

Department of Biological Sciences

Marine Biology

The Marine Biology major provides students with a strong foundation in basic biological concepts such as genetics, ecology, cell biology and marine systems as well as chemistry and mathematics. The plan of study provides the opportunity to choose elective courses from a wide variety of courses offered at Auburn University. In addition, students are required to take summer courses offered at marine labs around the United States, including Dauphin Island Sea Lab and Gulf Coast Research Lab. Students are also encouraged to consider internships and undergraduate research. Marine Biology graduates are well-prepared for advanced study in any marine science area or employment with marine labs, various governmental and nongovernmental agencies involved with coastal management and conservation, and tourism.

Microbial, Cellular and Molecular Biology

The Microbial, Cellular and Molecular Biology major provides students with an excellent foundation in the areas of microbiology, cellular and molecular biology that emphasizes the understanding of life at the cellular and molecular level. The choice of a formal option within the major allows students to concentrate on a particular area of interest. Each option provides a wide variety of courses and opportunities for undergraduate research. Students selecting the Microbiology option will be well prepared for postgraduate work or career advancement in a number of areas including food, environmental and medical microbiology. Students selecting the Cell and Molecular Biology option would also be well prepared for postgraduate study or career advancement in any area of eukaryotic cell or molecular biology. Both options provide excellent preparation for students interested in biotechnology or professional programs in the health sciences.

Organismal Biology

The Organismal Biology major provides students with a solid foundation in basic biological concepts, such as evolution, ecology, genetics and cell biology and also provides a foundation in physics, chemistry and mathematics. The three formal options within the major allow students to specialize in various ways, while focusing on the study of plants or animals through the choice of elective courses. The major provides a solid foundation for pursuing graduate degrees (M.S. or Ph.D.) in biological fields, but also prepares students for a wide range of laboratory and field-based research positions in environmental resource assessment, management and conservation within federal, state and private agencies or organizations.

Majors

- Genetics (http://bulletin.auburn.edu/undergraduate/collegeofsciencesandmathematics/biologicalsciences/genetics_major/)
- Genetics — Pre-professional concentrations in:
 - Pre-Medicine, Pre-Dental, Pre-Optometry (http://bulletin.auburn.edu/undergraduate/collegeofsciencesandmathematics/prehealthprofessionalcurricula/genetics_major_pre-med/)
 - Pre-Veterinary Medicine (http://bulletin.auburn.edu/undergraduate/collegeofsciencesandmathematics/prehealthprofessionalcurricula/genetics_major_pre-vet/)
- Marine Biology (http://bulletin.auburn.edu/undergraduate/collegeofsciencesandmathematics/biologicalsciences/marinebiology_major/)
- Microbiology — Pre-professional concentrations in:
 - Pre-Medicine, Pre-Dental, Pre-Optometry (http://bulletin.auburn.edu/undergraduate/collegeofsciencesandmathematics/biologicalsciences/microbialcellularmolecularbiology-microbiology_major_pre-med/)
 - Pre-Physical Therapy, Pre-Physician Assistant (http://bulletin.auburn.edu/undergraduate/collegeofsciencesandmathematics/biologicalsciences/microbialcellularmolecularbiology-microbiology_major_pre-pphsppat/)
 - Pre-Veterinary (http://bulletin.auburn.edu/undergraduate/collegeofsciencesandmathematics/prehealthprofessionalcurricula/microbiology_preveterinarymedicine_major/)
- Microbial, Cellular and Molecular Biology — Microbiology Option (MCMB) (http://bulletin.auburn.edu/undergraduate/collegeofsciencesandmathematics/biologicalsciences/microbialcellularmolecularbiology-microbiology_major/)
- Microbial, Cellular and Molecular Biology — Cell & Molecular Biology Option (MCCM) (http://bulletin.auburn.edu/undergraduate/collegeofsciencesandmathematics/biologicalsciences/microbialcellularmolecularbiology-cellmolecularbiology_major/)
- Organismal Biology — Conservation & Biodiversity Option (http://bulletin.auburn.edu/undergraduate/collegeofsciencesandmathematics/biologicalsciences/orgbio-conversationbiodiversity_major/)

- Organismal Biology — Ecology, Evolution & Behavior Option (http://bulletin.auburn.edu/undergraduate/collegeofsciencesandmathematics/biologicalsciences/orgbio-ecoevolutionbehavior_major/)
- Organismal Biology — Integrative Biology Option (http://bulletin.auburn.edu/undergraduate/collegeofsciencesandmathematics/biologicalsciences/orgbiointegrativebio_major/)
- Organismal Biology — Pre-professional concentrations in:
 - Pre-Medicine, Pre-Dental, Pre-Optometry (http://bulletin.auburn.edu/undergraduate/collegeofsciencesandmathematics/biologicalsciences/ibio_major_premed/)
 - Pre-Physical Therapy, Pre-Physician Assistant (http://bulletin.auburn.edu/undergraduate/collegeofsciencesandmathematics/biologicalsciences/ibio_major_prephsppat/)
 - Pre-Veterinary (http://bulletin.auburn.edu/undergraduate/collegeofsciencesandmathematics/prehealthprofessionalcurricula/orgbio_preveterinarymedicine_major/)

Minors

- Biological Sciences (http://bulletin.auburn.edu/undergraduate/collegeofsciencesandmathematics/biologicalsciences/biosci_minor/)

Courses

BIOL 1000 INTRODUCTION TO BIOLOGY (3) LEC. 3. Science Core. Introduction to biological principles relevant to human society. Designed for non-science majors. Credit will not be given for both BIOL 1000 and BIOL 1020 or BIOL 1027.

BIOL 1001 INTRODUCTION TO BIOLOGY LABORATORY (1) LAB. 2. Pr. P/C BIOL 1000 or P/C BIOL 1003. Laboratory course for BIOL 1000 or BIOL 1003.

BIOL 1010 A SURVEY OF LIFE (3) LEC. 3. Pr. BIOL 1000 or BIOL 1020 or BIOL 1023 or BIOL 1027 or SCMH 1010 or SCMH 1013 or SCMH 1017 or SCMH 1020 or SCMH 1023 or SCMH 1027. Science Core. Emphasis on contrasting strategies employed by organisms to meet similar biological needs. Credit will not be given for both BIOL 1010 and BIOL 1030 or BIOL 1037.

BIOL 1011 A SURVEY OF LIFE LABORATORY (1) LAB. 2. Pr. P/C BIOL 1010 or P/C BIOL 1013. Laboratory course for BIOL 1010.

BIOL 1020 PRINCIPLES OF BIOLOGY (3) LEC. 3. Science Core. Introduction to the physical, chemical, and biological principles common to all organisms. Credit will not be given for both BIOL 1020 and BIOL 1000 or BIOL 1027.

BIOL 1021 PRINCIPLES OF BIOLOGY LABORATORY (1) LAB. 2. Pr. P/C BIOL 1020 or P/C BIOL 1023 or P/C BIOL 1027. Laboratory Course for BIOL 1020.

BIOL 1027 HONORS BIOLOGY (4) LEC. 3. LAB. 2. Pr. Honors College. Science Core. Introduction to the physical, chemical, and biological principles common to all organisms. Credit will not be given for both BIOL 1027 and BIOL 1000 or BIOL 1020.

BIOL 1030 ORGANISMAL BIOLOGY (3) LEC. 3. Pr. BIOL 1020 or BIOL 1023 or BIOL 1027. Science Core. Principles and fundamentals of biology at the organismal level. Credit will not be given for both BIOL 1030 and BIOL 1010 or BIOL 1037.

BIOL 1031 ORGANISMAL BIOLOGY LABORATORY (1) LAB. 2. Pr. P/C BIOL 1030. Laboratory Course for BIOL 1030.

BIOL 1037 HONORS ORGANISMAL BIOLOGY (4) LEC. 3. LAB. 1. Pr. BIOL 1020 or BIOL 1023 or BIOL 1027. Science Core. Principles and fundamentals of biology at the organismal level. Credit will not be given for both BIOL 1037 and BIOL 1010 or BIOL 1030.

BIOL 2100 PROFESSIONAL DEVELOPMENT (1) LEC. 1. Introduction to career opportunities and student development options for majors in biological sciences. Students will investigate post-graduation academic and professional options, develop writing skills by creating resumes and ePortfolios, and explore course and research options with the department. Biology majors only.

BIOL 2425 MARINE BIOLOGY (4) LEC. 4. Pr. BIOL 1030 or BIOL 1037. Departmental approval. The invertebrates, vertebrates and marine plants as communities with emphasis on local examples. Taught only at Dauphin Island Sea Lab. (DISL).

BIOL 2500 HUMAN ANATOMY AND PHYSIOLOGY I (3) LEC. 3. Pr. BIOL 1000 or BIOL 1020 or BIOL 1023 or BIOL 1027. Study of the structure and function of the human body. First half of two-part sequence with BIOL 2510, concentrating on tissues, muscle, and nervous system.

BIOL 2501 HUMAN ANATOMY AND PHYSIOLOGY I LABORATORY (1) LAB. 1. Pr. (BIOL 1000 or BIOL 1020 or BIOL 1027) and (P/C BIOL 2500 or P/C BIOL 2503 or P/C BIOL 2507). Lab course for study of the structure and function of the human body. First half of two-part sequence with BIOL 2510, concentrating on tissues, muscle, and nervous system.

BIOL 2507 HONORS HUMAN ANATOMY AND PHYSIOLOGY I (3) LEC. 3. Pr. Honors College. BIOL 1000 or BIOL 1020 or BIOL 1023 or BIOL 1027. Study of the structure and function of the human body. First half of two-part sequence with BIOL 2510, concentrating on tissues, muscle, and nervous system.

BIOL 2510 HUMAN ANATOMY AND PHYSIOLOGY II (3) LEC. 3. Pr. (BIOL 2500 or BIOL 2503 or BIOL 2507) and BIOL 2501. Study of the structure and function of the human body. Second half of two-part sequence with BIOL 2500/2501, concentrating on cardiovascular, respiratory, digestive, urinary, reproductive, and endocrine systems.

BIOL 2511 HUMAN ANATOMY AND PHYSIOLOGY II LABORATORY (1) LAB. 1. Pr. (BIOL 2500 or BIOL 2503 or BIOL 2507) and BIOL 2501 and (P/C BIOL 2510 or P/C BIOL 2517). Lab course for study of the structure and function of the human body. Second half of two-part sequence with BIOL 2500, concentrating on the individual organ systems.

BIOL 2517 HONORS HUMAN ANATOMY AND PHYSIOLOGY II (3) LEC. 3. Pr. Honors College. BIOL 2501 and BIOL 2500 or BIOL 2503 or BIOL 2507. Study of the structure and function of the human body. Second half of two-part sequence with BIOL 2500/2501, concentrating on cardiovascular, respiratory, digestive, urinary, reproductive, and endocrine systems.

BIOL 3000 GENETICS (3) LEC. 3. Pr. (BIOL 1020 or BIOL 1023 or BIOL 1027). An overview of theoretical principles of transmission, cytological, molecular, and population genetics. Problem solving will be emphasized. May count either BIOL 3000 or BIOL 3003 or AGRI 3000.

BIOL 3001 GENERAL GENETICS LABORATORY (1) LAB. 2. Pr. (BIOL 1020 or BIOL 1023 or BIOL 1027) and (P/C BIOL 3000 or P/C BIOL 3003). Laboratory provides practical experience in the areas of transmission, cytological, molecular, and population genetics. Problem solving is emphasized through analysis of simulated and real genetics data sets.

BIOL 3010 COMPARATIVE ANATOMY (4) LEC. 3. LAB. 1. Pr. BIOL 1030 or BIOL 1037. We will examine evolution of anatomical structures from early chordates through vertebrates (both living and extinct). Students will learn the main vertebrate taxa and how each anatomical system appears in them. Students will also examine the linkage of these systems through all vertebrates. The phylogenetic tree (evolutionary relationships of the vertebrates) will be the backbone on which we explore the diversity of anatomy. In lab, students will use and develop their integrative skills by examining the anatomy of a wide variety of organisms.

BIOL 3011 COMPARATIVE ANATOMY LABORATORY (1) LAB. 1. Pr. P/C BIOL 1030 or BIOL 1037. Laboratory to accompany Comparative Anatomy Lecture. This lab course will explore the diverse morphologies of vertebrates.

BIOL 3020 GENOMIC BIOLOGY (4) LEC. 3. LAB. 2. Pr. BIOL 3000 or BIOL 3003 or AGRI 3000. An overview of genes, genomes, and genomic and proteomic approaches and methodology. Application of principles of biology at the genomic level. Includes an introduction to bioinformatic approaches to genomic problems in a computer laboratory setting.

BIOL 3030 EVOLUTION AND SYSTEMATICS (3) LEC. 3. Pr. BIOL 1030 or BIOL 1037. An introduction to evolutionary processes, classification, of organisms and scientific nomenclature.

BIOL 3040 BIOLOGY OF MARINE SYSTEMS (3) LEC. 3. Pr. (BIOL 1020 or BIOL 1023 or BIOL 1027) and (BIOL 1030 or BIOL 1037). Introduction to marine systems and biological investigations of coastal, near shore and open ocean organisms and processes.

BIOL 3060 ECOLOGY (4) LEC. 3. LAB. 3. Pr. (BIOL 1020 or BIOL 1023 or BIOL 1027) and (BIOL 1030 or BIOL 1037). Interactions of organisms with their environments and characteristics of populations, communities, and ecosystems. 8 hours of Biology.

BIOL 3075 INTRODUCTION TO OCEANOGRAPHY (4) LEC. 4. Pr. (MATH 1150 or MATH 1153) and (CHEM 1110 or CHEM 1117 or CHEM 1030 or CHEM 1033) and PHYS 1500. Departmental approval. The physics, chemistry, biology, and geology of the oceans. Taught only at Dauphin Island Sea Lab (DISL).

BIOL 3100 PLANT BIOLOGY (4) LEC. 4. LAB. 1. Pr. (BIOL 1030 or BIOL 1037) and (CHEM 1010 or CHEM 1030 or CHEM 1033 or CHEM 1110 or CHEM 1117). Introduction to the morphology, anatomy, physiology and classification of plants with laboratory.

BIOL 3200 GENERAL MICROBIOLOGY (3) LEC. 3. Pr. (BIOL 1020 or BIOL 1023 or BIOL 1027) and (CHEM 1030 or CHEM 1033 or CHEM 1110 or CHEM 1117) and P/C BIOL 3201. Introduction to the science of microbiology, emphasizing cell structure, systematics, growth, genetics, and the role in human affairs.

BIOL 3201 GENERAL MICROBIOLOGY LABORATORY (1) LAB. 2. Pr. (BIOL 1020 or BIOL 1023 or BIOL 1027) and (CHEM 1030 or CHEM 1033 or CHEM 1110 or CHEM 1117) and (P/C BIOL 3200 or P/C BIOL 3203 or P/C BIOL 3207). Fundamental laboratory techniques required to safely handle, enumerate, identify, and provide basic biochemical characterization of microorganisms.

BIOL 3207 HONORS GENERAL MICROBIOLOGY (3) LEC. 3. Pr. Honors College. CHEM 1030 or CHEM 1033 or CHEM 1110 or CHEM 1117 and BIOL 3201. and BIOL 1020 or BIOL 1023 or BIOL 1027. Introduction to the science of microbiology, emphasizing cell structure, systematics, growth, genetics, and the role in human affairs.

BIOL 4000 HISTOLOGY (3) LEC. 3. Pr. (BIOL 1030 or BIOL 1037) and BIOL 1031 and (BIOL 2500 or BIOL 2507 or BIOL 2510 or BIOL 2517 or BIOL 3010 or BIOL 5240). Coreq. BIOL 4001. Morphology and classification of tissues; arrangement of tissues in organs and systems of vertebrate animals.

BIOL 4001 HISTOLOGY LABORATORY (1) LAB. 3. Pr. (BIOL 1030 or BIOL 1037). Coreq. BIOL 4000. Laboratory investigation of the morphology and classification of tissues using prepared slides to reveal the arrangement of tissues in organs and organ systems of vertebrate animals.

BIOL 4010 INVERTEBRATE BIODIVERSITY (4) LEC. 3. LAB. 3. Pr. BIOL 1030 or BIOL 1037. Survey of the phyla of invertebrates with emphasis on morphology, anatomy, ecology, evolution, and systematics.

BIOL 4015 BIOLOGY AND CONSERVATION OF MARINE TURTLES (2) LEC. 15. LAB. 45. Pr. BIOL 1020 or BIOL 1023 or BIOL 1027 and BIOL 1030 or BIOL 1037 and BIOL 3040. OR permission of Marine Biology coordinator. An introductory overview of the biology of marine turtles. Topics include: identification, distribution, nesting & migratory behavior, feeding, population biology, development, paleontology and conservation. Extensive laboratory and field studies of multiple species of turtles. Taught only at Dauphin Island Sea Lab (DISL).

BIOL 4020 VERTEBRATE BIODIVERSITY (4) LEC. 3. LAB. 3. Pr. BIOL 1030 or BIOL 1037. Ecology and evolution of living vertebrates of the world.

BIOL 4025 ECOLOGY OF THE FLORIDA EVERGLADES (2) LEC. 15. LAB. 45. Pr. BIOL 1020 or BIOL 1023 or BIOL 1027 and BIOL 1030 or BIOL 1037 and BIOL 3040. Examines the natural history, ecology and evolution, and human impact on the Everglades. Includes intensive lectures and a more than 1-week long campsite based field trip in the Everglades. Multiple short trips to various locales within the Everglades. Taught only at Dauphin Island Sea Lab (DISL).

BIOL 4035 INTRODUCTION TO MARINE ANIMAL NEUROBIOLOGY (3) LEC. 15. LAB. 60. Pr. BIOL 1020 or BIOL 1023 or BIOL 1027 and BIOL 1030 or BIOL 1037. The neuroanatomy and neurophysiology of marine invertebrates and vertebrates. Lectures and labs on neurons, glia, resting and action potentials, synapses and neurotransmitters, muscle contraction, sensorimotor integration; neurophysiological bases of behavior; labs include computer simulation of cellular neurobiology. Taught only at Dauphin Island Sea Lab (DISL).

BIOL 4045 MARINE MAMMAL BIOLOGY (4) LEC. 30. LAB. 60. Pr. BIOL 1020 or BIOL 1023 or BIOL 1027 and BIOL 1030 or BIOL 1037 and BIOL 3040. Introduction to the evolution, taxonomy and classification, anatomy, physiology, behavior, conservation and management issues of marine mammals, including cetaceans, pinnipeds, mustelids, sirenians and the polar bear. Lab and field research methods used to study marine mammals will be covered. Taught only at Dauphin Island Sea Lab (DISL).

BIOL 4065 MARINE CONSERVATION BIOLOGY (4) LEC. 45. LAB. 30. Pr. BIOL 1020 or BIOL 1023 or BIOL 1027 and BIOL 1030 or BIOL 1037 and (BIOL 3040 or BIOL 3060). Study of major threats to marine biodiversity as and potential solutions to the threats. Students discuss current topics in marine conservation biology and critically debate marine conservation literature. Field trips to impacted and pristine sites will demonstrate principles. Taught only at Dauphin Island Sea Lab (DISL).

BIOL 4085 HURRICANES OF THE GULF OF MEXICO (2) LEC. 30. An introductory survey with emphasis on Gulf of Mexico hurricanes. Hurricane features. Basic principles of the atmosphere, review of Gulf, Atlantic and Caribbean hurricanes, El Nino, changes in the Atlantic circulation, hurricane formation, development, features, movement, steering and forecasting. Taught only at Dauphin Island Sea Lab (DISL).

BIOL 4095 COASTAL BIRDS OF ALABAMA (2) LEC. 15. LAB. 30. Pr. BIOL 1020 or BIOL 1023 or BIOL 1027 and BIOL 1030 or BIOL 1037 and BIOL 3040. Behavior and ecology-oriented avian field biology. Identification, banding, record/broadcast, other survey methods. Emphasis on behavioral ecology. Extensive field effort along the Gulf Coast and in the Mobile/Alabama/Tombigbee/Tensaw River Delta, other riparian environments, and salt marshes. Taught only at Dauphin Island Sea Lab (DISL).

- BIOL 4100 CELL BIOLOGY (3) LEC.** 3. Pr. CHEM 2030 or (CHEM 2070 or CHEM 2077) and (BIOL 3000 or BIOL 3003 or FISH 3000 or AGRI 3000) and (BIOL 1030 or BIOL 1037). Introduction to cellular structure and processes, including evolution, organization, physiology, molecular biology of cells, membranes, cytoplasm, and organelles as well as energy, transport, motility, cell division, signaling, transcription, and translation.
- BIOL 4101 CELL BIOLOGY LABORATORY (2) LAB.** 4. Pr. P/C BIOL 4100 or P/C BIOL 4103. Light/electron microscopy, cell structure, origins of life, centrifugation, protein/nucleic acid electrophoresis, and blotting, motility, DNA purification, chromatography, pH, fluorescence microscopy.
- BIOL 4135 MARINE BEHAVIORAL ECOLOGY (4) LEC.** 30. **LAB.** 60. Pr. BIOL 1020 or BIOL 1023 or BIOL 1027 and BIOL 1030 or BIOL 1037 and BIOL 3040. Animal behavior in the context of the marine environment. Students study the ecological and evolutionary significance of behavior in a marine setting. Topics include principles of marine behavioral ecology, techniques for observing behavior, conducting behavior experiments, and data collection. Taught only at Dauphin Island Sea Lab (DISL).
- BIOL 4150 HUMAN GENETICS (3) LEC.** 3. Pr. BIOL 3000 or BIOL 3003 or AGRI 3000 or FISH 3000 and BIOL 4100 and (CHEM 2080 or CHEM 2087). Study of the biological interaction of genes, effects of mutation and changes in gene frequency in human populations. Emphasis on molecular approach to study evolutionary changes in human gene pools.
- BIOL 4410 VERTEBRATE DEVELOPMENT (5) LEC.** 3. **LAB.** 4. Pr. BIOL 3000 or BIOL 3003 or FISH 3000 or AGRI 3000. Morphogenesis and organogenesis of frog, chick, pig, and human from a descriptive and analytical viewpoint.
- BIOL 4415 SHARK AND RAY BIOLOGY (2) LEC.** 15. **LAB.** 45. Pr. BIOL 1020 or BIOL 1023 or BIOL 1027 and BIOL 1030 or BIOL 1037 and BIOL 3040. An introduction to the biology of sharks and rays with special emphasis on regional shark fauna and field technique. Topics: chondrichthyan origin, systematics, sensory biology, trophic ecology, reproductive biology, life history, ecology, fisheries and conservation. Extensive lab and field work. Taught only at Dauphin Island Sea Lab (DISL).
- BIOL 4445 SPECIAL PROBLEMS IN MARINE SCIENCE (1-6) AAB/LEC.** Departmental approval. Individualized research-oriented experience. Taught at Gulf Coast Research Laboratory. Course may be repeated for a maximum of 6 credit hours.
- BIOL 4455 MARINE INVERTEBRATE ZOOLOGY (6) LEC.** 6. Departmental approval. Structure, classification, phylogenetics, larval development and functional processes of marine and estuarine invertebrates. Taught at Gulf Coast Research Laboratory.
- BIOL 4475 MARINE ICHTHYOLOGY (6) LEC.** 6. Departmental approval. Biology of the major piscine taxa in Mississippi Sound. Principles involved in classification and evolutionary relationships of these organisms. Taught at Gulf Coast Research Laboratory.
- BIOL 4515 MARINE INVERTEBRATE ZOOLOGY (4) LEC.** 4. Pr. At least 10 credits in BIOL 2000-8990. Departmental approval. The natural history, systematics, and morphology of marine invertebrates from the Gulf of Mexico; oriented toward a field and laboratory approach. Participation in extended field trips is part of the course. Taught at DISL.
- BIOL 4525 DOLPHINS AND WHALES (2) LEC.** 2. Pr. BIOL 1030 or BIOL 1037. Departmental approval. Classification, anatomy, and ecology of the cetaceans. Taught at DISL.
- BIOL 4565 MARINE VERTEBRATE ZOOLOGY (4) LEC.** 4. Pr. BIOL 1030 or BIOL 1037. Departmental approval. Systematics, zoogeography and ecology of marine fishes, reptiles, and mammals. Taught at DISL. May not be substituted for BIOL 4020.
- BIOL 4575 MARINE ECOLOGY (4) LEC.** 4. Pr. BIOL 1020 or BIOL 1023 or BIOL 1027. Prerequisites: BIOL1020 or marine biology. Departmental approval. Experimental ecological theory and its application to interactions of marine organisms with each other and the environment. Includes laboratory, extensive field trip experience. Taught at DISL.
- BIOL 4585 PLANKTON BIOLOGY (2) LEC.** 15. **LAB.** 45. Pr. (BIOL 1020 and BIOL 1021 or BIOL 1023 or BIOL 1027) and (BIOL 1030 and BIOL 1031 or BIOL 1037). Students will learn about the biology of all forms of plankton and the methods for their study including optical, chemical and molecular techniques. Students will understand the basic methods of study and be able to sight-identify major groups. Taught only at Dauphin Island Sea Lab (DISL).
- BIOL 4700 PEDAGOGY OF PEER-LED INSTRUCTION (1) LEC.** 1. Departmental approval. This is the pedagogical training course designed for students serving as peer instructors who are interested in effective instructional strategies in the STEM disciplines. This course helps peer instructors integrate educational theory, pedagogy, content, and practice. Course meetings will focus on practical concerns as well as associated theoretical models. This is a seminar course where students are responsible for weekly readings, in-class discussions, reflections and projects which are coordinated with students' practice.

BIOL 4920 INTERNSHIP IN BIOLOGY (1-4) INT. SU. Application of biology concepts and skills in a professional experience. 12 credit hours in 3000-level or higher BIOL courses. Departmental approval. Student must be enrolled in a major offered by the Department of Biological Sciences. Course may be repeated for a maximum of 4 credit hours.

BIOL 4950 SENIOR SEMINAR (1) LEC. 1. Oral presentation and discussion of recent scientific publications from a selected area of biological sciences. One hour is required for all majors. Course may be repeated for a maximum of 3 credit hours.

BIOL 4967 HONORS SPECIAL PROBLEMS (1-3) DSL/LEC. Pr. Honors College. Departmental approval and membership in the Honor College. Course may be repeated for a maximum of 3 credit hours.

BIOL 4970 SPECIAL TOPICS (1-4) AAB. Departmental approval. Instruction and discussion in a selected current topic in Biological Sciences. Course may be repeated for a maximum of 8 credit hours.

BIOL 4980 UNDERGRADUATE RESEARCH (2-4) AAB/IND. Directed research in an area of specialty within the department. Course may be repeated for a maximum of 6 credit hours.

BIOL 4997 HONORS THESIS (1-3) IND. Pr. Honors College. Undergraduate research and thesis. Course may be repeated for a maximum of 3 credit hours.

BIOL 4AA0 PROFESSIONAL DEVELOPMENT II (0) PRA. SU. Students enrolled in this course will complete the ePortfolio that they began developing as Freshmen, in BIOL 2100 - Professional Development I. Successfully designing and completing a professional ePortfolio will provide students with: 1. An opportunity to create a unified, polished and coherent educational and professional history of themselves. 2. A platform to organize their thinking about skills and experiences and the opportunity to connect them to the next step in career development. 3. A place to collect, present and reflect on evidence of professional development and growth during the undergraduate experience.

BIOL 5000 HUMAN CARDIOVASCULAR PHYSIOLOGY (4) LEC. 3. LAB. 2. Pr. BIOL 2510 or BIOL 5240 or BIOL 5600. An in-depth exploration of molecular events and mechanisms governing heart and vascular function in health and disease. Laboratory will provide hands-on experiences with ECG, local blood flow, and case study examples.

BIOL 5020 EMBRYONIC DEVELOPMENT (3) LEC. 3. Pr. (BIOL 4100 or BIOL 4103). This course is designed to teach students the evolution of the molecular mechanisms used by developing embryos to form the adult body plan with a focus on the vertebrate model systems used to understand human developmental biology. In addition, the course will expose students to current research on these processes and the techniques used to carry out these studies.

BIOL 5050 FUNDAMENTALS OF BIOPHYSICS (2) LEC. 2. Pr. PHYS 1510 or BIOL 4100. Introduction to use of theories and methods of physics in biology, illustrated by discussion of organism size, metabolism, physiology, vision, hearing, cell cellular and molecular processes in medicine, physiology and molecular biology.

BIOL 5090 CONSERVATION BIOLOGY (3) LEC. 3. Pr. BIOL 3060. This course is an overview of ethical, economic and biological aspects of conservation biology at scales ranging from local to global. Credit will not be given for both BIOL 5090 and BIOL 6090.

BIOL 5110 PARASITOLOGY (4) LEC. 3. LAB. 3. Pr. BIOL 1030 or BIOL 1037 or BIOL 2500 or BIOL 2503. Students must have Junior or Senior standing. Development, identification, host-parasite relationships, and medical significance of parasitic protozoa, helminthes, and arthropods that infect humans, domestic animals and wildlife. May count either BIOL 5110 or LABT 4050.

BIOL 5120 SYSTEMATIC BOTANY (4) LEC. 3. LAB. 3. Pr. (BIOL 1030 or BIOL 1037). Classification, nomenclature, distribution, systematics, and evolution of vascular plants.

BIOL 5130 ADVANCED PLANT PHYSIOLOGY (3) LEC. 3. Pr. BIOL 3100 and (CHEM 2030 or CHEM 2080 or CHEM 2087). Physiological and biochemical processes affecting plant growth and development including water relations, photosynthesis, respiration, and hormones.

BIOL 5131 ADVANCED PLANT PHYSIOLOGY LABORATORY (1) LAB. 3. Pr. BIOL 3100 and (CHEM 2081 or BIOL 5130). Laboratory exercises in plant physiology. Including water relations, metabolism and growth, and development.

BIOL 5140 PLANT ECOLOGY (4) LEC. 3. LAB. 4. Pr. (BIOL 1030 or BIOL 1037) and BIOL 3060. Exploration of ecological interactions between plants and their environment. Field trips emphasize Southeastern habitats/plant examples. Includes 3-day weekend field trip.

BIOL 5150 POPULATION AND COMMUNITY ECOLOGY (3) LEC. 3. Pr. BIOL 3060. Quantitative study of natural population and ecological communities. Selected topics include density-dependent population growth, life-history theory, mark-recapture analysis, eco-evolutionary dynamics, and species interactions especially how they relate to questions of species distributions in time and space.

BIOL 5160 FIELD BIOLOGY AND ECOLOGY (3-15) LEC. 3. Prereq. 15 hours of biology. Intensive classroom and field studies of an area outside Alabama. Course may be repeated for a maximum of 15 credit hours.

BIOL 5190 CELL AND MOLECULAR SIGNAL TRANSDUCTION (3) LEC. 3. Pr. BIOL 4100 and BIOL 5220. Study of cellular communication and regulation with emphasis on integration between cellular, molecular, genetic, and biochemical approaches.

BIOL 5200 CLINICAL MICROBIOLOGY (5) LEC. 3. LAB. 4. Pr. (BIOL 3200 or BIOL 3203 or BIOL 3207) and BIOL 3201. Isolation, cultivation, identification, classification and pathogenesis of infectious agents with emphasis on bacteria; includes clinical materials, Eubacteria, Mycoplasmata, Rickettsiae and Spirochetes. May count either BIOL 5200 or BIOL 6200.

BIOL 5210 MICROBIAL PHYSIOLOGY (3) LEC. 3. Pr. (BIOL 3200 or BIOL 3203) and BIOL 3201 and (CHEM 2030 or CHEM 2080 or CHEM 2087). General physiology of microbial cells emphasizing fermentation, respiration, photosynthesis, nitrogen fixation, cell wall synthesis, membranes, and macromolecular synthesis.

BIOL 5220 INTRODUCTORY MOLECULAR GENETICS (3) LEC. 3. Pr. (BIOL 3000 or BIOL 3003 or FISH 3000 or AGRI 3000) and (BIOL 3200 or BIOL 3203) and BIOL 3201. Principles of gene expression including replication, transcription, and translation; structure and regulation of genes; concepts and techniques in recombinant DNA.

BIOL 5230 VIROLOGY (3) LEC. 3. Pr. (P/C BIOL 5220 or P/C BIOL 6220) or (P/C BIOL 5260 or P/C BIOL 6260). Biology of viruses, including structure, entry, replication, assembly and release, pathogenesis, and epidemiology of viral infections. May count BIOL 5230 or BIOL 6230.

BIOL 5240 ANIMAL PHYSIOLOGY (4) LEC. 3. LAB. 3. Pr. BIOL 4100 or (CHEM 2030 or CHEM 2070 or CHEM 2077). General overview of the function of the major systems in animals, including evolution and adaptation to specific environments.

BIOL 5250 MICROBIAL EVOLUTION AND DIVERSITY (4) LEC. 3. LAB. 2. Pr. BIOL 3000 or BIOL 3003 or FISH 3000 or AGRI 3000 and (BIOL 3200 or BIOL 3203) and BIOL 3201. Introduction to microbial evolutionary history and theory, and survey of microbial diversity. Credit will not be given for both BIOL 5250 and BIOL 6250.

BIOL 5260 PROKARYOTIC MOLECULAR GENETICS (3) LEC. 3. Pr. BIOL 3000 or BIOL 3003 or FISH 3000 or AGRI 3000 and (BIOL 3200 or BIOL 3203) and BIOL 3201. Molecular principles of bacterial genetics including gene structure, genetic organization, regulation of gene expression, acquisition and loss of genes leading to microbial evolution. Credit will not be given for both BIOL 5260 and BIOL 6260.

BIOL 5270 HOST-MICROBE INTERACTIONS (3) LEC. 3. Pr. (BIOL 3200 or BIOL 3203) and (BIOL 3201) and (BIOL 5220 or BIOL 5260). This course will explore interactions between microbes and their hosts including plants, insects and animals. Credit will not be given for both BIOL 5270 and 6270.

BIOL 5280 GENETHICS (3) LEC. 3. Pr. BIOL 3000 or BIOL 3003 or FISH 3000 or AGRI 3000. Twenty-first century biotechnology and related ethical issues, including human cloning, stem cells, neuroenhancement, age retardation, genetic enhancement, and nanobiology. May count BIOL 5280 or 6280.

BIOL 5290 CASE STUDIES IN INFECTION AND IMMUNITY (3) LEC. 3. Pr. BIOL 5500. This course is designed to enrich student understanding of infection and immunity in the context of clinical presentations. Students will learn to use deductive reasoning to narrow down potential causes of symptoms and then use scientific literature to gain a detailed understanding of the mechanisms underlying disease. Cases covered will include infectious disease, immunodeficiency, neoplasms and/or autoimmunity.

BIOL 5300 PLANT ANATOMY AND DEVELOPMENT (4) LEC. 3. LAB. 4. Pr. BIOL 3100. Investigation of the various levels of plant organization from subcellular to organ through use of light and scanning electron microscopes.

BIOL 5320 PLANT GENE EXPRESSION (3) LEC. 3. Pr. BIOL 3100. Departmental approval. Genetic expression of genetic elements in plants from the recent literature.

BIOL 5330 DEVELOPMENTAL GENETICS (3) LEC. 3. Pr. BIOL 3000 or BIOL 3003 or AGRI 3000 or FISH 3000. Study of the genetics and genetic mechanisms behind developmental processes occurring in a range of species. May count either BIOL 5330 or BIOL 6330.

BIOL 5340 PROTOZOOLOGY (4) LEC. 3. LAB. 3. Pr. BIOL 3000 or BIOL 3003 or FISH 3000 or AGRI 3000. Life history, identification, cell biology, and evolution of free-living and parasitic protozoa of the major groups. Laboratory includes techniques for microscopy.

BIOL 5350 BEHAVIORAL ECOLOGY (3) LEC. 3. Pr. (BIOL 3030 or BIOL 3033) and BIOL 3060. Evolution of behaviors via natural, sexual, and kin selections; evolutionary influences on social groups, mating systems, cooperative breeding, and other interactions.

BIOL 5370 MOLECULAR ECOLOGY (3) LEC. 3. Pr. (BIOL 3000 or BIOL 3003 or FISH 3000 or AGRI 3000) and BIOL 3060. General overview of the concepts and techniques regarding the application of molecular variation in answering questions pertaining to populations and communities of organisms. Credit will not be given for both BIOL 5370 and BIOL 6370.

BIOL 5380 GENERAL ICHTHYOLOGY (4) LEC. 3. LAB. 4. Pr. BIOL 1030 or BIOL 1037. Survey of the biodiversity of world and local fishes with an overview of ecology, behavior, biology, and conservation of fishes.

BIOL 5425 MARINE BOTANY (4) LEC. 4. Pr. BIOL 1020 or BIOL 1023 or BIOL 1027. Departmental approval. Pr. BIOL 1020 or equiv. Survey of microscopic and macroscopic algae, salt marsh vegetation, sea grasses, mangroves and maritime forests with regard to identification, distribution, structure, ecology and physiology. Field trips and laboratory work. Taught at DISL.

BIOL 5440 CLIMATE CHANGE PHYSIOLOGY AND EVOLUTION (3) LEC. 3. LAB. 0. This class investigates on the basic mechanisms of climate change and its impact on living organisms, focusing on their physiological, evolutionary, behavioral and molecular responses. Special interest is given to plants and marine organisms.

BIOL 5500 IMMUNOLOGY (3) LEC. 3. Pr. (BIOL 3200 or BIOL 3203 or BIOL 3207) and BIOL 3201 and (BIOL 3000 or BIOL 3003 or BIOL 3020). The cellular and molecular basis of the immune response, including antigen presentation, immunogenetics, effector mechanisms, and medical immunology. May count either BIOL 3500 or BIOL 5500.

BIOL 5501 IMMUNOLOGY LAB (2) LAB. 2. Pr. P/C BIOL 5500 or P/C BIOL 3500. Techniques illustrating principles of antigen-antibody interactions and their application in immunoassays, identification of leukocytes, cellular interactions, and antibody production.

BIOL 5521 GENE EXPRESSION AND RECOMBINANT DNA LABORATORY (2) LEC. 2. LAB. 4. Pr. P/C BIOL 5220 or P/C BIOL 5260. Laboratory experiences demonstrating concepts and techniques in recombinant DNA.

BIOL 5550 NANOMEDICINE (2) LEC. 2. Pr. PHYS 1510 and CHEM 2080 and BCHE 5180. Nanomedicine is a branch of medicine that applies the knowledge and tools of nanotechnology to the prevention and treatment of disease. It involves the use of nanoscale materials, such as biocompatible nanoparticles, nanorobots and nanosensors, for diagnosis, drug delivery, and sensing in living organisms.

BIOL 5560 RNA IN BIOMEDICINE (3) LEC. 3. Pr. BIOL 3000 or BIOL 3003. This course introduces the basic and novel types and functions of RNAs, as well as the integration of these molecules in biomedical contexts. Students will learn about the 'RNA World' theory, the diverse roles of RNA in cellular processes, and pathogenesis. Technological approaches to RNA research will be covered, as well as the application of this research to the diagnosis and therapy of genetic diseases.

BIOL 5600 MAMMALIAN PHYSIOLOGY (BIOMEDICAL PHYSIOLOGY) (5) LEC. 4.25. LAB. 2.75. Pr. (BIOL 1030 or BIOL 1037) or (BIOL 2500 or BIOL 2503) and BIOL 2501 and (CHEM 2030 or CHEM 2070 or CHEM 2077). An in-depth investigation of the physiology of the major mammalian organ systems.

BIOL 5650 ANIMAL BEHAVIOR (3) LEC. 3. Pr. (BIOL 1030 or BIOL 1037) and BIOL 3060. Animal behaviors, analysis of their adaptive value, development, and evolution.

BIOL 5660 FOOD MICROBIOLOGY (4) LEC. 3. LAB. 3. Pr. (BIOL 3200 or BIOL 3203) and BIOL 3201. Introduction to basic and applied microbiology in food, including how bacteria, viruses, parasites, yeasts and mold affect and in turn are affected by foods both positively and negatively. May count either FDSC 5660, BIOL 5660, FDSC 6600, or BIOL 6600.

BIOL 5700 APPLIED AND ENVIRONMENTAL MICROBIOLOGY (4) LEC. 3. LAB. 2. Pr. (BIOL 3200 or BIOL 3203) and BIOL 3201. Introduction to the ecology, systematics, interrelationships, and role of micro-organisms in geochemical cycles, bioremediation and pharmaceutical production.

BIOL 5740 HERPETOLOGY (4) LEC. 3. LAB. 3. Ecology and evolution of living amphibians and reptiles of the world.

BIOL 5750 ORNITHOLOGY (4) LEC. 3. LAB. 3. Pr. (BIOL 3030 or BIOL 3033) and BIOL 3060. Taxonomy, evolution, ecology, and behavior of birds.

BIOL 5760 MAMMALOLOGY (4) LEC. 3. LAB. 3. Characteristics, origins, ecology, behavior, reproduction, physiology, and diversity of mammals. Labs include survey or current literature, field trips, data analysis, and report preparation.

BIOL 5800 INTRODUCTION TO COMPUTATIONAL BIOLOGY (3) LEC. 2. LAB. 1. Pr. STAT 2510 or STAT 2513. Overview of computational approaches to biological data analysis. Additionally, students will learn basic statistical and graphical analysis. May count either BIOL 5800 or BIOL 6800.

BIOL 5850 FUNCTIONAL GENOMICS (3) LEC. 3. Pr. (BIOL 3000 or BIOL 3003 or BIOL 3020 or FISH 3000 or AGRI 3000) and BIOL 4100 and BIOL 5800. An active-learning course to study the functional aspects of the genome emphasizing gene regulation and functional genetic variation. May count either BIOL 5850 or BIOL 6850.

BIOL 5860 BIOINFORMATICS AND GENOME ANALYSIS (3) LEC. 2. LAB. 1. Pr. (BIOL 3000 or BIOL 3003 or BIOL 3020 or FISH 3000 or AGRI 3000) and BIOL 5800. Overview of informatic approaches to biological data analysis. Students will use the scientific method to investigate key questions in model organisms through emerging 'omics fields. May count either BIOL 5860 or BIOL 6860.

BIOL 6020 EMBRYONIC DEVELOPMENT (3) LEC. 3. Pr. BIOL 4100 or BIOL 4103. Consideration of induction, constancy of the genome, pathfinding by migrating cells, morphogenetic movements, and other developmental processes.

BIOL 6050 FUNDAMENTALS OF BIOPHYSICS (2) LEC. 2. Pr. PHYS 1510 or BIOL 4100. Introduction to use of theories and methods of physics in biology, illustrated by discussion of organism size, metabolism, physiology, vision, hearing, cell cellular and molecular processes in medicine, physiology and molecular biology.

BIOL 6090 CONSERVATION BIOLOGY (3) LEC. 3. Pr. BIOL 3060. This course is an overview of ethical, economic and biological aspects of conservation biology at scales ranging from local to global. Credit will not be given for both BIOL 5090 and BIOL 6090.

BIOL 6110 PARASITOLOGY (4) LEC. 3. LAB. 3. Pr. (BIOL 1030 or BIOL 1037) or (BIOL 2500 or BIOL 2503) and BIOL 2501. Development, identification, host-parasite relationships, and medical significance of parasitic protozoa, helminthes, and arthropods that infect humans, domestic animals, and wildlife.

BIOL 6120 SYSTEMATIC BOTANY (4) LEC. 3. LAB. 3. Pr. (BIOL 1030 or BIOL 1037). Classification, nomenclature, distribution, systematics, and evolution of vascular plants.

BIOL 6130 ADVANCED PLANT PHYSIOLOGY (3) LEC. 3. Pr. BIOL 3100 and (CHEM 2030 or CHEM 2080 or CHEM 2087). Physiological and biochemical processes affecting plant growth and development including water relations, photosynthesis, respiration, and hormones.

BIOL 6131 ADV PLANT PHYSIOLOGY LAB (1) LAB. 3. Pr. BIOL 3100 and (CHEM 2081 or CHEM 2088). Laboratory exercises in plant physiology. Including water relations, metabolism, and growth and development.

BIOL 6140 PLANT ECOLOGY (4) LEC. 3. LAB. 4. Pr. (BIOL 1030 or BIOL 1037) and BIOL 3060. Departmental approval. Exploration of ecological interactions between plants and their environment. Field trips emphasize Southeastern habitats/plant examples. Includes 3-day weekend field trip.

BIOL 6150 POPULATION AND COMMUNITY ECOLOGY (3) LEC. 3. Pr. BIOL 3060. Quantitative study of natural population and ecological communities. Selected topics include density-dependent population growth, life-history theory, mark-recapture analysis, evolutionary dynamics, and species interactions especially how they relate to questions of species distributions in time and space.

BIOL 6190 CELL AND MOLECULAR SIGNAL TRANSDUCTION (3) LEC. 3. Pr. BIOL 4100 and BIOL 5220 and (CHEM 2080 or CHEM 2087). Study of cellular communication and regulation with emphasis on integration between cellular, molecular, genetic, and biochemical approaches.

BIOL 6200 CLINICAL MICROBIOLOGY (5) LEC. 3. LAB. 4. Pr. (BIOL 3200 or BIOL 3203) and BIOL 3201. Isolation, cultivation, identification, classification and pathogenesis of infectious agents with emphasis on bacteria; includes clinical materials, Eubacteria, Mycoplasmata, Rickettsiae and Spirochetes. May count either BIOL 5200 or BIOL 6200.

BIOL 6210 MICROBIAL PHYSIOLOGY (3) LEC. 3. Pr. (BIOL 3200 or BIOL 3203) and BIOL 3201 and (CHEM 2030 or CHEM 2080 or CHEM 2087). General physiology of microbial cells emphasizing fermentation, respiration, photosynthesis, nitrogen fixation, cell wall synthesis, membranes, and macromolecular synthesis.

BIOL 6220 INTRODUCTORY MOLECULAR GENETICS (3) LEC. 3. Pr. (BIOL 3000 or BIOL 3003 or AGRI 3000) and (BIOL 3200 or BIOL 3203) and BIOL 3201. Advanced principles of gene expression including replication, transcription and translation; structure and regulation of genes; detailed concepts and techniques in recombinant DNA. Credit will not be given for both BIOL 6220 and CMBL 6220.

BIOL 6230 VIROLOGY (3) LEC. 3. Pr. (P/C BIOL 5220 or P/C BIOL 6220) or (P/C BIOL 5260 or P/C BIOL 6260). Biology of viruses, including structure, entry, replication, assembly and release, pathogenesis, and epidemiology of viral infections. May count BIOL 5230 or BIOL 6230.

BIOL 6240 ANIMAL PHYSIOLOGY (4) LEC. 3. LAB. 3. Pr. BIOL 4100 or CHEM 2030 or CHEM 2070 or CHEM 2077. General overview of the function of the major systems in animals, including evolution and adaptation to specific environments.

BIOL 6250 MICROBIAL EVOLUTION AND DIVERSITY (4) LEC. 3. LAB. 2. Pr. (BIOL 3000 or BIOL 3003 or FISH 3000 or AGRI 3000) and (BIOL 3200 or BIOL 3203) and BIOL 3201. Introduction to microbial evolutionary history and theory, and survey of microbial diversity. Credit will not be given for both BIOL 5250 and BIOL 6250.

BIOL 6260 PROKARYOTIC MOLECULAR GENETICS (3) LEC. 3. Pr. (BIOL 3000 or BIOL 3003 or FISH 3000 or AGRI 3000) and (BIOL 3200 or BIOL 3203) and BIOL 3201. Molecular principles of bacterial genetics including gene structure, genetic organization, regulation of gene expression, acquisition and loss of genes leading to microbial evolution. Course will not be given for both BIOL 5260 and BIOL 6260.

BIOL 6270 HOST-MICROBE INTERACTIONS (3) LEC. 3. Pr. (BIOL 3200 or BIOL 3203) and (BIOL 3201) and (BIOL 5200 or BIOL 5260). This course will explore interactions between microbes and their hosts including plants, insects and animals. Credit will not be given for both BIOL 5270 and BIOL 6270.

BIOL 6290 CASE STUDIES IN INFECTION AND IMMUNITY (3) LEC. 3. Pr. BIOL 6500. This course is designed to enrich student understanding of infection and immunity in the context of clinical presentations. Students will learn to use deductive reasoning to narrow down potential causes of symptoms and then use scientific literature to gain a detailed understanding of the mechanisms underlying disease. Cases covered will include infectious disease, immunodeficiency, neoplasms and/or autoimmunity.

BIOL 6300 PLANT ANATOMY AND DEVELOPMENT (4) LEC. 2. LAB. 4. Pr. BIOL 6130. The study of the structure and ontogeny of plant cells, tissues, and organs. Fall.

BIOL 6320 PLANT GENE EXPRESSION (3) LEC. 3. Departmental approval. Genetic expression of genetic elements in plants from the recent literature. Credit will not be given for both BIOL 6320 and CMBL 6320.

BIOL 6330 DEVELOPMENTAL GENETICS (3) LEC. 3. Pr. BIOL 3000 or BIOL 3003 or FISH 3000 or AGRI 3000. Study of the genetics and genetic mechanisms behind developmental processes occurring in a range of species. May count either BIOL 6330 or BIOL 5330.

BIOL 6340 PROTOZOOLOGY (4) LEC. 3. LAB. 3. Pr. BIOL 3000 or BIOL 3003 or FISH 3000 or AGRI 3000. Life history, identification, cell biology, and evolution of free-living and parasitic protozoa of the major groups. Laboratory includes techniques for microscopy.

BIOL 6350 BEHAVIORAL ECOLOGY (3) LEC. 3. Pr. (BIOL 3030 or BIOL 3033) and BIOL 3060. Evolution of behaviors via natural, sexual, and kin selections; evolutionary influences on social groups, mating systems, cooperative breeding, and other interactions.

BIOL 6370 MOLECULAR ECOLOGY (3) LEC. 3. Pr. (BIOL 3000 or BIOL 3003 or FISH 3000 or AGRI 3000) and BIOL 3060 and BIOL 6800. General overview of the concepts and techniques regarding the application of molecular variation in answering questions pertaining to populations and communities of organisms. Credit will not be given for both BIOL 5370 and BIOL 6370.

BIOL 6380 GENERAL ICHTHYOLOGY (4) LEC. 3. LAB. 4. Pr. BIOL 1030 or BIOL 1037. Survey of the biodiversity of world and local fishes with an overview of ecology, behavior, biology, and conservation of fishes.

BIOL 6440 CLIMATE CHANGE PHYSIOLOGY AND EVOLUTION (3) LEC. 3. LAB. 0. Pr. BIOL 1030. This class investigates on the basic mechanisms of climate change and its impact on living organisms, focusing on their physiological, evolutionary, behavioral and molecular responses. Special interest is given to plants and marine organisms.

BIOL 6500 IMMUNOLOGY (3) LEC. 3. Pr. (BIOL 3200 or BIOL 3203) and BIOL 3201 and (BIOL 3000 or BIOL 3003 or FISH 3000 or BIOL 3020) and P/C BIOL 6501. The cellular and molecular basis of the immune response, including antigen presentation, immunogenetics, effector mechanisms, and medical immunology.

BIOL 6501 IMMUNOLOGY LABORATORY (2) LAB. 4. Pr. P/C BIOL 5500 or P/C BIOL 6500. Techniques illustrating principles of antigen-antibody interactions and their application in immunoassays, identification of leukocytes, cellular interactions, and antibody production.

BIOL 6521 GENE EXPRESSION AND RECOMBINANT DNA LABORATORY (2) LEC. 2. LAB. 4. Pr. P/C BIOL 5220 or BIOL 6220 or BIOL 5260 or BIOL 6260. Laboratory experiences demonstrating concepts and techniques in recombinant DNA.

BIOL 6525 MARINE BEHAVIORAL ECOLOGY (4) LEC. 3. LAB. 3. Study of animal behavior and the influence by and interaction with the environment and the ecological and evolutionary significance of these behaviors. Vertebrate and Invertebrate Zoology required. Taught at DISL.

BIOL 6550 NANOMEDICINE (2) LEC. 2. Pr. PHYS 1510 and CHEM 2080 and BCHE 5180. Nanomedicine is a branch of medicine that applies the knowledge and tools of nanotechnology to the prevention and treatment of disease. It involves the use of nanoscale materials, such as biocompatible nanoparticles, nanorobots and nanosensors, for diagnosis, drug delivery, and sensing in living organisms.

BIOL 6560 RNA IN BIOMEDICINE (3) LEC. 3. This course introduces the basic and novel types and functions of RNAs, as well as the integration of these molecules in biomedical contexts. Students will learn about the 'RNA World' theory, the diverse roles of RNA in cellular processes, and pathogenesis. Technological approaches to RNA research will be covered, as well as the application of this research to the diagnosis and therapy of genetic diseases.

BIOL 6600 MAMMALIAN PHYSIOLOGY (BIOMEDICAL PHYSIOLOGY) (5) LEC. 4.25. LAB. 2.75. Pr. (BIOL 1030 or BIOL 1037) or (BIOL 2500 or BIOL 2503) and BIOL 2501 and (CHEM 2030 or CHEM 2070 or CHEM 2077). An in-depth investigation of the physiology of the major mammalian organ systems.

BIOL 6650 ANIMAL BEHAVIOR (3) LEC. 3. Pr. (BIOL 1030 or BIOL 1037) and BIOL 3060. Animal behaviors, analysis of their adaptive value, development, and evolution.

BIOL 6660 FOOD MICROBIOLOGY (4) LEC. 3. LAB. 3. Pr. (BIOL 3200 or BIOL 3203) and BIOL 3201. Introduction to basic and applied microbiology in food, including how bacteria, viruses, parasites, yeasts and mold affect and in turn are affected by foods both positively and negatively. May count either FDSC 5660, BIOL 5660, FDSC 6600, or BIOL 6600.

BIOL 6700 APPLIED AND ENVIRONMENTAL MICROBIOLOGY (4) LEC. 3. LAB. 2. Pr. (BIOL 3200 or BIOL 3203) and BIOL 3201. An advanced treatment of bacteria comprising the Kingdom Prokaryotae, emphasizing ecology, systematics, interrelationships, geochemical cycles, and bioremediation.

BIOL 6740 HERPETOLOGY (4) LEC. 3. LAB. 3. Ecology and evolution of living amphibians and reptiles of the world.

BIOL 6750 ORNITHOLOGY (4) LEC. 3. LAB. 3. Pr. (BIOL 3030 or BIOL 3033) and BIOL 3060. Departmental approval. An intensive investigation of the current literature and relevant research dealing with birds.

BIOL 6760 MAMMALOLOGY (4) LEC. 3. LAB. 3. Characteristics, origins, ecology, behavior, reproduction, physiology, and diversity of mammals. Labs include survey or current literature, fieldtrips, data analysis and report preparation.

BIOL 6800 INTRODUCTION TO COMPUTATIONAL BIOLOGY (3) LEC. 2. LAB. 1. Pr. STAT 2510 or STAT 2513. Overview of computational approaches to the analysis of biological data. Students will learn basic statistical and graphical analysis. May count either BIOL 5800 or BIOL 6800.

BIOL 6850 FUNCTIONAL GENOMICS (3) LEC. 3. Pr. (BIOL 3000 or BIOL 3003 or BIOL 3020 or FISH 3000 or AGRI 3000) and BIOL 4100 and BIOL 5800. Active-learning course to study the functional aspects of the genome emphasizing gene regulation and functional genetic variation. May count either BIOL 5850 or BIOL 6850.

BIOL 6860 BIOINFORMATICS AND GENOME ANALYSIS (3) LEC. 2. LAB. 1. Pr. (BIOL 3000 or BIOL 3003 or BIOL 3020 or FISH 3000 or AGRI 3000) and BIOL 5800. Overview of informatic approaches to biological data analysis. Students will use the scientific method to investigate key questions in model organisms through emerging 'omics fields. May count either BIOL 5860 or BIOL 6860.

BIOL 7035 MARINE ANIMAL NEUROBIOLOGY (4) LEC. 30. LAB. 60. Pr. BIOL 1020 or BIOL 1023 and BIOL 1021 and BIOL 1030 and BIOL 1031 and BIOL 4100. Biophysical neurobiology of marine invertebrates and vertebrates. Lectures and labs on neurons, glia, resting and action potentials, synapses, neurotransmitters, muscle contraction, sensorimotor integration, computer simulation and extensive technical methods: extra-, intracellular, patch recording, molecular neuroimmunology, confocal fluorescence microscopy. Evening/Saturday classes.

BIOL 7075 INTRODUCTION TO OCEANOGRAPHY (4) LEC. 30. LAB. 60. Pr. MATH 1150 or MATH 1153 and CHEM 1030 or CHEM 1033 or CHEM 1110 or CHEM 1117 and PHYS 1500 and BIOL 3040. An in-depth examination of the physics, chemistry, geology and biology of the oceans. Lectures cover the interrelationships of these components to each other. Field and lab work will introduce students to research on oceanographic processes of the Gulf of Mexico. Taught only at Dauphin Island Sea Lab (DISL).

BIOL 7170 POPULATION GENETICS (3) LEC. 3. Pr. BIOL 3000 or BIOL 3003 or FISH 3000 or AGRI 3000. Examination of the theories relating to maintenance of variation in natural populations of plants and animals.

BIOL 7180 SCRIPTING FOR BIOLOGISTS (3) LEC. 2. LAB. 1. Pr. BIOL 6800 and STAT 7000. or Instructor approval. A hands-on course to teach students concepts, applications, and best practices of utilizing computer scripting languages in the life sciences.

BIOL 7200 EVOLUTIONARY BIOLOGY (3) LEC. 3. Pr. (BIOL 3000 or BIOL 3003 or FISH 3000 or AGRI 3000) and (BIOL 3200 or BIOL 3203) and BIOL 3201. Topics of current interest in evolution. Readings and presentation required.

BIOL 7210 EVOLUTIONARY ECOLOGY (3) LEC. 3. The Evolutionary Ecology research paradigm is a key approach to the study of behavioral, evolutionary, and ecological processes in the context of realistic or natural environmental settings. We will investigate a number of current "hot" research topics in Evolutionary Ecology, discuss the leading hypotheses being developed and how they are cast as statistica.

BIOL 7250 PRACTICAL DATA ANALYSIS AND COMPUTATION FOR THE LIFE SCIENCES (3) LEC. 2. LAB. 3. Pr. STAT 7020 or WILD 7150. or equivalent; or permission of the instructor. Data from the life sciences and advanced statistical techniques for data analyses and computation are brought together through a cross-fertilization of graduate student students in the life sciences, statistics, and mathematics. Focus on production of publication-quality research on student-identified projects. May count either BIOL 7250 or STAT 7250.

BIOL 7290 EVOLUTIONARY GENETICS (3) LEC. 3. Pr. (BIOL 3000 or BIOL 3003 or FISH 3000 or AGRI 3000) and BIOL 6170. Departmental approval. The role of population processes as mechanisms for evolution; and evolution at the molecular level. Credit will not be given for both BIOL 7290 and CMBL 7290.

BIOL 7440 ADVANCED CELL BIOLOGY (3) LEC. 3. Pr. BIOL 4100. Examination of current areas of research in cell and developmental biology by directed reading and discussion. Credit will not be given for both BIOL 7440 and CMBL 7440.

BIOL 7470 GENOME EVOLUTION (3) LEC. 3. Provides a broad evolutionary perspective on the origin, composition, and architecture of eukaryotic genomes. Students will participate in a literature-driven discussion format and will complete weekly writing assignments.

BIOL 7485 ADVANCED MARINE ECOLOGY (4) LEC. 2. LAB. 2. Pr. (BIOL 1020 or BIOL 1023) and BIOL 1021 and BIOL 1030 and BIOL 1031 and (BIOL 3060 or BIOL 3040). An advanced course open only to MS or PhD students. Interactions between marine organisms and the environment. In-depth discussion of ecological theory with emphasis on the latest research, using extensive reference to the literature. Lecture, lab and overnight field trips.

BIOL 7490 PHYSIOLOGICAL ECOLOGY (3) LEC. 3. Pr. BIOL 3060. A study of the physiological adaptations that allow animals to survive in unusual environments. A course in ecology required.

BIOL 7500 STRESS PHYSIOLOGY (2) LEC. 2. Pr. (BIOL 4100 or BIOL 5240 or BIOL 5600). This course is a discussion-based course focusing on physiological stress responses at various levels of organization and communication among them, from molecules, cells, organ, to whole organism.

BIOL 7510 NATURAL HISTORY MUSEUM PRACTICUM (1) LAB. 3. Practical methods in natural history museum curation. Students will assist in curating collections at the Auburn University Museum of Natural History. Course may be repeated for a maximum of 4 credit hours.

BIOL 7525 MARINE INVERTEBRATES (4) LEC. 2. LAB. 2. Morphology, natural history, physiology, evolution and ecology. Students examine modern literature and develop an advanced presentation on invertebrate biology involving problem solving in an area such as sensory biology, molecular evolution or management. Term paper, classroom presentation and lecture.

BIOL 7540 PROFESSIONAL ASPECTS OF BIOLOGY (3) LEC. 3. Departmental approval. Instruction on practical aspects of a career in biological sciences.

BIOL 7550 PHYSIOLOGICAL ECOLOGY OF REPRODUCTION (3) LEC. 3. This course focuses on physiological ecology of reproduction by identifying key physiological mechanisms linking the environmental change, reproductive constraints, and reproductive performance and describing how variation in reproductive performance are impacted by ecological and evolutionary processes.

BIOL 7800 COMPUTATIONAL BIOLOGY COLLOQUIUM (2) LEC. 0. LAB. 0, LEC. 0. Pr. (BIOL 7180). Oral presentations and discussions of recent scientific publications, challenges, and opportunities within the field of computational biology. Hands-on experience in data analysis and presentation.

BIOL 7880 MITONUCLEAR ECOLOGY (2) LEC. 2. Pr. BIOL 3030. This course will explore the implications of the necessity of mitonuclear coadaptation for the evolution of quintessential eukaryotic characteristics, including sex and two sexes, a sequestered germ line, senescence, discrete species, mate choice, and adaptation. Permission of instructor may be needed.

BIOL 7950 MASTERS THESIS SEMINAR (1) LEC. 1. SU. Departmental approval. Oral presentation and discussion of research in the field of specialization. Course may be repeated for a maximum of 2 credit hours.

BIOL 7960 SPECIAL PROBLEMS (1-4) DSL/LEC. Pr. P/C BIOL 6220. Oral presentation and discussion of recent scientific publications from a selected area molecular biology. Credit will not be given for both BIOL 7960 and CMBL 7960. Course may be repeated for a maximum of 4 credit hours.

BIOL 7970 SPECIAL TOPICS (1-4) AAB. Departmental approval. Instruction and discussion in a selected current topic in botany, microbiology, molecular biology, or zoology. A different topic for advanced study will be selected each semester this course is offered. Course may be repeated for a maximum of 8 credit hours.

BIOL 7990 RESEARCH AND THESIS (1-10) MST. Course may be repeated with change in topic.

BIOL 8950 DOCTORAL SEMINAR (1) SEM. 1. SU. Oral presentation and discussion of research in the field of specialization. Course may be repeated for a maximum of 3 credit hours.

BIOL 8990 RESEARCH AND DISSERTATION (1-10) DSR. Course may be repeated with change in topic.