FALL 2018 CHEMISTRY / BIOLOGY ELECTIVES

SC412: Environmental Chemistry (3-0-3)
Professor 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

SB453: Neuroscience and Developmental Biology (3-2-4)
Professor B. Rehill
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.
Prerequisites: SB252. The course does not count as a chemistry major elective.

SC485C: Chemistry of Drugs, Poisons, and Toxins (3-0-3)
Associate Professor Chris Kinter
This course will explore how biologically relevant compounds are discovered and synthesized. Students will examine how chemical structure relates to biological activity. While studying a variety of pharmaceuticals, the students will look at the role chemist play in the process of discovering, optimizing activity, testing, and bringing drugs to market. The class will also examine the adverse effects of common poisons and agents used as chemical weapons.
Prerequisite: SC226

SC485D: Biophysical Chemistry (3-0-3)
Assistant Professor Elizabeth Yates
Everything in biology is based on a chemical or physical foundation. Biophysical chemistry is the study of biological systems through the use of theories and methods of the physical sciences. In this course, we will use fundamental principles originating from the field of physics and chemistry, to gain molecular and structural insights into the mechanisms of biological processes. This course will introduce physical techniques used in the detection and analysis of biomolecules as well as develop the description of the physicochemical properties of such molecules. Some topics to be covered in the course include protein structure, aggregation and self-assembly, membranes, thermodynamics and interactions, chemical equilibrium, kinetics, spectroscopy, scanning probe microscopy, nanotechnology, surface phenomena and biomacromolecule dynamics. *Prerequisites*: SC345, SC346 or permission of the instructor.

SPRING 2019 CHEMISTRY / BIOLOGY ELECTIVES

SC416: Analytical Chemistry in Forensics (3-0-3)
Professor Graham Cheek

This course is designed to use your knowledge of analytical chemistry to appreciate how modern forensic investigators solve criminal cases. The chemical and instrumental methods covered in the Integrated Laboratory sequence and the SC216 course will be applied to important investigations such as sampling a crime scene, DNA profiling, drug detection, arson (petroleum residues), bombings (explosives residues), characterization of fibers and paint, and documents and artworks. It is the intent of this course to give you an overall appreciation for the fascinating ways in which modern analytical methods can be used to gain the detailed knowledge necessary to solve crimes. Building on the instruments which you used in our IL sequence, the course will give you information on the latest instrumental techniques and sampling devices which allow processing of difficult, real-world crime scene samples. Some "hands-on" experience in laboratory techniques is also planned for this course. In addition, the use of case studies will help the student understand the role of science in the larger world.
Prerequisites: SC361 or permission of the department chair

SC336: Biochemistry II (3-0-3)
Professor 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 – counts as a chemistry major elective. *Prerequisites*: SB251 or SC335.

SC351 Chemical Structures by X-Rays (2-2-3)
Associate Professor Wayne Pearson

The subject of the course is the use of X-ray diffraction to solve crystal structures. Students will get a practical, hands-on, introduction to the modern methods of crystal structure determination. Through a series of lectures and lab sessions, students will learn the basics of crystal symmetry, diffraction of X-rays by single crystals, data collection techniques, structure solution and refinement. Each student will have the opportunity to collect X-ray data from a crystal and then use the data to solve the structure for that crystal. As a result of taking this course, the student should be able to understand how structures are reported in the literature and be able to critically evaluate them.
Prerequisites: SC112, SM219

SC486C Nobel Prize-winning Catalysis (3-0-3)
Professor Shirley Lin

Four Nobel Prizes in chemistry (1963, 2001, 2005, 2010) have been awarded for significant accomplishments in the area of developing catalytic synthetic reactions. The history and the state-of-the-art of the chemistry behind each award will be explored in this interactive, seminar-

style course. The impact of these transformations on medicine, materials, and the production of specialty chemicals will be highlighted.
Prerequisites: SC226 and SC356 or permission of instructor.

SC446: Quantum Chemistry (3-0-3)
Professor 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