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

Summer 2026 Special Topics

BIOS 4803 ES Nutrition (Rosbruck)
ASYN
Prerequisite: APPH 1040/1050/1060
Credit hours: 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 2026 Special Topics and Project Lab Descriptions

BIOS 4803 A Virology (Instructor TBD)
Credit hours: 3
Prerequisite: BIOS 2600 or BIOS 2610 or BIOS 3450
Description: This advanced virology course examines how viruses replicate, evolve, and cause disease, with emphasis on molecular mechanisms, genomic strategies, and patterns of infection and pathogenesis. Designed for advanced undergraduates and graduate students, it equips learners with the analytical tools needed to critically evaluate virological research across basic science, public health, and medical contexts.

BIOS 4803 FEL Endocrinology (Felner)
Prerequisite: BIOS 3755 or BMED 3100
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 PRI Human Sensorimotor Deficits (Prilutsky)
Prerequisites: BIOS 1107 or BIOS 1207
Credits hours: 3
Description: The course provides in-depth review of neurophysiological mechanisms and biomechanical consequences of common human motor disorders and current therapeutic interventions. Sensorimotor conditions reviewed in the course include limb loss and prosthetic and orthotic interventions, peripheral nerve neuropathies and traumatic injury, spinal cord injury, and deficits of cortical motor control. Students will learn about the current understanding of causes and mechanisms of each condition, how each condition affects human motion and its control, and what therapeutic interventions are available for treatment or mitigation.

BIOS 4803 ROS Nutrition (Rosbruck)
ASYN
Prerequisite: APPH 1040/1050/1060
Credit hours: 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.

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BIOS 4813 MGL and MGU Biodiversity on a Changing Planet (McGuire)
Prerequisites: BIOS 1107 or BIOS 1207 or BIOL 1510 or BIOL 1511or EAS 1600 or permission of the instructor
Credit hours: 3
Description: Why do plants and animals live where they do and how will they respond to changing environmental conditions? This course will explore scientific approaches to untangle the dynamic interactions between geologic features, climate, and biodiversity. In it, we will use real data to examine the fundamental principles of landscape ecology and biogeography and their applications to conservation practices. The course will consist of 2 hours of lectures and 3 hours of lab per week. Students will be evaluated on lab write-ups that will integrate concepts from lectures that are then demonstrated through computational labs. In these labs, we will practice the techniques used to map and analyze patterns of biodiversity. Through this course, students will gain marketable GIS skills while simultaneously learning how to formulate spatial hypotheses about ecological processes. At the end of the course, students will develop independent projects, in which they formulate hypotheses about spatial interactions between abiotic and biotic factors and test those hypotheses using real data.

BIOS 4590 – Research Project Lab section A and AL (Agarwal)
Permit should be requested ASAP and no later than the Tuesday before the close of phase II: https://forms.office.com/r/pVsQwqPwVU
Prerequisite: SR standing
Corequisite: BIOS 4460 Communicating Biological Research
Credits: 3
Description: This course is designed to offer a hands-on approach to investigate the microbiome (community biology) and metabolome (pharmaceutical chemistry) from marine sponges, one of the most ancient living organisms on earth which offer an unparalleled biological and chemical diversity. The course will offer broad training in biological and chemical sciences. As a result of this training, students will learn how to do taxonomic assignments, work with E. coli, carry out genomic DNA extractions, design and set up PCR reactions, clone genes, and to do community analyses using genomic tools. The students will also learn mass spectrometry for metabolomics and bioassays for antibiotic discovery. The course will include traditional lectures, laboratory time, and individual projects. During individual projects, students working in teams of two will carry out their own investigations and present their findings via in-class presentations. A manuscript will be developed cataloging the learning outcomes and findings from this course. The course is thus an essential resource for students who seek to expand their knowledge of modern molecular biology and chemistry tools.

BIOS 4590 – Research Project Lab section B and BL (Lobachev)
Permit should be requested ASAP and no later than the Tuesday before the close of phase II: https://forms.office.com/r/pVsQwqPwVU
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.