

Chemistry (CHEM)

CHEM 102 CHEMISTRY AND SOCIETY (3)

Lecture, 2 hours; laboratory, 3 hours. An introductory course in chemistry for non-majors. Covers the basics of chemistry related to everyday life. The laboratory will consist of experiments covering chemical principles and phenomena discussed in the lecture. Satisfies GE Area B1 (Physical Sciences) and the GE laboratory requirement.

CHEM 105 ELEMENTS OF GENERAL, ORGANIC, AND BIOCHEMISTRY (5)

Lecture, 4 hours; laboratory, 3 hours. A survey of the principles of chemistry, with emphasis placed on those that apply to living organisms. The course is designed for students in Nursing and majors that do not require further courses in Chemistry. Course is not a prerequisite for any chemistry course. Satisfies GE Area B1 (Physical Sciences) and the GE laboratory requirement. Fall only.

CHEM 107 INTRODUCTION TO PHYSICAL SCIENCE FOR TEACHERS (3)

Lecture, 3 hours. A non-mathematical course designed to introduce students to a range of topics in physics and chemistry that are required by the California Science Standards for grades K-8, including the laws of motion, energy, the structure of matter, the states of matter, electricity and magnetism, and light and optics. Lectures include many demonstrations to illustrate physical science principles and students will be asked to think about how they would demonstrate or explain various concepts.

CHEM 110 INTRODUCTORY GENERAL CHEMISTRY (3)

Lecture, 3 hours. Develop fundamental knowledge and necessary skills in General Chemistry for students who plan to major in science or pre-health programs. Recommended for students with no prior chemistry background or as a refresher course to enhance an insufficient chemistry background. Topics covered include the scientific method, word problem analysis, significant figures, scientific notation, unit conversion, periodic table, chemical equations, fundamental laws of matter and energy, the mole concept, and stoichiometry. Satisfies GE Area B1. Fall only.

CHEM 115A GENERAL CHEMISTRY (5)

Lecture, 3 hours; discussion, 1 hour; laboratory, 3 hours. Principles of chemistry for students in science, pre-health, and related areas of study. This course will introduce students to science and scientific thought by using problem-solving strategies in both a conceptual and mathematical manner. First semester topics include atomic and molecular structure, states of matter, chemical reactions, stoichiometry, and thermodynamics. Second semester topics include kinetics, equilibrium, buffers, and electrochemistry. Prerequisite: GE math placement. Satisfies GE Area B1 (Physical Sciences), and laboratory requirements.

CHEM 115B GENERAL CHEMISTRY (5)

Lecture, 3 hours; discussion, 1 hour; laboratory, 3 hours. Continuation of CHEM 115A. Prerequisite: CHEM 115A. Satisfies GE Area B1 (Physical Sciences), and laboratory requirements.

CHEM 120A THINKING LIKE A SCIENTIST (2)

First course of a two-course series. Topics include logic, critical thinking, the scientific method, data analysis, statistics, ethics, science and society, problem solving, and college transition elements. Students must be GE math eligible and be concurrently enrolled in CHEM 125A and either Math 160, Math 161, or Math 161X. Upon completion of CHEM 120B in the spring, the course will satisfy the GE Area A3 requirement.

CHEM 120B THINKING LIKE A SCIENTIST (2)

Second course of a two course series. Topics include logic, critical thinking, the scientific method, data analysis, statistics, ethics, science and society, problem solving, and college transition elements. Students should be concurrently enrolled in CHEM 125B. Upon completion of CHEM 120B, the course will satisfy the GE Area A3 requirement. Prerequisite: CHEM120A.

CHEM 125A QUANTITATIVE GENERAL CHEMISTRY (5)

Lecture, 3 hours; discussion 1 hour; laboratory 3 hours (5 units). This one-year analytical general chemistry course is designed for freshmen Chemistry majors, Biochemistry majors, or others interested in chemical fields who have taken High School Chemistry or equivalent. This first semester course (CHEM 125A) will focus on: statistics, atomic structure, stoichiometry, gas laws, redox reactions, equilibrium, and acid/base reactions. Prerequisites: high school chemistry or equivalent and GE math placement. Taken concurrently with CHEM 120A.

CHEM 125B QUANTITATIVE GENERAL CHEMISTRY (5)

Lecture, 3 hours; discussion, 1 hour; laboratory, 3 hours (5 units). The second semester (CHEM 125B) starts by applying the topics covered in the first semester to chemical literature, chromatography, spectroscopy, biological chemistry, thermodynamics, electrochemistry, quantum mechanics, bonding, and kinetics. After completion of this course students will receive credit for the full year of general chemistry and one semester of quantitative analysis (CHEM 255). Prerequisite: CHEM 125A and concurrent enrollment in CHEM 120B.

CHEM 255 QUANTITATIVE ANALYSIS (4)

Lecture, 2 hours; laboratory, 6 hours. Theory and practice of methods of analysis, including volumetric, gravimetric, and selected instrumental techniques. Prerequisite: CHEM 115B.

CHEM 275 INSTRUMENTAL ANALYSIS (2)

This course focuses on the theory behind commonly used chemistry instruments. Lecture will focus on analysis of spectroscopic data (molecular transitions), an overview of instrumental hardware, and principles of chromatography. Topics include basic electronics, statistics, optics, signal to noise detectors, IR, optical, NMR and fluorescence spectroscopy, mass spectrometry, atomic absorption, and chromatography. Prerequisite: CHEM 335B.

CHEM 310A FUNDAMENTALS OF PHYSICAL CHEMISTRY (3)

Lecture, 3 hours. Development and applications of the concepts of thermodynamics, equilibrium, kinetics, quantum mechanics, and spectroscopy to chemical systems. Prerequisites: CHEM 115B or CHEM 125B; MATH 211.

CHEM 310B FUNDAMENTALS OF PHYSICAL CHEMISTRY (3)

Lecture, 3 hours. Continuation of CHEM 310A. Prerequisite: CHEM 310A required; or consent of instructor.

CHEM 315 INTRODUCTION TO RESEARCH METHODS IN CHEMISTRY (1)

Chemistry 315 is designed for Chemistry majors but may be taken by others. Students will learn about research in Chemistry at SSU and then will choose a research project with a faculty mentor. This course will focus on preparation of a proposal to be performed in the subsequent semester. Topics such as scientific ethics, literature, and writing will also be covered.

CHEM 316 RESEARCH METHODS IN CHEMISTRY (2)

Chemistry 316 is the second part of a year-long course designed for Chemistry majors. Students will execute the research proposal developed in CHEM 315. Research will be done under the mentorship of faculty. Students will meet weekly to discuss research progress. Students will conclude the semester with a research manuscript. Prerequisite: CHEM 315.

CHEM 325 INORGANIC CHEMISTRY (3)

Lecture, 3 hours; Atomic structure, symmetry, and group theory of small molecules and the relationship of these concepts to bonding theory and molecular spectroscopy. Applications of symmetry and group theory to coordination chemistry of transition metal complexes in organometallic, environmental, bioinorganic, and materials chemistry. Other topics include kinetics and reaction mechanisms of inorganic and organometallic compounds including electron transfer. Prerequisite: CHEM 310B and CHEM 401, or concurrent enrollment.

CHEM 335A ORGANIC CHEMISTRY (3)

Lecture, 3 hours. A study of the fundamental principles of organic chemistry including bonding, electrophilicity, nucleophilicity, and molecular shapes and geometry for organic compounds. Applies these concepts to the study of the properties, syntheses, and reactions of major classes of organic compounds. A special emphasis is given to reaction mechanisms. Prerequisite: CHEM 115B or CHEM 125A (with department consent), or consent of instructor.

CHEM 335B ORGANIC CHEMISTRY (3)

Lecture, 3 hours. Continuation of CHEM 335A. Prerequisite: CHEM 335A.

CHEM 336A ORGANIC CHEMISTRY LAB I (2)

Laboratory lecture, 1 hour; laboratory, 3 hours. Fundamental techniques in organic chemistry, emphasizing separation techniques, modern instrumental methods, and qualitative organic analysis. Designed to complement CHEM 335A. Prerequisite/co-requisite: CHEM 335A.

CHEM 336B ORGANIC CHEMISTRY LAB II (2)

Laboratory lecture, 1 hour; laboratory, 3 hours. Fundamental techniques of organic chemistry, emphasizing synthetic organic chemistry, modern instrumental methods, and qualitative organic analysis. Designed to complement CHEM 335B. Prerequisite or corequisite of CHEM 335B required.

CHEM 397 CHEMISTRY PRACTICUM (1-6)

Supervised chemistry work experiences that involve practical application of previously studied theory. Intended for professional growth and/or collection of data for future theoretical interpretation. Not applicable toward the Chemistry major or minor. May be repeated for up to a total of 6 units. Two hours of work per week for each unit of credit. Cr/NC only. Prerequisite: consent of instructor.

CHEM 401 SENIOR INTEGRATED LAB (3)

This course focuses on making connections between the sub-disciplines of chemistry by performing experiments that cross over between these sub-disciplines in this capstone course. Students will perform experiments independently. Students will learn to properly write up their results in a format similar to published papers. This course is for graduating seniors and is the capstone for B.A. Chemistry majors. Prerequisite: CHEM 255, CHEM 275, and CHEM310A. CHEM 275 and CHEM 310A may also be taken concurrently.

CHEM 402 ADVANCED SYNTHESIS AND INSTRUMENTAL ANALYSIS (3)

Lecture, 1 hour; laboratory, 6 hours. Project-based synthesis, purification, and characterization of inorganic, organic, and organometallic molecules. Capstone course for the B.S. chemistry degree. Topics will include air-sensitive syntheses, standard Schlenk line techniques, characterization through IR, optical and NMR spectroscopy, mass spectrometry, and electrochemistry. This course is for graduating seniors and is the capstone for BS Chemistry majors. Prerequisite: CHEM 401.

CHEM 441 BIOCHEMICAL METHODS (3)

Project based course involving characterization of proteins from natural sources utilizing biochemical methods and experimental design techniques common in biotechnology and research. This course is for graduating seniors and is the capstone for B.S. Biochemistry majors. Offered in spring only. Prerequisites: CHEM 445 or 446 (may be concurrent), CHEM 255, and a foundation in spectroscopy; kinetics strongly recommended.

CHEM 445 STRUCTURAL BIOCHEMISTRY (3)

Lecture, 3 hours. A study of the structure-function relationships of amino acids, proteins, enzymes, carbohydrates, lipids, and nucleic acids. Also includes topics such as enzyme kinetics, membrane transport, and signaling. Only offered in the fall. Prerequisites: CHEM 335B or CHEM 232, and a foundation in kinetics and thermodynamics, or consent of instructor.

CHEM 446 METABOLIC BIOCHEMISTRY (3)

Lecture, 3 hours. A study of bioenergetics and the metabolism of biological molecules including carbohydrates, lipids, nucleic acids, and proteins. This course is only offered in the spring. Prerequisites: CHEM 335B or CHEM 232; CHEM 445 or BIOL 123; and a foundation in kinetics and thermodynamics, or consent of instructor.

CHEM 492 CHEMISTRY SEMINAR SERIES (1)

Invited speakers from universities and industry will present on current topics in the chemical and biochemical fields. May be repeated; does not count towards the major.

CHEM 494 UNDERGRADUATE RESEARCH (1-6)

Under supervision by the Chemistry faculty, students will participate in individual investigations of student- or faculty-initiated chemical problems. May be taken only by petition to the Chemistry Department. May be repeated. Prerequisite: consent of instructor.

CHEM 495 SPECIAL STUDIES (1-3)

Investigation of existing information on a specific or general topic of interest to the student. Prerequisites: consent of instructor; upper-division standing in chemistry, or closely related science.

CHEM 496 SELECTED TOPICS IN CHEMISTRY (1-6)

A study of an advanced topic in chemistry. May be repeated for credit with new subject matter.

CHEM 497 RESEARCH SEMINAR (1)

Laboratory, 3 hours. Capstone course for B.A. and B.S. degrees. The course will focus on techniques involved in the preparation and delivery of technical seminars. This final project will be a formal oral presentation to the Chemistry department on a research paper from the chemical literature or the student's undergraduate research project. Instruction includes the appropriate coverage of the selected topic, use of the chemical literature, and the preparation and use of PowerPoint, graphic, and web-based applications to create an informative talk. Prerequisite: CHEM 401 required, or consent of instructor.

CHEM 499 INTERNSHIP (1-4)

Chemistry field experience in industrial, hospital, or similar laboratory settings. Enrollment by prior arrangement with supervising faculty member and community sponsor. Please see department advisor for details. Three hours of work per week for each unit of credit. Internship assignments may be paid. Cr/NC only. May be repeated.