Special Topics Course Descriptions (APPH or BIOL 4801, 4802, 4803)

Fall 2017

BIOL 4803 - Community Ecology (Jiang)
Meets: TR 4:30-5:45
Prerequisites: BIOL 2335 or equivalent
Credits: 3
Course description: This is a two credit course suitable for both undergraduate and graduate students interested in learning more about community ecology beyond those covered in the sophomore-level General Ecology. We will examine species interactions and their roles in regulating the structure and dynamics of ecological communities. Classroom discussion of readings from the primary literature, including both classic and recent scientific articles, will be a major component of the course. The main goal of this course is to introduce you to important concepts and issues in community ecology; by the end of the course you should have a basic understanding of the current knowledge on how ecological communities operate. We will not cover each and every aspect of community ecology, but instead focus on selected issues and questions that have had large influences in the field. Another goal of this course is to practice and refine your skills in critically reading and effectively presenting scientific papers.

BIOL 4803 - Human Evolutionary Genomics (Lachance)
Meets: MW 3:00-4:15
Prerequisite: BIOL 1510/1511
Credits: 3
Course description: In this grad/undergrad course, students will discuss primary literature and use computational tools to investigate how evolution has shaped global patterns of human genetic variation. This class integrates genetics, evolutionary biology, anthropology, computation biology, and bioinformatics. During the three weekly class meetings, time will be spent on lecture to learn concepts of evolutionary genomics, on discussion of cutting edge research in human genomics, and on exercises where computation tools are applied to real world datasets.

BIOL 4803 - Programming in the Biological and Health Sciences (McGrath)
Meets: TR 3:00-4:15
Prerequisite: BIOL 1510 or BIOL 1511 or equivalent
Credits: 3
Course description: Computational skills has become an essential tool for biological research. This lecture course will introduce students to the process of coding using the Python scripting language. We will then apply these skills towards fundamental biological issues, including collecting, analyzing, and visualizing biological data sets, working with genomic, genetic variation, and protein sequences, and modeling biological processes. Students will become familiar with common open source Python modules, many that were designed by biologists. Students will leave this class with the ability to customize their analysis of large-scale datasets common to biological research today.

APPH 4803 - Special Topics: Human Motor Control (Prilutsky)
Meets: MW 3:00-4:15
Prerequisite: BIOL 1510 or BIOL 1511 or equivalent
Credits: 3
Course description: The course provides in-depth review of mechanical and physiological properties of skeletal muscles, bones and inertial properties of body segments; describes kinematics and kinetics of human motion; gives basic information about anatomy and physiology of the nervous system and discusses how human movements are planned, executed and corrected by the nervous system. The theoretical concepts are illustrated by practical examples from Rehabilitation, Robotics, Prosthetics, Neuroscience and Comparative Zoology. The course consists of two parts. The first part is a series of lectures on Mechanical Properties of Human Body, Human Motion, and Neurophysiological Basis of Human Motor Control. The second part of the course will involve a problem-based learning during which the students work on developing a neuromechanical model and computer simulations of a selected motor control problem using software AnimatLab.

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Research Project Lab (Schmidt-Krey)
Meets: M 12:20-1:10, M 1:25-4:10; W 1:25-4:10
Prerequisite: SR standing
Co-requisite: BIOL 4460 Communicating Biological Research
Credits: 3
Course description: 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. Students may choose a project that falls within their own biological interests.

Research Project Lab (Lobachev)
Meets: T 12:00-12:50, T 1:30-4:15, R 1:30-4:15
Prerequisite: SR standing
Co-requisite: BIOL 4460 Communicating Biological Research
Credits: 3
Course description: In this section, students will learn modern molecular biology techniques and apply 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 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.