SC485F  Chemistry of Cooking (2-2-3)
Associate Professor Schroeder
This laboratory-based course will investigate the chemistry involved in cooking and foods. Why do breads rise? Why do meats brown? How are grapes converted to wine? Why are some mushrooms poisonous? Laboratory experiments will include investigations of sugar phase transitions, ice-cream thermodynamics, egg protein behavior, beer and bread making, and the kinetics of food spoilage. Military applications will also be incorporated into the course including coverage of survival foods, water purification, and nutrition. Students will design a laboratory experiment in a food science area of interest. Prereq: SC112.

SC485B  Chemical Kinetics   (3-0-3)
Assoc. Prof. R. McClean
Chemical kinetics is the study of the rates of chemical reactions, and how the rates depend on factors such as concentration and temperature. Chemical kinetic studies are important in providing evidence for reaction mechanisms; i.e., the elementary steps that occur at the molecular level. Kinetics is relevant to disciplines such as biology, oceanography, pharmacology, geology, physics, atmospheric science, chemical engineering, and psychology. This course will focus on basic kinetic concepts, the analysis of kinetic data, and the theories of reaction rates. Most applications will involve elementary gas phase reactions. Prereqs: SC112 or SC151, SP211 and SM212

SC485C  Advanced Organic Chemistry   (3-0-3)
Assoc. Prof. J. Urban
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.

SC485E  Biomolecular Motors: The Biochemistry of Motion   (3-0-3)
Asst. Prof. J. Schlessman
Motor proteins provide the ability to transform chemical energy, usually from ATP, into kinetic energy. These biomolecules function by small increments, converting changes in protein conformation into direct motion. The dynamic interplay between protein structure, function and energetics that allows proteins to move will be explored. Topics will include function of myosins in muscle tissue; kinesins in microtubules; mechanosensitive ion channels; ATPases in oxidative phosphorylation; and dyneins in flagellar motion. Motor proteins serve as natural models for nanotechnological advancements, and design applications will be explored. Relevant experimental techniques will be discussed in the context of each protein system. Prereq: SC335.

SB486  From Mendel to the SuperMouse: The Awesome Power of Genetics   (3-0-3)
Asst. Prof. B. Rehill
Students in this course will study the inheritance of traits, starting with basic (Mendelian) genetics and ending with modern molecular biology (example: making a ‘supermouse’ through genetic engineering to study the role of various genes). In between, course participants will study phenomena such as incomplete dominance, epistasis, pleiotropy, transformation, cloning, genetic engineering, imprinting (parental effects on gene expression), and techniques for studying genetics such as gel electrophoresis and PCR (polymerase chain reaction). The course will have a problem solving approach, and high levels of class participation will be expected. Prereq: SB251 or equivalent recommended.
SPRING 2007 CHEMISTRY / BIOLOGY ELECTIVES

SC486A  Environmental Aquatic Chemistry  (3-0-3)
Asst. Prof. R. Siefert
This course will focus on the fundamental aquatic chemistry principles that can be applied to a variety of environmental systems (e.g., marine, freshwater, atmospheric). Topics include acids and bases, air-sea interactions, aqueous metal ions, precipitation and dissolution, chemical thermodynamics and kinetics, oxidation and reduction, 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.

SC486G  Chemical Structure Determination by X-ray Diffraction  (2-2-3)
Assoc. Prof. W. Pearson
X-ray diffraction is arguably 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. Each student will have the opportunity to perform at least one crystal structure determination using the state-of-the-art APEXII diffractometer. Compounds studied will range from small inorganic and organic molecules to large proteins. After taking this course, students should understand how crystal structures are determined and be able to critically evaluate structures that are published in the literature. Prereq: SC112.

SC486H  Advanced NMR Spectral Interpretation  (2-2-3)
Assoc. Prof. D. Dillner
Nuclear magnetic resonance spectroscopy is the main tool for determining the structure of organic compounds. While NMR spectroscopy is introduced in IL1, the compounds examined are fairly simple. In this course, spectra of more complex molecules, including natural products, will be examined. Advanced NMR techniques, such as 2D techniques, will be introduced. The main emphasis of the course will be on acquiring NMR spectra using the department’s 400 MHz spectrometer and structure determination by interpretation of those spectra. Solving such problems is like putting together a jigsaw puzzle, where the pieces used are common organic functional groups. Prereq: SC263.

SC486I  The Chemistry of Propellants and Explosives  (2-2-3)
Assoc. Prof. Trulove
Summary: 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. Prereqs: SC226, SC345.

SC486E  Biochemistry II  (3-0-3)
Asst. Prof. V. Smith
This course will provide advanced treatment of topics covered in SC335, such as biomolecular structure, bioenergetes 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.