

FALL 2020 (AY21) CHEMISTRY / BIOLOGY ELECTIVES

SC412: Environmental Chemistry (3-0-3)

Prof. Dianne 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 (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: Advanced Physiology (3-2-4)

Assoc. Prof. Charles Sweet

This course is an advanced treatment of sensory physiology and motor control, developmental biology, and immunology. It will build on basic principles and knowledge attained in SB251 and SB252 to explore the functions of the somatic motor, special sensory, and enteric modalities of the nervous system, human development from embryo to adulthood, and the structure and function of the lymphatic, innate immune, and adaptive immune systems. Additional related topics and others not covered in detail in previous biology courses may be introduced at instructor discretion.

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

SC451: Bioinorganic Chemistry (3-0-3)

Assoc. Prof. Joseph Lomax

Life is inorganic, too. Every breath uses the iron protein, hemoglobin, most electron-transfers involve metallo-proteins, every step is supported by bone made of calcium salts and driven by phosphate containing molecules such as ATP. Function gives rise to structure and structure enlightens functions, so this course will show how a host of techniques such as X-ray diffraction and NMR spectroscopy sheds light on the structure and function of these bioinorganic compounds. This is an authorized course for the Biochemistry Concentration.

Prerequisites: SC335, SC356

SC485C: Natural Product Chemistry (3-0-3)

Prof. Debra Dillner

Organic compounds isolated from plants have been productive leads in determining new medical treatments. Chemists have learned from folk medicine which plants have healing properties and then isolated the active components. This has led to pharmaceuticals ranging from pain killers to anti-cancer compounds. Some are used exactly as found in nature and others have been modified in the laboratory to make even better pharmaceuticals. In this course, we will look at how these compounds are isolated and identified. We'll also see how drug companies have taken these compounds and tried to make better drugs.

Prerequisites: SC225, SC261

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 2021 (AY21) CHEMISTRY / BIOLOGY ELECTIVES

SC416 Analytical Chemistry in Forensic Investigations (3-0-3)

Prof. 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.

Prerequisites: SC361

SC336 Biochemistry II (3-0-3)

Instructor: TBD

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/SC486: Molecular Virology (3-0-3)

Assistant Prof. Ina O'Carroll

This course will explore the genetic and structural diversity of viruses and the molecular basis of viral infections. We will examine 1) structures of virus particles and the features that allow them to enter cells, 2) the extraordinary diversity of viral genomes and genetic tricks they use to replicate in host cells, 3) the assembly of virus particles, 4) how infected cells antagonize viral infections, and 5) vaccines and treatments against viral infections. *Prerequisites:* SB251 and SC335 (or permission from instructor).

SC485C: Organic Structure Determination and Communication Skills (3-0-3)

Professor Craig Whitaker

This course is designed to acquaint students with spectroscopic techniques (NMR ($^1\text{H}/^{13}\text{C}$), FT-IR, UV-vis and mass spectroscopy) from Integrated Laboratory I and II used for organic structure elucidation and to introduce new multi-dimensional NMR experiments for structure determination of complex natural products. The material covered is intended to give students a more complete picture of how spectroscopic methods are used to reveal the structure of organic molecules. During this course students will also analyze journal articles, design laboratory experiments, and present the data in various different media. By the end of the course, students will be able to identify quality science information and present information in an appropriate and engaging style.

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.