

FALL 2010 CHEMISTRY / BIOLOGY ELECTIVES

SC416 Analytical Chemistry in Forensics (3-0-3)

Professor C. Copper

This course will address the types of sample collection techniques used in criminal investigations, as well as the chemical and instrumental methods used to determine the presence of substances associated with illicit activities. Emphasis will be placed on specific forensic investigative techniques such as DNA fingerprinting, drug detection, arson investigations (petroleum residues), bombings (explosives residues) and characterization of fibers and paint. *Prereq: SC363.*

SC451 Bioinorganic Chemistry (3-0-3)

Associate Professor J. Lomax

This course will shed light on the structure and function of important bioinorganic compounds (hemoglobin, hydroxyapatite, ATP, etc.) using a host of techniques such as x-ray diffraction and NMR spectroscopy. *Prereq: SC335 and SC356 or permission of instructor.*

SC485C Polymer Synthesis: from ATRP to Ziegler-Natta (3-0-3)

Associate Professor S. Lin

Polymers, from biomacromolecules to everyday plastics, are all around us. This course will explore through lecture and in the laboratory the diversity of materials that can be accessed from the repertoire of reactions learned in 3/C and 2/C years. Find out why water bottles are now BPA-free, study Nobel prize-winning polymerizations, and make your own polystyrene. *Prereq: SC226, SC364, and SC356.*

SC485E The Biochemistry of Pathogenesis (3-0-3)

Assistant Professor C. Sweet

This course will discuss the chemical basis of innate and adaptive immunity, the structure and mechanisms of toxins, pathogen co-evolution and virulence factor genetics. The course will include case studies of particular pathogens and toxins, including *Yersinia*, anthrax, cholera, malaria, and botulism. *Prereq: SC335.*

SB487 Special Topics in Biology – Neuroscience and Development (3-2-4)

Assistant Professor D. Isaac

The content of this course can change on a rotating basis and will feature a rigorous treatment of various areas in modern biology. The topics for Fall of 2010 are Neurobiology and Developmental Biology. The course will build on basic principles underlying nervous system function introduced in SB252 and apply them to sensory modalities such as vision, taste, hearing and balance as well as nervous system development and higher cortical functions. We will use the examples set by studies performed in model organisms such as the fruitfly *Drosophila melanogaster* and the roundworm *Caenorhabditis elegans* to elucidate the mechanisms by which normal development proceeds in higher eukaryotes. A lab component of the course will complement both areas of study. *Prereq: SB252. Does not count as a chemistry major elective.*

SPRING 2011 CHEMISTRY / BIOLOGY ELECTIVES

SC336 Biochemistry II (3-0-3)

Associate Professor V. Smith

This course will provide advanced treatment of topics covered in SC335, such as biomolecular structure, bioenergetics and enzyme kinetics, and cover the following new material as well: biosynthesis of amino acids, nucleotides and cofactors; photosynthesis and plant metabolic cycles; signal transduction; molecular genetics; regulation of eukaryotic and prokaryotic gene expression. There will be an introduction to virology, immunology and the metabolism of specialized cells. *Prereq: SC335.*

SC412 Environmental Chemistry (3-0-3)

Associate Professor D. Luning Prak

Many analytical chemistry techniques can be used to learn more about the chemistry of our environment. In this course students will be exposed to specific applications of these techniques to various environmental systems (e.g. water, air, soil, etc.). Topics to be explored may include the bio- and geochemical cycles, the effect of military activities on the environment and the use of “green chemistry” in industry. *Prereq: SC262 or permission of instructor.*

SC446 Quantum Chemistry (3-0-3)

Professor M. Campbell

The principles of quantum mechanics are reviewed and used to develop molecular orbital theory which is applied to the structure and properties of molecules. Modern quantum chemistry software will be used for electronic structure calculations. *Prereq: SC346.*

SC486C Global Challenges in Chemistry: Climate Change and Alternative Energy (3-0-3)

Professor J. Fitzgerald

Americans are being bombarded with messages from politicians, industrialists, scientists, national and international environmental groups, etc about two major challenges facing the U.S. and indeed all of mankind - depletion of cheap hydrocarbon-derived fuels and global warming due to man-made CO₂ emissions. These challenges will only become more pronounced as Third-World countries (primarily China and India) seek to attain living standards enjoyed by the U.S. and other First-World countries.

This course will critically evaluate the scientific evidence relevant to man-made climate change. The historical record clearly documents natural variations in global temperature – if there is a current warming trend, is it due to human activities? If so, what are appropriate policies – should the U.S. ratify the Kyoto Protocol?

This course will also explore energy alternatives which have received recent attention. “Clean” coal, biofuels, nuclear, solar, wind, geothermal, ocean thermal and biomass technologies will all be included. The relative advantages and disadvantages of these technologies as well as roadblocks to application will be considered. *Prereq: 1/C or 2/C STEM majors.*