**BIOL Biology**

**BIOL 1110 General Biology Laboratory**
1 Credit Hour. 0 Lecture Hours. 2 Lab Hours.
Labs that teach the basic principles of biology and their relevance to biological issues (e.g., disease, food safety, genetic modification, cloning, resistance to antibiotics, evolution, plant resources, and forensic science). Lab and field activities emphasize the scientific method of inquiry and promote the development of observation, analysis, and communication skills.

Cross Listing(s): BIOL 110H, BIOL 110S.

**BIOL 1110H General Biology Laboratory**
1 Credit Hour. 0 Lecture Hours. 2 Lab Hours.
Labs that teach the basic principles of biology and their relevance to biological issues (e.g., disease, food safety, genetic modification, cloning, resistance to antibiotics, evolution, plant resources, and forensic science). Lab and field activities emphasize the scientific method of inquiry and promote the development of observation, analysis, and communication skills.

Cross Listing(s): BIOL 110, BIOL 110S.

**BIOL 1110S General Biology Laboratory**
1 Credit Hour. 0 Lecture Hours. 2 Lab Hours.
Labs that teach the basic principles of biology and their relevance to biological issues (e.g., disease, food safety, genetic modification, cloning, resistance to antibiotics, evolution, plant resources, and forensic science). Lab and field activities emphasize the scientific method of inquiry and promote the development of observation, analysis, and communication skills.

Cross Listing(s): BIOL 110H, BIOL 110.

**BIOL 1130 General Biology**
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
An introduction to the biological sciences for the non-major. This course covers the organization of living things, their energetics, DNA and inheritance, evolution, organismal diversity, and the structure and function of select organ systems. The emphasis is on the importance of biology for society and the knowledge needed to make informed decisions about biological issues.

Cross Listing(s): BIOL 130H, BIOL 130.

**BIOL 1130H General Biology**
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
An introduction to the biological sciences for the non-major. This course covers the organization of living things, their energetics, DNA and inheritance, evolution, organismal diversity, and the structure and function of select organ systems. The emphasis is on the importance of biology for society and the knowledge needed to make informed decisions about biological issues.

Cross Listing(s): BIOL 130, BIOL 130S.

**BIOL 1130S General Biology**
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
An introduction to the biological sciences for the non-major. This course covers the organization of living things, their energetics, DNA and inheritance, evolution, organismal diversity, and the structure and function of select organ systems. The emphasis is on the importance of biology for society and the knowledge needed to make informed decisions about biological issues.

Cross Listing(s): BIOL 130H, BIOL 130.

**BIOL 1210 Environmental Biology Laboratory**
1 Credit Hour. 0 Lecture Hours. 2 Lab Hours.
Laboratories that teach the basic concepts of environmental biology and ecology, and their relevance to current environmental concerns. Lab and field activities emphasize the scientific method of inquiry and promote the development of observation, analysis, and communication skills.

Cross Listing(s): BIOL 1210H.

**BIOL 1210H Environmental Biology Laboratory**
1 Credit Hour. 0 Lecture Hours. 2 Lab Hours.
Laboratories that teach the basic concepts of environmental biology and ecology, and their relevance to current environmental concerns. Lab and field activities emphasize the scientific method of inquiry and promote the development of observation, analysis, and communication skills.

Cross Listing(s): BIOL 1210.

**BIOL 1230 Environmental Biology**
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
A survey of environmental issues from a biological perspective. The course will provide an introduction to environmental science, population growth, communities and ecosystems, evolution and biodiversity, and the fundamental interactions of humans with their environment (land, water, energy, food, and climate).

Cross Listing(s): BIOL 1230H.

**BIOL 1230H Environmental Biology**
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
A survey of environmental issues from a biological perspective. The course will provide an introduction to environmental science, population growth, communities and ecosystems, evolution and biodiversity, and the fundamental interactions of humans with their environment (land, water, energy, food, and climate).

Cross Listing(s): BIOL 1230.

**BIOL 1311 Insects and People**
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
An introduction to the role insects and other arthropods serve in relation to humans. Insect human interactions in the home, yard, garden, workplace, recreational areas, and human body are included. Considerations of the natural history, life cycles and optional human actions regarding pests, beneficial insects, insects and disease, insects and food, and aesthetics is included.

**BIOL 1333 From Neuron to Brain**
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
A consideration of the workings of the brain from a biological perspective. The mechanisms of neural function from cell to network to brain will be studied. Topics will include neurons, neurotransmitters, nerve nets, the biological basis of learning, vision, language, brain sex differences, major disorders of mind and brain, and aging of the brain.

**BIOL 1335 Plants and Civilization**
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
An introduction to major groups of economic plants and their role in the origin and maintenance of civilization. The course also deals with plant biodiversity and the potential impact of biological losses.

Cross Listing(s): BIOL 1335H, BIOL 1335S.

**BIOL 1335H Plants and Civilization**
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
An introduction to major groups of economic plants and their role in the origin and maintenance of civilization. The course also deals with plant biodiversity and the potential impact of biological losses.

Cross Listing(s): BIOL 1335, BIOL 1335S.
BIOL 135S Plants and Civilization
3 Credit Hours.  3 Lecture Hours.  0 Lab Hours.
An introduction to major groups of economic plants and their role in the origin and maintenance of civilization. The course also deals with plant biodiversity and the potential impact of biological losses.
Cross Listing(s): BIOL 135S, BIOL 135H.

BIOL 2107 Principles of Biology I
0.3 Credit Hours.  0.3 Lecture Hours.  0.1 Lab Hours.
This course covers foundational concepts in molecular and cellular biology. Topics include the scientific method, organic macromolecules, cell structure and function, respiration, photosynthesis, cell division, and the flow of information from DNA to proteins.
Corequisite(s): BIOL 2017L.
Cross Listing(s): BIOL 2107H.

BIOL 2107H Principles of Biology I
0.3 Credit Hours.  0.3 Lecture Hours.  0.1 Lab Hours.
This course covers foundational concepts in molecular and cellular biology. Topics include the scientific method, organic macromolecules, cell structure and function, respiration, photosynthesis, cell division, and the flow of information from DNA to proteins.
Cross Listing(s): BIOL 2107.

BIOL 2107L Principles of Biology I Laboratory
1 Credit Hour.  0 Lecture Hours.  3 Lab Hours.
Laboratory course emphasizing an experimental approach to learning major principles of molecular and cellular biology.
Corequisite(s): BIOL 2107.
Cross Listing(s): BIOL 2107.

BIOL 2108 Principles of Biology II
0.3 Credit Hours.  0.3 Lecture Hours.  0.3 Lab Hours.
An introduction to evolution and its role in creating biodiversity. Students will explore how evolution creates a hierarchical pattern of shared ancestry among all living things. Topics include natural selection and evolutionary change, speciation, phylogeny and classification, and the structure and function of the major forms of life (domains, kingdoms, and major phyla).
Prerequisite(s): BIOL 2107 and BIOL 2107L.
Corequisite(s): BIOL 2108L.
Cross Listing(s): BIOL 2108.

BIOL 2108H Principles of Biology II
3 Credit Hours.  3 Lecture Hours.  0 Lab Hours.
An introduction to evolution and its role in creating biodiversity. Students will explore how evolution creates a hierarchical pattern of shared ancestry among all living things. Topics include natural selection and evolutionary change, speciation, phylogeny and classification, and the structure and function of the major forms of life (domains, kingdoms, and major phyla).
Prerequisite(s): BIOL 2107 and BIOL 2107L.
Corequisite(s): BIOL 2108L.
Cross Listing(s): BIOL 2108.

BIOL 2108L Principles of Biology II Laboratory
1 Credit Hour.  0 Lecture Hours.  3 Lab Hours.
Laboratory survey of evolution and biodiversity, including natural selection, principles of classification, and the structure and function of the major forms of life (domains, kingdoms, and major phyla).
Corequisite(s): BIOL 2108.

BIOL 2240 Microbiology
0.4 Credit Hours.  0.3 Lecture Hours.  0.2 Lab Hours.
Emphasizes fundamental principles of microbiology. Topics include structure, physiology, and economic importance of microorganisms.
Cross Listing(s): BIOL 2240H.

BIOL 2240H Microbiology (Honors)
0.4 Credit Hours.  0.3 Lecture Hours.  0.2 Lab Hours.
Emphasizes fundamental principles of microbiology. Topics include structure, physiology, and economic importance of microorganisms.
Cross Listing(s): BIOL 2240.

BIOL 2320H Honors Research Methods in Biology
2 Credit Hours.  2 Lecture Hours.  0 Lab Hours.
Provides Departmental Honors in Biology students an overview of basic research methods, experimental design, visual presentation and analysis of biological information in diversity of biology sub-disciplines. This course provides the foundation for understanding the analyses typically presented in biological publications as well as the prerequisites necessary to plan a research project effectively.
Prerequisite(s): BIOL 2107, BIOL 2107L, BIOL 2108, BIOL 2108L and acceptance into the Departmental Honors in Biology Program is required.

BIOL 3099 Selected Topics/Biology
3-4 Credit Hours.  3-4 Lecture Hours.  0 Lab Hours.
Course taught on a selected topic in biology on a one time basis.
Prerequisite(s): BIOL 2107, BIOL 2107L, BIOL 2108, BIOL 2108L.
Cross Listing(s): BIOL 3099H, BIOL 3099S.

BIOL 3099H Selected Topics/Biology
3-4 Credit Hours.  3-4 Lecture Hours.  0 Lab Hours.
Course taught on a selected topic in biology on a one time basis.
Prerequisite(s): BIOL 2107, BIOL 2107L, BIOL 2108, BIOL 2108L.
Cross Listing(s): BIOL 3099, BIOL 3099S.

BIOL 3099S Selected Topics/Biology
3-4 Credit Hours.  3-4 Lecture Hours.  0 Lab Hours.
Course taught on a selected topic in biology on a one time basis.
Prerequisite(s): BIOL 2107, BIOL 2107L, BIOL 2108, BIOL 2108L.
Cross Listing(s): BIOL 3099, BIOL 3099S.

BIOL 3130 Principles of Genetics
3 Credit Hours.  3 Lecture Hours.  0 Lab Hours.
This course is a broad survey of the principles of inheritance, including the study of gene structure, gene function, and the role of genes in determining the traits of living organisms. Topics include the molecular structure of DNA/RNA, replication, transcription, translation, interaction of genes, linkage and mapping, sex linkage, regulation of gene expression, and Mendelian and non-Mendelian inheritance.
Prerequisite(s): BIOL 2107, BIOL 2107L, BIOL 2108, BIOL 2108L.
Cross Listing(s): BIOL 3130H.

BIOL 3130H Principles of Genetics- Honors
3 Credit Hours.  3 Lecture Hours.  0 Lab Hours.
This course is a broad survey of the principles of inheritance, including the study of gene structure, gene function, and the role of genes in determining the traits of living organisms. Topics include the molecular structure of DNA/RNA, replication, transcription, translation, interaction of genes, linkage and mapping, sex linkage, regulation of gene expression, and Mendelian and non-Mendelian inheritance.
Prerequisite(s): BIOL 2107, BIOL 2107L, BIOL 2108, BIOL 2108L.
Cross Listing(s): BIOL 3130.

BIOL 3131 Principles of Physiology
3 Credit Hours.  3 Lecture Hours.  0 Lab Hours.
This course is an introduction to the fundamental principles of physiology. The focus is on how organisms maintain homeostasis in the face of changes in their internal and external environment. This course will cover energetics, the basic physiological processes of cells, how cell signaling can coordinate more elaborate functions, the hierarchical organization of cells into organs and organ systems, and how these organ systems can carry out complex adaptive functions. Students will see the fundamental relationship between structure and function and learn how physiological systems are constrained by phylogeny, physical limits, and functional trade-offs.
Prerequisite(s): BIOL 2107, BIOL 2107L, BIOL 2108 and BIOL 2108L.
BIOL 3133  Evolution and Ecology
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
An introduction to major principles of evolution and ecology. This course covers the origin and maintenance of genetic variation, genetic change in populations over time (microevolutionary processes of selection, drift, and gene flow), and taxonomic diversification (macroevolutionary process of speciation). Students will see how this evolution and diversification are shaped by ecological interactions between organisms and their abiotic and biotic environment. These ecological interactions will be studied at the population, community, and ecosystem levels.
Prerequisite(s): BIOL 2107, BIOL 2107L, BIOL 2108, BIOL 2108L.

BIOL 3440  Field Biology
4 Credit Hours. 3 Lecture Hours. 3 Lab Hours.
Field study of the basic natural history of plants and/or animals of the southeastern United States. Lectures, laboratories, and field trips emphasize the ability to locate, observe, collect, and identify organisms in the field, as well as manage field data.
Prerequisite(s): BIOL 2107 and BIOL 2107L and BIOL 2108 and BIOL 2108L.

BIOL 3535  The Biology of Plants
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
An introduction to the biology of plants. Topics include the evolution and diversity of plants, as well as the unique morphology, physiology, reproduction and ecology of higher plants in particular.
Prerequisite(s): BIOL 2107 and BIOL 2107L and BIOL 2108 and BIOL 2108L.

BIOL 3541  Invertebrate Zoology
0.4 Credit Hours. 0.3 Lecture Hours. 0.3 Lab Hours.
A survey of the diversity and basic biology of the invertebrates. Emphasis is placed on adaptations responsible for the diversity and life history strategies of invertebrates, and identifications of locally important invertebrate groups. Field trips and research project required.
Prerequisite(s): BIOL 2107 and BIOL 2107L and BIOL 2108 and BIOL 2108L.

BIOL 3630H  Honors Current Trends in Biological Research
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
Provides students in Departmental Honors in Biology with a structured introduction to current topics in biological research. The course familiarizes students with the scope of biological research and aids students in selecting an area of inquiry to pursue their capstone research requirement. Students will attend the Departmental Seminar series as part of this course. One outcome of this course is a research proposal written with a faculty mentor. Students may not receive credit for this course and BIOL 4620.
Prerequisite(s): BIOL 2320H and acceptance into the Departmental Honors in Biology Program is required.

BIOL 3790  Teaching Internship in Biology
1-3 Credit Hours. 0 Lecture Hours. 0 Lab Hours.
Student internship in BIOL 1210 under the mentorship of a faculty member. The student will participate in an introductory workshop immediately prior to the start of the semester, intern in BIOL 1210, and meet with the faculty mentor one hour each week.
Prerequisite(s): BIOL 2107, BIOL 2107L, BIOL 2108, BIOL 2108L.

BIOL 4230  Introduction to Immunology
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
Introduction to the biology of lymphocytes and adaptive immune response including the study of immunoglobulins and cytokines. The roles of the immune system in health and disease are also examined.
Prerequisite(s): BIOL 2107, BIOL 2107L, BIOL 2108 and BIOL 2108L and 3-4 courses in CHEM.

BIOL 4240  Biology of Microorganisms
4 Credit Hours. 3 Lecture Hours. 3 Lab Hours.
Covers the principles and techniques of general microbiology, including physiology, genetics, and host-parasite interactions involving bacteria, eukaryotic microorganisms and viruses.
Prerequisite(s): BIOL 2107, BIOL 2107L, BIOL 2108 and BIOL 2108L.

BIOL 4535  Vertebrate Zoology
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
An introduction to the evolution, structure, and function of the vertebrates. This course will trace the origin of vertebrates from their invertebrate ancestors and explore how basic vertebrate design has evolved in the major vertebrate groups. Students will also learn how vertebrate structure has affected their function, distribution, behavior, and ecology.
Prerequisite(s): BIOL 2107, BIOL 2107L, BIOL 2108 and BIOL 2108L.

BIOL 4620  Undergraduate Seminar
2 Credit Hours. 2 Lecture Hours. 0 Lab Hours.
Group study of selected biological topics held in conjunction with the normal seminar schedule of the Department of Biology. Topics will vary each semester and will be led by biology faculty.
Prerequisite(s): BIOL 2107, BIOL 2107L, BIOL 2108, BIOL 2108L and Junior standing in Biology Program is required.

BIOL 4635  Biological Basis of Animal Behavior
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
This course will cover the biological basis of animal behavior, emphasizing the evolution, function, development and causes of behavioral actions by animals. Classes will be interactive and include student discussions. Video clips will illustrate behavioral concepts discussed in the course. A range of topics will be covered, including such possibilities as communication, predator/prey interactions, reproductive behavior, the interaction of genes and the environment, the development of behavior and sensory mechanisms.
Prerequisite(s): BIOL 2107, BIOL 2107L, BIOL 2108 and BIOL 2108L.
Cross Listing(s): BIOL 4635H.

BIOL 4635H  Animal Behavior (Honors)
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
This course will cover the biological basis of animal behavior, emphasizing the evolution, function, development and causes of behavioral actions by animals. Classes will be interactive and include student discussions. Video clips will illustrate behavioral concepts discussed in the course. A range of topics will be covered, including such possibilities as communication, predator/prey interactions, reproductive behavior, the interaction of genes and the environment, the development of behavior and sensory mechanisms.
Prerequisite(s): BIOL 2107, BIOL 2107L, BIOL 2108 and BIOL 2108L.
Cross Listing(s): BIOL 4635.

BIOL 4730  Internship in Biology
3 Credit Hours. 0 Lecture Hours. 0 Lab Hours.
Qualified biology majors may acquire practical experience by working with a public or private agency that specializes in the proposed area of study. A faculty member in the biology department will act as advisor. Internships must be approved by the head of the department, and a poster presentation of the results must be presented at the end of the semester.
Prerequisite(s): BIOL 2107, BIOL 2107L, BIOL 2108, BIOL 2108L.
Biology majors will be encouraged to conduct a research project under the supervision of faculty. The faculty recommendation must have approval of the head of the biology department. A written abstract and an oral presentation of the results by the student must be presented at the end of the semester.

**Prerequisite(s):** BIOL 2107, BIOL 2107L, BIOL 2108, BIOL 2108L.

**Cross Listing(s):** BIOL 4890S

**BIOL 4890S Undergraduate Research**

1-4 Credit Hours. 0 Lecture Hours. 0 Lab Hours.

Biology majors will be encouraged to conduct a research project under the supervision of faculty. The faculty recommendation must have approval of the head of the biology department. A written abstract and an oral presentation of the results by the student must be presented at the end of the semester.

**Cross Listing(s):** BIOL 4890.

**BIOL 4999H Honors Thesis**

2 Credit Hours. 2 Lecture Hours. 0 Lab Hours.

Written and oral presentation of results of independent research. Honors thesis must follow the guidelines adopted by the University Honors Program. Required for students attempting to earn Departmental Honors in Biology.

**Cross Listing(s):** BIOL 5099G, BIOL 5099S, BIOL 5099H.

**BIOL 5099S Selected Topics/Biology**

3,4 Credit Hours. 3 Lecture Hours. 0,3 Lab Hours.

A course taught on a one-time basis. Lecture only courses will be three credit hours while courses with a laboratory will be four credit hours. Graduate students will be given an extra assignment determined by the instructor that undergraduates will not be required to do.

**Cross Listing(s):** BIOL 5099G, BIOL 5099S, BIOL 5099H.

**BIOL 5099H Selected Topics/Biology**

3,4 Credit Hours. 3 Lecture Hours. 0,3 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. Graduate students will be given an extra assignment determined by the instructor that undergraduates will not be required to do.

**Cross Listing(s):** BIOL 5099, BIOL 5099S, BIOL 5099G.

**BIOL 5099S Selected Topics/Biology**

3,4 Credit Hours. 3 Lecture Hours. 0,3 Lab Hours.

A course taught on a one-time basis. Lecture only courses will be three credit hours while courses with a laboratory will be four credit hours. Graduate students will be given an extra assignment determined by the instructor that undergraduates will not be required to do.

**Cross Listing(s):** BIOL 5099, BIOL 5099S, BIOL 5099G.

**BIOL 5131 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 5131S, BIOL 5131G, BIOL 5131H.
BIOL 5148H Human Genetics (Honors)  
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. Graduate students will be given an extra assignment determined by the instructor that undergraduates will not be required to do.  
Cross Listing(s): BIOL 5148, BIOL 5148G.

BIOL 5210 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. Graduate students will be given an extra assignment determined by the instructor that undergraduates will not be required to do.  
Cross Listing(s): BIOL 5210G.

BIOL 5230 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. Graduate students will be given an extra assignment determined by the instructor that undergraduates will not be required to do.  
Cross Listing(s): BIOL 5230G, BIOL 5230H.

BIOL 5237 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 5237G.

BIOL 5239 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. Graduate students will be given an extra assignment determined by the instructor that undergraduates will not be required to do.  
Cross Listing(s): BIOL 5239, BIOL 5239H, BIOL 5239S.

BIOL 5239S 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. Graduate students will be given an extra assignment determined by the instructor that undergraduates will not be required to do.  
Cross Listing(s): BIOL 5239, BIOL 5239H, BIOL 5239G.

BIOL 5240 Histology  
4 Credit Hours. 3 Lecture Hours. 3 Lab Hours.  
Examines the origin, development, function and structure of vertebrate tissues. Graduate students will be given an extra assignment determined by the instructor that undergraduates will not be required to do.  
Cross Listing(s): BIOL 5240G.

BIOL 5241 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. Graduate students will be given an extra assignment determined by the instructor that undergraduates will not be required to do.  
Cross Listing(s): BIOL 5241G.

BIOL 5242 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 conservation 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.  
Prerequisite(s): BIOL 3130 and BIOL 3131 and BIOL 3133.  
Cross Listing(s): BIOL 5242G.

BIOL 5243 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. Graduate students will be given an extra assignment determined by the instructor that undergraduates will not be required to do.  
Cross Listing(s): BIOL 5243G.

BIOL 5244 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. Graduate students will be given an extra assignment determined by the instructor that undergraduates will not be required to do.  
Cross Listing(s): BIOL 5244G.

BIOL 5246 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. Graduate students will be given an extra assignment determined by the instructor that undergraduates will not be required to do.  
Cross Listing(s): BIOL 5246G.
BIOL 5247 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. Graduate students will be given an extra assignment determined by the instructor that undergraduates will not be required to do.
Cross Listing(s): BIOL 5247G.

BIOL 5248 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. Graduate students will be given an extra assignment determined by the instructor that undergraduates will not be required to do.
Cross Listing(s): BIOL 5248G.

BIOL 5333 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. Graduate students will be given an extra assignment determined by the instructor that undergraduates will not be required to do.
Cross Listing(s): BIOL 5333H, BIOL 5333G.

BIOL 5333H Emerging Diseases (Honors)
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. Graduate students will be given an extra assignment determined by the instructor that undergraduates will not be required to do.
Cross Listing(s): BIOL 5333H, BIOL 5333G.

BIOL 5340 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 5340G.

BIOL 5341 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 5341G.

BIOL 5343 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 5343G.

BIOL 5345 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 5345G.

BIOL 5346 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.
Prerequisite(s): BIOL 3130 and BIOL 3131 and BIOL 3133.
Cross Listing(s): BIOL 5346G.

BIOL 5431 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 5431G.

BIOL 5432 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.
Prerequisite(s): BIOL 2107 and BIOL 2108.
Cross Listing(s): BIOL 5432G.

BIOL 5441 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 5441G.

BIOL 5442 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 5442G.
BIOL 5443 Identification and Taxonomy of Vascular Plants
4 Credit Hours. 3 Lecture Hours. 3 Lab Hours.
This course teaches the identification and taxonomy of the vascular plants, with an emphasis on the southeastern United States. Lectures, laboratories, and field trips cover the evolution, classification, identification, collection, and preservation of vascular plants. Graduate students are given extra assignments not required of undergraduates.
Cross Listing(s): BIOL 5443G.

BIOL 5444 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 5444G.

BIOL 5445 Herpetology
4 Credit Hours. 3 Lecture Hours. 3 Lab Hours.
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 5445G.

BIOL 5446 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 are given extra assignments not required of undergraduates.
Cross Listing(s): BIOL 5446G.

BIOL 5448 Mammalogy
4 Credit Hours. 3 Lecture Hours. 3 Lab Hours.
Course examines the classification, evolution, distribution and life histories of mammals. The laboratory includes identification and preparation of specimens and development of field techniques. 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 5448G.

BIOL 5530 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 are given extra assignments not required of undergraduates.
Cross Listing(s): BIOL 5530G.

BIOL 5532 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 5532H, BIOL 5532G.

BIOL 5532H Evolution-Honors
3 Credit Hours. 0 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 5532G.

BIOL 5534 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 5534G.

BIOL 5537 Biogeography
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
Examines the distributional patterns of animals and plants from the perspectives of vicariance biogeography and organizational dispersal. One field trip 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 5537G.

BIOL 5540 Ecology
4 Credit Hours. 3 Lecture Hours. 3 Lab Hours.
Reviews basic ecological principles and current hypotheses relevant to biological organisms from the level of the population to ecosystems. Application of mathematical models to biological processes is emphasized. Graduate students will be given an extra assignment determined by the instructor that undergraduates will not be required to do.
Cross Listing(s): BIOL 5540G.

BIOL 5541 Tropical Marine Biology
4 Credit Hours. 3 Lecture Hours. 3 Lab Hours.
This is an intensive 2-week field course conducted at a tropical marine field station. Through daily lectures and field excursions, students are exposed to the natural history and ecology of a variety of marine organisms and ecosystems that may include mangroves, seag rasses, rocky shores and coral reefs. Additional fees required. Graduate students are given extra assignments not required of undergraduates.
Cross Listing(s): BIOL 5541S, BIOL 5541G.

BIOL 5541S Tropical Marine Biology
4 Credit Hours. 3 Lecture Hours. 3 Lab Hours.
This is an intensive 2-week field course conducted at a tropical marine field station. Through daily lectures and field excursions, students are exposed to the natural history and ecology of a variety of marine organisms and ecosystems that may include mangroves, seagrass, rocky shores and coral reefs. Additional fees required. Graduate students are given extra assignments not required of undergraduates.
Cross Listing(s): BIOL 5541, BIOL 5541G.

BIOL 5542 Aquatic Ecology
4 Credit Hours. 3 Lecture Hours. 3 Lab Hours.
Covers the biological and physicochemical factors that affect common organisms found in local aquatic ecosystems, including streams and rivers, wetlands, estuaries, and lakes. Graduate students will be given an extra assignment determined by the instructor that undergraduates will not be required to do.
Cross Listing(s): BIOL 5542G.
BIOL 5543  Biological Field Experience  
4 Credit Hours.  3 Lecture Hours.  3 Lab Hours.  
A field expedition involving biological investigations of a major biome or natural area. Expeditions normally require three to five weeks in the field, depending upon the habitat selected and the type of travel required. In addition to tuition, students must bear all travel expenses while in the field. Graduate students will be given an extra assignment determined by the instructor that undergraduates will not be required to do.  
Cross Listing(s): BIOL 5543G, BIOL 5543S.  

BIOL 5543S Biological Field Experience  
4 Credit Hours.  3 Lecture Hours.  3 Lab Hours.  
A field expedition involving biological investigations of a major biome or natural area. Expeditions normally require three to five weeks in the field, depending upon the habitat selected and the type of travel required. In addition to tuition, students must bear all travel expenses while in the field. Graduate students will be given an extra assignment determined by the instructor that undergraduates will not be required to do.  
Cross Listing(s): BIOL 5543, BIOL 5543G.  

BIOL 5544  Population Biology  
4 Credit Hours.  3 Lecture Hours.  3 Lab Hours.  
A review of the genetic consequences of evolutionary forces that impact population structure, cohesion, and persistence. Special attention is given to the behavioral, ecological, and demographic responses of populations to natural selection pressures arising from the social environment and the presence of other species in the community. Graduate students will be given an extra assignment determined by the instructor that undergraduates will not be required to do.  
Cross Listing(s): BIOL 5544G.  

BIOL 5546  Plant Ecology  
4 Credit Hours.  3 Lecture Hours.  3 Lab Hours.  
Examines fundamental principles and major conceptual issues in plant ecology. Students will learn about the distinctive and often unique ways in which plants interact with the biotic and abiotic components of their environment, and how these factors affect the abundance and distribution of plants. Graduate students are given extra assignments not required of undergraduates.  
Prerequisite(s): BIOL 2107, BIOL 2107L, BIOL 2108, BIOL 2108L, BIOL 3133.  
Cross Listing(s): BIOL 5546G.  

BIOL 5547  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.  
Prerequisite(s): BIOL 2107 and BIOL 2107L and BIOL 2108 and BIOL 2108L and BIOL 3133.  
Cross Listing(s): BIOL 5547G.  

BIOL 5644  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 are given extra assignments not required of undergraduates.  
Cross Listing(s): BIOL 5644G.  

BIOL 5645  Behavioral Ecology  
0.4 Credit Hours.  0.3 Lecture Hours.  0.3 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 given an extra assignment determined by the instructor that undergraduates will not be required to do.  
Prerequisite(s): BIOL 2107 and BIOL 2107L and BIOL 2108 and BIOL 2108L and BIOL 4635.  
Cross Listing(s): BIOL 5645G.