

BIOS Special Topics Electives and Project Labs

Special Topics – Spring 2020

BIOS 4801 History of Neuroscience (Nichols)

Meets: T 3:00 pm-03:50 pm, Location TBA

Prerequisites: Permission of instructor

Credit hours: 1

Description: The purpose of this seminar is to learn and explore the history of neuroscience from a perspective of reading classic papers that have evolved. The history of neuroscience can be traced back to at least the time of Rene Descartes and has a history of seminal papers and readings in behavioral, cellular, physiological, computational and cognitive domains. This class will utilize readings of various classical papers, readings of Nobel lectures and chapters to demonstrate the evolution of the field.

BIOS 4803 Neuromotor Physiology (Balog and Nichols)

Meets: TR 1:30 pm-2:45 pm, Location Fourteenth Street 1253

Prerequisites: APPH/BIOL 3755 Human Physiology or BME 3100 Systems Physiology

Description: This course focuses on the function and adaptations of the skeletal, nervous and muscular systems. Students will gain understanding of the normal physiological responses of these systems and how each adapts to perturbations such as physical and psychological stressors such as loading and pathology. Interactions among the various systems and their plasticity will be emphasized.

BIOS 4803 Nutrition (Rosbruck)

Meets: Asynchronously online

Prerequisite: APPH 1040/1050

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.

BIOS 4813 MGU Biodiversity on a changing planet (McGuire)

Meets: MW 11:15 am-12:05 pm and F 11:15 am-2:00 pm, Cherry Emerson 320 and CULC 483

Prerequisites: BIOS 1510 or 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.

Biol 4814/ PHYS 3250 Physics of Living Systems (Goldman)

Meets: Tues, Thurs 1:30-2:45, Wed 1:55-4:40; Boggs 1-17

Prerequisite: PHYS 2212

Credit hours: 4

Description: This hands-on survey course in the physics of living systems features multiple faculty from Physics and Biological Sciences to cover measurement, mechanism & modeling in living systems, evolution of life on earth, statistical mechanics and fluctuations of biomolecules, nonlinear ecological dynamics of groups of organisms, the emergence of complexity from “simple” parts, and the dynamical systems applied to locomotion. Each of these modules spans a 2 week block: Lectures in the 1st week (with a “meet the expert” lecture on the Thursday), and hands-on laboratory experiments in the 2nd week.

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Project Labs – Spring 2020

BIOS 4590 Research Project Lab (Schmidt-Krey) – Molecular and Structural Biology Research Using Bioinformatics and Computational Biology Approaches

Meets: MW afternoons in Cherry Emerson

Credit hours: 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 Molecular and Structural Biology Research Using Bioinformatics and Computational Biology Approaches. Following initial experiments to obtain hands-on knowledge and training in methods, students will design and carry out a research project, communicating the overall goal and results in an end-of-semester manuscript and poster presentation, as well as in the Communicating Biological Research class.

BIOS 4590 Research Project Lab (Hu and Jiang) – How Fire Ants Cooperate

Meets: TR afternoons in Boggs 1-77

Credit hours: 3

Description: How do animals work in a team? In this experimental project laboratory, students will answer this question by working with a champion social insect, fire ants. Ants are unique among cooperative animals in that they can link their bodies together to build smart adaptable structures such as ladders, bridges, tents and rafts. Students will gain proficiency in the use of time-lapse photography to visualize the construction of these built structures and the use of video analysis and machine learning to track the ants. This year, we also be focusing on metabolism of ants, measured with carbon dioxide sensors. We may construct obstacle courses for the ants, but no prior engineering knowledge is required for the course.