SC485E Chemical and Biological Warfare Agents (3-0-3)

LT Katherine Dozier

This course will give students a working knowledge of potential chemical and biological threats to US Forces as well as the civilian population. Students will also learn the effects that chemical and biological agents have on the human body, learn how to recognize symptoms of attack by specific agents, and learn about the available treatments and their mechanisms of action. Prereqs: SC112 and either SB201/SB211/or SB251, or with instructor permission

SC485A Computational Methods for Chemists (3-0-3)

Professor J. Harrison

This course will explore the use of numerical methods that are utilized by theoretical chemists to solve problems on computers. The students will write programs in FORTRAN or C to solve equations, do matrix manipulations, do curve fitting, do numerical integration, etc. These techniques will be applied to chemical problems. The use of advanced techniques, such as Spartan, Gaussian, or molecular dynamics programs, that utilize prewritten software, may also be explored for various problems. Prerequisites: Calc I & II, Diff. Eqns, SC345, SC346 or by permission of the instructor, no programming experience required.

SC287 Art Conservation Chemistry (3-2-4)

Associate Professor J. Lomax

Objects exist in time. Investigating the physical content of art and artifacts can give us insight into the mind a culture of the people who created the object. The history of an object (what happened to it since it was created) can leave it obscured, weakened or damaged. It is the job of conservators to mitigate or sometime reverse the effects of the fourth dimension on these three-dimensional objects. Chemistry’s analytical techniques are exquisitely capable of determining content of objects and the effect of time on them. Though scientists have been assisting in museums since the 19th century, the explosion of modern micro-analytical techniques and computer assisted analysis have made it possible to probe art and artifacts non-destructively or using samples that are smaller than can be seen with the naked eye. This course will deal with the chemical aspects of art conservation as well as the philosophy and ethics of science involved in art conservation. Though we will be covering analytical techniques not discussed in General Chemistry, the classroom and laboratory presentation will not assume any knowledge beyond SC111/112. Pre-req: SC111, SC112 or validation equivalents.
SB453 Neuroscience and Developmental Biology (3-2-4)
Assistant Professor D. Isaac
This course offers an advanced treatment of neuroscience and developmental biology that builds on both the molecular and cellular background provided in SB251 and the basic principles underlying nervous system function introduced in SB252 and applies them to topics including both somatic and special sensory modalities, initiation, execution and coordination of motor programs and the neuroanatomical organization of the pathways that control these functions. Additional special topics will be introduced on a rotating basis. The course will also use the examples set by studies performed in model organisms to elucidate the mechanisms by which normal development proceeds in higher eukaryotes with an emphasis on neural development. Prereq: SB252. The course does not count as a chemistry major elective.

SC412 Environmental Chemistry (3-0-3)
Associate Professor R. Siefert
Water covers about 75% of the Earth’s surface, and it also is a major factor in the atmosphere. This course will focus on aquatic chemistry and its application to a variety of environmental systems. Marine, freshwater, and atmospheric systems (i.e., cloudwater) will be investigated in the course. Topics include: air-sea interactions, acid/base buffering, dissolved metal ions, precipitation and dissolution, and the solid-solution interface. Case studies will be incorporated into the course that will highlight the role of aquatic chemistry on current environmental issues. These case studies will include topics such as: ocean acidification, acid rain and its effects (e.g., lake chemistry, leaching of metals from soils), and nutrient pollution in the Chesapeake Bay and the Gulf of Mexico. Prereq: SC216.

SC485C The Organic Chemistry of Biological Pathways (3-0-3)
Professor D. Dillner
Organic Chemistry is the study of the reactions of carbon compounds. Biochemistry is the study of the chemical reactions in living systems. This course will explore the connection between these two sub-disciplines of chemistry by looking at the organic reactions involved in many biological pathways. Among other topics, we’ll examine the biosynthesis of steroids and the metabolism of amino acids; looking at the intermediate compounds and mechanisms of their formation from the organic point of view, writing mechanisms and showing how the reactions are examples of what you learned in organic chemistry. This course will fulfill the elective requirement of the biochemistry option. Prerequisites SC226 and SC335.
SPRING 2013 CHEMISTRY / BIOLOGY ELECTIVES

SC338 Molecular and General Genetics (3-0-3)
Assistant Professor D. Isaac
Students in this course will study the inheritance of traits, starting with basic (Mendelian) genetics and ending with modern molecular biology. The course will examine incomplete dominance, epistasis, pleiotropy, transformation, cloning, genetic engineering, imprinting, and experimental techniques. Colisted as SC338. Prereq: SB251 or SC335.

SC351 X-Ray Structure Determination (2-2-3)
Associate Professor W. Pearson
X-ray diffraction is the most powerful tool for determining the three dimensional structures of molecules. This course is a practical, hands-on, introduction to the modern methods of crystal structure determination using X-ray diffraction. Through a series of lectures and lab sessions, students will learn the basics of the technique from crystal growth to final structure solution. Prereq: SC112, Coreq SM212.

SC336 Biochemistry II (3-0-3)
Assistant Professor C. Sweet
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.

SC442 Propellants and Explosives (2-2-3)
Professor P. Trulove
This course will explore the fundamental aspects of the chemistry of propellants and explosives. It will delve into the structural, physical, and chemical properties of these energetic materials. It will investigate the application of these energetic materials to military and civilian systems, and it will explore methods and processes to detect and characterize energetic materials both before and after use. This course will consist of classroom lecture and group activities. In addition, it will involve laboratory experiments investigating energetic materials and their applications. Prereq: SC226, SC345.
SC485C: Special Topics in Organic Chemistry
Professor J. Urban

This course will revisit fundamental topics from Organic Chemistry I and II such as conformational analysis, stereochemistry, and reaction mechanisms and explore them in new ways and in greater detail. It will also delve into a selection of special topics derived from the current research literature in organic chemistry including, for example, physical organic chemistry, and computational organic chemistry. Students will make use of molecular modeling software to investigate the structure-property relationships of organic compounds throughout the course. Prerequisite: SC226. Corequisites: SC335, SC345, or permission from instructor.