with reference to empirical studies in behavioral ecology.

Cross Listing(s): BIOL 5535.
BIOL 5547G Marine Ecology
4 Credit Hours. 3 Lecture Hours. 3 Lab Hours.
Course stresses ecological processes and adaptations that act to structure coastal associations and permit their persistence through time. The course provides a background for students interested in research in the marine sciences. Students will learn to develop good statistical designs and use various techniques to collect data in marine ecology. Several field trips are required. Graduate students will be given an extra assignment determined by the instructor that undergraduates will not be required to do.
Cross Listing(s): BIOL 5547.

BIOL 5644G Insect Ecology
4 Credit Hours. 3 Lecture Hours. 3 Lab Hours.
Examines the basic principles of ecology as they apply to insects. The ecology of insects will be investigated at the level of individuals, populations, communities and ecosystems. Emphasis will be placed on how insects interact with, and have evolved unique adaptations to, their abiotic and biotic environment. Graduate students will be required to complete advanced level assignments in an area beyond the scope of the undergraduate requirements that demonstrates a higher level of mastery in the subject matter with additional required deliverables representative of graduate level work, as determined by the instructor.
Cross Listing(s): BIOL 5644.

BIOL 5645G Behavioral Ecology
4 Credit Hours. 3 Lecture Hours. 3 Lab Hours.
An advanced course on how evolution and ecology shape behavior. Through lectures, discussions of papers from the primary literature, field trips with experiments related to recent topics covered in class, and presentations on their research, students will be immersed in the field of behavioral ecology. The laboratory will emphasize techniques used to study behavioral ecology and provide students an opportunity to conduct their own research projects. Graduate students will be required to complete advanced level assignments in an area beyond the scope of the undergraduate requirements that demonstrates a higher level of mastery in the subject matter with additional required deliverables representative of graduate level work, as determined by the instructor.
Prerequisite(s): BIOL 2107 and BIOL 2107L and BIOL 2108 and BIOL 2108L and BIOL 3635 or graduate status.
Cross Listing(s): BIOL 5645.

BIOL 7090 Selected Topics/Biology
0-9 Credit Hours. 0-9 Lecture Hours. 0-9 Lab Hours.
A course taught on a one-time basis.

BIOL 7133 Molecular Biology
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
This course provides graduate students with a fundamental knowledge of how organisms operate at the molecular level. Emphasis is on relevant biological theory and techniques in the molecular field.

BIOL 7135 Cytogenetics
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
Studies from a cytological aspect of eukaryotic chromosomes including chromosome structure, chromosomal aberrations, and chromosome mapping.

BIOL 7233 Applied Biology
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
Modern biological theory and technologies will be used to address applied questions related to conservation, restoration and environmental management. Emphasis will be on examining applicable, underlying theory with contemporary techniques and technologies to better understand and investigate solutions for relevant biological issues.

BIOL 7333 Evolutionary Ecology
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
Evolutionary Ecology is a quantitative examination of population growth, interspecific competition, predator-prey interaction, microevolution, and game theory relevant to sexual selection and sex ratio evolution. Topics are presented via spread sheet simulations of dynamic processes. Students will analyze and simulate models and solve problems based on algebraic theoretical models.
Prerequisite(s): Graduate Status or permission of the Instructor.

BIOL 7440 Vector Ecology
4 Credit Hours. 3 Lecture Hours. 3 Lab Hours.
Examines physiological, evolutionary, and ecological relationships between arthropod vectors, microbial pathogens they transmit and their vertebrate hosts.

BIOL 7530 Biometry
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
Provides students with basic skills in the analysis of biological data. Lectures cover both parametric and nonparametric methods, with an emphasis on the practical problems posed by biological data.

BIOL 7531 Research Methods
3 Credit Hours. 1 Lecture Hour. 4 Lab Hours.
A general introduction to biological research methods, including computer skills, web-based resources, oral and written scientific presentations, proposal writing, and the peer-review process. This course is designed for first-year M.S. students.

BIOL 7610 Graduate Seminar
1 Credit Hour. 1 Lecture Hour. 0 Lab Hours.
An intensive study of an advanced biological topic covered by one or more members of the graduate faculty from the department of Biology. The selected topic will vary from semester to semester. Required for M.S. degree.

BIOL 7890 Directed Individual Study
1-4 Credit Hours. 0 Lecture Hours. 0 Lab Hours.
An independent or directed individual study supervised by a member of the graduate faculty of the Department of Biology.

BIOL 7893 Biological Problems
1-4 Credit Hours. 0 Lecture Hours. 0 Lab Hours.
Studies of biological problems in a specialized area of biology under the supervision of a member of the biology faculty.

BIOL 7895 Research
1-3 Credit Hours. 0 Lecture Hours. 0 Lab Hours.
Graduate students will pursue, under the direction of their advisory committee, a program of independent research in a particular area of biology. Results of the research will be presented as a thesis in partial fulfillment of the requirements for the Master of Science degree.

BIOL 7999 Thesis
1-3 Credit Hours. 0 Lecture Hours. 0 Lab Hours.
Results of individual research will be presented as a thesis in partial fulfillment of the Master of Science degree. The thesis requires defense of design, execution, analysis and interpretation of the research project.