

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

Spring 2025 Special Topics and Project Lab Descriptions

BIOS 4083 BAL Neuromotor Physiology (Balog)

Prerequisites: BIOS 3755 or BME 3100

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

BIOS 4083 HAR Sexual Differentiation in Humans (Harrison)

Prerequisites: BIOS 2600/2610 or BIOS 3450

Description: This active-learning course is focused on developmental biology, where we will explore the molecular, genetic and cellular underpinnings of sexual differentiation in humans. We will explore what biological sex means in a human context and discover how the earliest molecular signals eventually lead to the formation of primary and secondary sex characteristics.

BIOS 4803 ROS Nutrition (Rosbruck)

ASYN

Prerequisites: APPH 1040/1050/1060

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 Aging Movement Control (Shinohara)

Prerequisites: BIOS 1108/1208, BIOS 2500, or BMED 3100

Description: Aging affects the neuromuscular and motor control systems, leading to declines in movement function and quality of life. This course explores the physiological, biomechanical, and neural changes in motor control that occur with aging. Students will engage in lectures, discussions, paper readings, and hands-on activities to understand the mechanisms behind movement decline, as well as interventions aimed at maintaining or improving motor function in older adults. Through critical analysis of current research, students will gain insight into the factors contributing to movement dysfunction and rehabilitation strategies in aging populations. This course is relevant to students interested in gerontology, physical therapy, occupational therapy, biomechanics, rehabilitation, and sports science.

BIOS 4590 A & AL Research Project Lab (Spencer)

Description: This project lab focuses on the ecological genetics of living systems on or near the Georgia Tech campus. Students will develop and test hypotheses about the ecological system under study using genetics techniques including PCR, RT-PCR, and sequencing to screen samples to detect different genetic variants. Past study systems have included painted-lady butterflies and honeybees. This year we plan to work on projects centered on the Kendeda living building.

BIOS 4590 B & BL Research Project Lab (Storici)

This course is in person. The lecture part and the laboratory/data analysis's part will require in-person attendance on the Georgia Tech campus.

Description: This course is designed for upper-level undergraduate students interested in learning molecular biology and basic bioinformatics data analysis techniques and applying them to study biological processes in cells or organisms of choice. No previous experience working in the lab is required. State of the art approaches and tools used for genetic engineering and manipulation of genetic information will be presented. As a result of this training, students will learn basic procedures to work with baker yeast, carry out genomic DNA and RNA extractions, design and set up PCR reactions, DNA fragmentation, preparation of genomic libraries for high-throughput sequencing, agarose and pulse field gel electrophoresis, and basic bioinformatics procedures for

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analysis of high-throughput sequencing data. This year's course will focus on studying the composition and patterns of ribonucleotide incorporation in the genomic DNA of budding yeast grown in the presence of a DNA synthesis inhibitor. The course will include traditional lectures, laboratory time and individual projects. During individual projects students working as a team in a pair will conduct their own investigation studying composition, distribution, and patterns of ribonucleotide presence in genomic DNA of the chosen yeast genotype and growth conditions. The course is thus an invaluable resource for students who seek to expand their knowledge of modern biology tools.

BIOS 4590 C & CL Research Project Lab (Skolnick)

Description: This project lab will cover all aspects of the drug discovery process in a virtual context. Each participant will be expected to identify a disease, the protein target(s) associated with the disease, and then predict possible approaches to treat the disease. Then, an animal or organoid model of the disease must be selected. Next, a patient population suitable for Phase I-III clinical trial must be identified and good outcomes defined.