Course Descriptions for BIOS Project Labs (BIOS 4590) and Special Topics (BIOS 48X1, 48X2, 48X3)

Summer 2025 Special Topics

BIOS 4803 ES Nutrition (Rosbruck)
ASYN
Prerequisite: APPH 1040/1050/1060
Credits: 3
Description: The course is a study of human nutrition as an applied science and covers nutrition physiology: metabolism, energy production, biochemical aspects, role of nutrients, weight control mechanisms, fitness and consumerism.

Fall 2025 Special Topics and Project Lab Descriptions

BIOS 4801 L1 4801 Biological Data Science (Richards)
Prerequisite with concurrency: BIOS 4401
Credits: 1
Description: Data science and statistical programming are tools used every day by modern biologists. In this lab course you will learn how to analyze all sorts of biological data using these tools in the popular R programming environment. By the end of the course, you will have completed a research project using a dataset of your choice and will have a digital research poster, and professional github repository to show for it! Lab periods will be made up of a combination of coding skill workshops, data science and statistical analysis activities, and research project work. No prior coding or R experience are required for this course.

BIOS 4803 BAL Integrative Physiology (Balog)
Prerequisite: BIOS 3755 or BMED 3100
Credits: 3
Description: This course will provide students with a more sophisticated understanding of how organ systems interact to maintain homeostasis than is provided by the pre-requisites.

BIOS 4803 DIC Geomicrobiology (DiChristina)
Prerequisites: BIOS 3380 or EAS 3620
Credits: 3
Description: Geomicrobiology describes the interactions between microorganisms and the geosphere and bridges the gap between geochemistry and environmental microbiology. Fundamental processes such as microbial physiology and genetics, geochemical controls on microbial diversity and activity, microbiological controls on geochemical reaction networks, redox and acid-base geochemistry, biogeochemical cycles, climate change, and evolution will be examined.

BIOS 4803 GRE Urban Ecology (Green)
Credit hours: 3
Prerequisite: BIOS 2300 or BIOS 2310
Description: Interested in learning more about how urbanization is affecting plant and animal life? With more than half of the global population living in cities, understanding our impact on nature is increasingly important to study. Urban ecology explores the interactions of nature and people in city settings, including the legacy of environmental racism. We will consider the role of nature on our supply of healthy air, water and food, as well as the human impact of climate change, pollution, and urban development on biodiversity. The course will include a research project on green infrastructure in Atlanta, with field trips to several locations around the city.

BIOS 4803 FEL Endocrinology (Felner)
Prerequisite: BIOS 3755
Credit hours: 3
Description: This 3-unit course is designed for students interested in learning human endocrinology at the pathophysiologic level and considering a career in healthcare/medicine. The focus will be on how a clinician (i.e., endocrinologist) identifies a change in a patient's physiologic endocrine (hormone) system and then evaluates the patient (by collecting history, performing a physical exam, and ordering laboratory and/or imaging studies) to generate a differential diagnosis (a list of the potential causes) and eventually, makes a diagnosis and develops a treatment plan. The conditions that will be covered include disorders of glucose homeostasis (diabetes mellitus and hypoglycemia), thyroid disorders (hypothyroidism and hyperthyroidism), adrenal gland disorders (insufficiency and excess states), disorders of the pituitary gland (deficiency and excess states), and metabolic bone disease (vitamin D deficiency), differences in sexual

differentiation. As this course will focus on pathologic endocrine conditions, a strong working knowledge in human endocrine physiology is recommended.

BIOS 4803 ROS Nutrition (Rosbruck)
ASYN
Prerequisite: APPH 1040/1050/1060
Credits: 3
Description: The course is a study of human nutrition as an applied science and covers nutrition physiology: metabolism, energy production, biochemical aspects, role of nutrients, weight control mechanisms, fitness and consumerism.

BIOS 4803 SHI Muscle Structure and Plasticity (Shinohara)
Prerequisites: BIOS 2500 or BIOS 3753 or BIOS 3755 or BMED 3100
Credits: 3
Description: Human movement is produced by the contraction of the skeletal muscles, which have unique structure, function, and plasticity. Contraction of the muscles is controlled by neural activity, and motor function is determined by the mechanics of the structures. Skeletal muscles are adaptable due to increased and decreased use. Students will learn these essential and inter-related aspects of skeletal muscles and related research through lecture, critical thinking, paper reading, and discussion. A comprehensive understanding of the muscle structure and plasticity will help apply the knowledge to various fields including neuromotor rehabilitation, orthotics/prosthetics, medical robotics, exoskeleton, human augmentation, and athletic training.

BIOL 4590 – Research Project Lab section A and AL (Jiang)
Prerequisite: SR standing
Corequisite: BIOS 4460 Communicating Biological Research
Credits: 3
Description: Students will gain experience in designing, implementing, and communicating a biology research project, and practical training in modern approaches for biological research. This section will have a scientific theme of ***Causes and Consequences of Biodiversity***. Students will design and run projects to explore how various ecological factors influence one or multiple dimensions of biodiversity (e.g., genetic diversity, species diversity, functional diversity, phylogenetic diversity) and/or how changes in biodiversity influence ecological properties at the species, community, or ecosystem levels.

BIOS 4590 – Research Project Lab section B and BL (Lobachev)
Prerequisite: SR standing
Corequisite: BIOS 4460 Communicating Biological Research
Credits: 3
Description: This course is designed for upper-level undergraduate students interested in learning modern molecular biology techniques and applying them to study biological processes in model organisms. No previous experience working in the lab is required. Modern approaches and tools used for modification of genetic information will be presented. As a result of this training, students will learn how to work with E. coli and baker yeast, to carry out plasmid and genomic DNA extractions, to design and set up PCR reactions, to do restriction digestion analysis, to clone genes, to create mutation alleles on plasmids and in the chromosomal genes, to map mutations using next-generation sequencing, and to analyze the effect of these mutations in vivo. The course will include traditional lectures, laboratory time and individual projects. During individual projects students working as a team will carry out their own investigation of the effect of mutations in particular genes on chromosomal metabolism. The course is thus an essential resource for students of colleges of science who seek to expand their knowledge of modern molecular genetics tools.