FALL 2005 CHEMISTRY ELECTIVES

SC485A  The Impact of the Military on the Chemistry of the Environment  (3-0-3)
Assoc. Prof. Copper

In this course, students will study the effect of military activities on the environment. Topics to be explored include the effect of aviation on the atmosphere, ships on the water, and artillery on the land. Other areas to be addressed are nuclear power/nuclear waste, green chemistry, and ethical issues related to the environment. For a majority of the course time, students will complete projects and make presentations based on their specific interests in the area of the military and environmental chemistry. Prereq: SC262 or SC264.

SC485B  Introduction to Chemical Engineering Processes   (3-0-3)
Asst. Prof. G. Cotten

An introductory course designed to prepare students to be able to solve material and energy balances relative to chemical processes utilizing the engineering approach for problem solving. Prereq: SC112, SP212, SM221.

SC485C  Advanced Organic Chemistry   (3-0-3)
Assoc. Prof. D. Dillner

Advanced Organic Chemistry will build on the foundation of SC225-226 by exploring some relevant subtopics of organic chemistry that are typically not given much attention in the sophomore course. The goal is to provide a bridge for the student from basic organic chemistry to that which is encountered in chemical research and literature, as well as in more specialized subdisciplines such as bioorganic chemistry. This course will revisit some of the fundamental topics from the sophomore course such as stereochemistry, conformation, structure and bonding, reactions and mechanisms. It will also touch on more advanced topics such as pericyclic reactions, the chemistry of heterocyclic compounds, and the study of the relationship between structure and function of biochemically relevant organic compounds. Prereq: SC226.

SPRING 2006 CHEMISTRY ELECTIVES

SC486A  Design and Modeling of Experiments   (3-0-3)
Assoc. Prof. J. Hartman

There are two parts to any experimental problem: the design of the experiment and the statistical analysis of the data. Laboratory courses in chemistry generally simplify experiments to vary one parameter so that simple statistics can be used to analyze the results. Unfortunately, “real world” chemical problems usually involve many parameters that often interact with each other so that the approach of varying one variable at a time leads to too many experiments to practically carry out. Computers have helped to solve this problem by making it easy to use statistics in experimental design. In this course, we will use a tutorial approach to learn to use MINITAB, a commercial statistics package, to design and analyze experiments. Case studies in topics including chemistry, biology, toxicology, clinical medicine, and environmental hazards will be examined. The emphasis will be on developing the capability for statistical thinking, and only elementary mathematics will be involved.

SC486B  Bioinorganic Chemistry  (3-0-3)
Assoc. Prof. J. Lomax

Life is inorganic, too. Every breath you take supplies your body oxygen which is bound by a molecule with an iron at the active site, hemoglobin. Every step you make is supported by bone and driven by phosphate containing molecules, ADP and ATP (the ‘P’ being phosphate). The cascade of electron transfer is mediated by iron-sulfur proteins and cytochromes. In the last decade especially, investigations into the rich chemistry of bioinorganic compounds has flourished and expanded. Genome mapping now allow us to compare the sequences of
metalloproteins from many species revealing subtle and important relationships. In addition, genome mapping has given us protein sequences which lead to larger amount of purer proteins. Advances in structural and spectroscopic techniques have shed light on the structure and function of these compounds. Now is an exciting time to explore the advances and future challenges of bioinorganic in this Special Topics course. Prereq: SC335 or permission of instructor.

SC486D  Introduction to Surface Chemistry  (3-0-3)
Prof. R. Ferrante

A material interacts with the outside world through its surfaces, so it is easy to appreciate the significance of surface chemistry in many areas of human industry. Since the advent of solid-state electronic devices, the trend towards miniaturization has accentuated the importance of the surface and, fortunately, has now been matched with an unprecedented ability to actually observe and measure the surface as it interacts. For example, scanning tunneling microscopy (STM) has made it possible to follow the kinetics of a reaction by literally counting the number of molecules on the surface as a function of time! (Science 278, 1931 (1997)). The benefits and potential of this confluence of techniques have expanded our knowledge of surface kinetics from empirical to theoretical, and will pave the way to future improvements in important technological areas such as thin-film growth, alloy design, micro/nanomechanical systems, semiconductors and tribology. This course will provide an introduction to the structure and behavior of materials at the surface, and will seek to apply a molecular-level understanding to macroscopic properties. Experimental and/or theoretical case studies will be used to connect the physical fundamentals and the measurements with modern practice in surface chemistry. Prereq: SC345 or permission of instructor.

SC486E  Nobel Endeavors  (3-0-3)
Asst. Prof. V. Smith

Since its establishment in 1901, the Nobel Prize committee has done a remarkable job of identifying landmark achievements in physics, chemistry and medicine. The field of biochemistry, which sits at the interface of the physical and biological sciences, is perfectly poised to benefit from the achievements of scientists recognized by two categories of Nobel Prizes - Chemistry and Physiology or Medicine. In this course we will examine a number of the conceptual breakthroughs and technological advances that have been awarded Nobel Prizes, place these achievements into historical context and assess their lasting impact on biochemistry. We will read original journal articles and reference texts to understand the theoretical background and experimental details of these prize-winning discoveries, supplemented with biographical materials on the scientists themselves. The course will be taught in seminar style, with a heavy emphasis on student participation. Prereq: SC112 or SC151.

SB201  Biology for the Naval Officer  (3-0-3)
Asst. Prof. B. Rehill

Students will learn basic biology in the context of how it applies to everyday life and their future duties in the Naval Service. Topics will include the role of genes versus the environment, genetic engineering, DNA identification, diet and nutrition, HIV/AIDS, gender and athleticism, how various drugs affect the nervous system, and the role of hormones in human reproduction. Recommended as an elective or for fulfillment of the General Science biology requirement. Students cannot take both SB201 and SB251 for credit.