

FALL 2019 CHEMISTRY / BIOLOGY ELECTIVES

SC412: Environmental Chemistry (3-0-3)

Assoc. Prof. Ron Siefert

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 (i.e. water, air, soil, etc.). Topics to be explored may include the bio- and geo-chemical cycles, the effect of military activities on the environment, and the use of "green chemistry" in industry.

Prerequisites: SC262 or SC264 or permission of the department chair

SB485: Immunology and Advanced Physiology (3-2-4)

Assoc. Prof. Charles Sweet

This course explores advanced topics in anatomy and molecular physiology including infection and immunology, pharmacology, and additional special topics unified around the framework of signal transduction such as sensation, motor control, and development. This course fulfills the AY2020 "additional biology course" requirement necessary in support of the Medical Corps billet for students who have validated SB251.

Prerequisites: SB252. The course does not count as a chemistry major elective.

SC351 Chemical Structures by X-Rays (2-2-3)

Assoc. Prof. Wayne Pearson

This course will deal with the use of X-rays as a tool in modern chemistry. We will study the three techniques that we currently have available at USNA. Those three are X-ray Fluorescence Spectroscopy (XRF), single crystal X-ray diffraction (SCXRD) and X-ray powder diffraction (XRD). Students will get a practical, hands-on introduction to all of these methods. Through a series of lectures and lab sessions, students will learn the basics of each technique, applications, strengths and limitations. We will discover how these techniques can reveal chemical information in the areas of organic and inorganic chemistry, material science and biochemistry. *Prerequisites:* SC112, SM219

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

Prof. Shirley Lin

Although the age of synthetic polymers began only in the mid-20th century, by 2015 more than 320 million tons of commodity plastics were manufactured world-wide. In the span of a mere 60 years, synthetic polymers have become an integral part of our lives, appearing in diverse applications ranging from precision drug delivery systems to smart bullet-proof vests. During this course, we will investigate the science behind the production of both large-scale commodity and high-performance polymers and explore the cutting edge of macromolecular design. Students will have opportunities for hands-on experience with polymeric materials throughout the semester.

Prerequisites: SC226, SC262

SC446: Quantum Chemistry (3-0-3)

Prof. Mark 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.

Prerequisites: SC346

SPRING 2020 CHEMISTRY / BIOLOGY ELECTIVES

SC336 Biochemistry II (3-0-3)

Prof. J. Schlessman

This course will expand and build on topics from SC335, such as biomolecular structure, bioenergetics and enzyme kinetics, to cover biosynthesis of amino acids, nucleotides and cofactors; photosynthesis and plant metabolic cycles; signal transduction; molecular genetics; regulation of eukaryotic and prokaryotic gene expression. *Prerequisites:* SC335

SB/SC338: Molecular and General Genetics (3-0-3)

Associate Professor D. Morse

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. *Prerequisites:* SB251 or SC335.

SC485C: What Did You Really Synthesize: Organic Structure Determination with Enhanced Communication Skills (3-0-3)

Professor Craig Whitaker

This course will provide students with an in-depth understanding of the most significant organic structure determination techniques. Participants will also critically analyze the application of molecular structure determination in research journal articles and effectively communicate these findings using a variety of presentation methods.

Prerequisite: SC226, SC262

SC485D Surface Chemistry (3-0-3)

CDR Julie Spencer

Surface chemistry is vitally important in many areas of modern life. In this course, students will be exposed to modern methods of surface analysis (such as Scanning Electron Microscopy, X-ray Photoelectron Spectroscopy, Atomic Force Microscopy, etc.) as well as interesting applications such as nanotechnology, catalysis, materials science, and drug delivery.

Prerequisite: SC345 or permission of instructor.