Fall 2018

Special Topics Electives

BIOL 4803 CHA – Kinesiological Basis of Human Movement (Chang)
Meets: MWF 10:10 am-11:00 am
Prerequisites: BIOL 1510/1511 or 1520/1521
Credit hours: 3
Description: Study of human and non-human animal movement from a physiological perspective with special emphasis on the neuromuscular, biomechanical, and energetic causes and consequences related to locomotion. Basic principles will be covered with application to the broad spectrum of physical performance from disability and rehabilitation to elite athletic performance.

BIOL 4803 GAR – Physiological Adaptation to Changing Climates (Garton)
Meets: MWF 11:15-12:05 pm
Prerequisites: BIOL 1520/1521 or EAS 1600
Credit hours: 3
Description: A fundamental driver of biological evolution is "The Environment," an ever changing and often unpredictable force of natural selection which at times favors certain specific physiological / morphological phenotypes, at other times making those same phenotypes a significant handicap. Adaptations for spatially and temporally variable environments have historically attracted much attention and led to creation of specific classic fields of study, including Environmental Physiology, Evolutionary Genetics, Physiological Ecology and Comparative Physiology. The relevance of these "classic" fields of study has risen with the advent of anthropogenic-driven global climate change. One premise of the physiological and genetic adaptations observed in animals is that these processes developed over long (evolutionary) time scales, in contrast to present rapid change in global climate (on the order of decades). An obvious practical question is "What are the consequences for natural populations confronted with a rapidly changing climate?" The primary goal of this course is to study how environment and natural selection interact over spatial and temporal scales, the resulting adaptations within animal populations evolving under such interactions, and to further apply this knowledge for making predictions regarding long term consequences of current rates of global climate change. Format: Three one-hour lecture sessions per week including formal lecture, group discussion of current literature and a student-led course project.

BIOL 4803 PRI - Special Topics: Human Motor Control (Prilutsky)
Meets: MW 3:00-4:15
Prerequisite: BIOL 1510/1511
Credits: 3
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.

Project Labs

BIOL 4590 A – Research Project Lab (Jiang)
Meets: M 12:20-1:10, MW 1:25-4:10
Prerequisite: SR standing
Corequisite: BIOL 4460 Communicating Biological Research
Credits: 3
Description: Causes and Consequences of Biodiversity
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.

BIOL 4590 B – Research Project Lab (Lobachev)
Meets: T 12:00-12:50, TR 1:30-4:15
Prerequisite: SR standing
Corequisite: BIOL 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 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.