

Spring 2019 – Special Topics Electives

BIOL 4803 DEC – Human Pathology (Decker)

Meets: TR 4:30 pm-05:45 pm

Prerequisite: BIOL/APPH 3753

Credit hours: 3

Description: This course will focus on linking our understanding of normal morphology to the abnormal. Once the leap is made, to understanding abnormal structure, we can see how treatments of certain diseases and disorders are possible. The course provides a comprehensive overview of both general and systemic anatomic human pathology. Course will focus on select diseases, their etiology, pathogenesis, morphologic changes, clinical manifestations and the current effective treatments offered.

BIOL 4803 GIB – Health, Genes, and Society (Gibson)

Meets: TR 03:00 pm-04:15 pm

Prerequisite: BIOL 1510/1511

Credit hours: 3

Course Description: The objective of this course is to provide students with an alternative perspective on health and wellness to that offered by standard cell/molecular biology or engineering classes. The emphases will be on evidence-based changes in healthcare practices, where relevant, discussing implications of contemporary genetics. A large component of the course will be student-driven projects addressing contemporary healthcare needs chosen by small teams. There are three sub-sections. (1) Health care models from epidemiology to molecular medicine: introduction to health and wellness, including comparative practices, the impact of socioeconomic status on health outcomes, and race and gender disparities; the epidemiological transition, and contrasting the roles of medicine and international public health programs for global health. (2) Health behavior and its impact on well-being, focusing on smoking, drinking, eating, exercise, and stress reduction. (3) Personalized medicine, examining the impacts of social media and predictive health initiatives (including the Emory-GT Center for Health Discovery and Well Being) and discussing the ethics and practicality of parental choice in reproduction.

BIOL 4803 LAC – Human Evolutionary Genomics (Lachance)

Meets: MW 03:00 pm-04:15 pm

Prerequisite: BIOL 1510/1511

Credit hours: 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 NL – BIO Impacts of Clim. Chg: Eco to Enzy. (Lopanik)

Meets: TR 03:00 pm-04:15 pm

Prerequisites: BIOL 1510/1511 or EAS 1600 or EAS 1601

Credit hours: 3

Description: This special topics course is designed to provide students a working knowledge of the chemical and physical drivers of climate change, and to better understand how biological systems respond to those changes. We will focus on multiple levels of biological organization, including ecosystems, communities, populations, individuals, cellular machinery, and enzymes. In this course, students from the Schools of Earth and Atmospheric Sciences and Biological Sciences will collaborate to present cutting edge and impactful research to the class on topics of their choosing. In addition, students will develop their writing skills through draft revisions of a research paper.

BIOL 4803 MEN – Conservation Biology (Mendelson)

Meets: TR 01:30 pm-02:45 pm

Prerequisite: BIOL 2335/2337

Credit hours: 3

This course explores major approaches in conservation biology, the ecological principles behind conservation initiatives, and the interdisciplinary challenges arising from social, political and economic factors in conservation efforts. The goal of this class is to explore conservation issues from different levels, ranging from genetics to ecosystems and from small to broad scales. Students will gain competency in analyzing primary literature, identifying uncertainties in conservation science, and discussing the tools needed to implement effective conservation strategies.

BIOL 4803 LOB – Chromosome Bio & Human Disease (Lobachev)

Meets: TR 12:00 pm-01:15 pm

Prerequisites: BIOL 1510/1511

Credit hours: 3

Course Description: This course is designed for graduate and upper-level undergraduate students interested in understanding fundamental mechanisms governing metabolism of eukaryotic chromosomes. Chromosomes are dynamic cellular structures that carry genetic information; they combine the stability required for inheritance and the flexibility required for change. How chromosomes are organized, compacted, segregated, replicated, repaired, mutagenized and rearranged will be discussed in detail. The departure from normal chromosome number and arrangement is underlying molecular feature of many cancers and hereditary diseases in humans. Each topic in the class will include an example of a disease that results from malfunctioning of chromosomal maintenance. In addition, modern approaches and tools developed based on the fundamental knowledge of molecular biology and currently available for modification of genetic information on chromosomes will be presented. The course will include traditional lectures and seminars where research papers will be presented by the enrolled graduate students. The course is thus an essential resource for students of colleges of science and engineering studying cell, molecular, and developmental biology, as well as biochemistry, genetics, and all who seek to expand their knowledge of modern genomics and molecular genetics.

BIOL 4803 RAT – Origins of Complex Life (Ratcliff)

Meets: MWF 10:10 am-11:00 am

Prerequisites: BIOL 1510/1511

Credit hours: 3

Course Description: ‘Origin of Complex Life’ is an active-learning class where students will gain a comprehensive overview of how complex life arose on Earth. Life on Earth started out simple (not even cellular!), and some lineages progressively evolved to be larger and more complex. The world we live in today looks the way it does because of a few key evolutionary steps, termed “major transitions in evolution”, in which more complex organisms evolved from consortia of simpler ancestors. For example, eukaryotic cells arose from a symbiosis between prokaryotes, and multicellular organisms evolved from single-celled ancestors. In this class you will learn the both how major transitions can occur in evolution and what we know about how complex life has evolved on Earth. Students will learn to read, analyze and discuss scientific papers and learn how to use simple mathematical models to make inference in to evolutionary processes.

BIOL 3803 ROS – Nutrition (Rosbruck)

Meets: Asynchronously

Prerequisite with concurrency: APPH 1050/1050

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.

Project Labs

Any student with senior standing can register for project lab (BIOL 4590), one of three course options to complete the senior research experience. The alternative courses to complete Senior Research are BIOL 4690 Independent Research Project or BIOL 4901 Honors Research Thesis in a faculty PI's lab.

BIOL 4590 B – Molecular Engineering, Genome Stability, and Human Disease (Storici)

Ribonucleotides in DNA constitute the most abundant abnormal nucleotides found in genomic DNA of cells with over one million in human DNA. We will engineer chromosomal DNA of yeast cells to introduce mutations in the RNase H2A gene that are associated with the neurological syndrome of Aicardi Goutières (AGS). We will then extract genomic DNA from these cells to build genomic libraries of ribonucleotide incorporation in DNA, perform high throughput Illumina sequencing and conduct computational analyses of the sequencing data to determine the spectra of ribonucleotide incorporation in the DNA of the AGS mutants.

BIOL 4590 C – Drug Discovery (Skolnick)

In this course, you will select a disease to be treated and then go through (virtually) the entire drug discovery process with emphasis on emerging systems biology and personalized medicine to design new drug that treats the disease.