

CHEMISTRY (CHEM)

CHEM 1101K. Intro to Chemistry Lab. (4 Credits)

This course is designed to prepare students with little, if any, chemistry or math backgrounds for the General Chemistry I and General Chemistry II sequence (CHEM 1211/1212). Topics to be studied include matter, measurement, units and unit conversions, graphing, atomic structure, nomenclature, bonding, the periodic table, chemical equations, chemical reactions, stoichiometry. Exercises designed to improve science study skills will be included. The emphasis of the lecture will be on problem solving strategies, skill building and real life applications.

CHEM 1151K. Survey of Chemistry I. (4 Credits)

This course is the first part of a two-semester sequence covering elementary principles of general and organic chemistry and biochemistry designed for allied health profession majors. Topics to be covered include elements and compounds, chemical equations, nomenclature, and molecular geometry. Laboratory exercises will supplement the lecture material. 4 credits. Prerequisite(s): Permission of instructor. Offered: Fall.

CHEM 1152K. Survey of Chemistry II. (4 Credits)

This course is the second in a two-semester sequence covering elementary principles of general and organic chemistry and biochemistry designed for allied health profession majors. Topics to be covered include gases, solutions, acids/bases, basic functional groups and reactions of organic molecules. Additionally, carbohydrates, lipids, proteins, and enzymes are introduced. Laboratory exercises will supplement lecture material. Prerequisite(s): CHEM 1151K US.

CHEM 1211K. Principles of Chemistry I. (4 Credits)

This course is the first part of a two-semester general chemistry curriculum. It is primarily designed for students with career interests in chemistry, biology, medicine, pharmacy, and other STEM (Science, Technology, Engineering, and Mathematics) fields. This course covers basic chemistry: the fundamental concepts concerning the atomic and molecular structures and properties of matter, states of matter, stoichiometry, chemical equations and various types of equilibrium in solution including electrochemistry. Laboratory exercises supplement lectures. 4 credits. Prerequisite(s): Permission of instructor. Offered: Fall, Spring, Summer.

CHEM 1212K. Principles of Chemistry II. (4 Credits)

This course is the second part of a two-semester general chemistry sequence. It is primarily designed for students with career interests in chemistry, biology, medicine, pharmacy and other science fields. It will mainly deal with states of matter, solutions, chemical reactions, chemical kinetics, equilibrium, acids/bases and pH with corresponding laboratory activities. The laboratory activity is extremely important to enhance understanding of the materials learned from lecture. 4 credits. Prerequisite(s): CHEM 1211K. Offered: Fall, Spring, Summer.

CHEM 2250. Responsible conduct of Research. (2 Credits)

This course is designed to provide appropriate training and oversight in the responsible and ethical conduct of research to students engaging in undergraduate research. Ethical and policy issues relevant to the responsible conduct of research will be discussed. Analysis and application of topics including conflict of interest, responsible authorship, policies for handling misconduct, data management, data sharing, and policies involving use of human and animal subjects.

CHEM 2301K. Organic Chemistry I. (4 Credits)

This is the first course of a two-semester sequence in modern organic chemistry. In this course the student will be introduced to concepts of reactivity from structural, mechanistic, and synthetic perspectives. We will explore details of aliphatic substitution, addition, elimination, and free-radical reaction types. The systematic naming of compounds, stereochemistry, conformation, and isomerism will also be covered extensively. Laboratory exercises supplement lectures. 4 credits. Prerequisite(s): CHEM 1212K US Offered: Fall, Spring, Summer.

CHEM 2302K. Organic Chemistry II. (4 Credits)

This course is a continuation sequence of CHEM 2301K and it includes a systematic description of the chemistry of functional groups such as alkenes, alkynes, alcohols, aromatic and carbonyl compounds. Spectroscopic methods of analysis, including infrared, ultraviolet/visible, mass spectroscopy and nuclear magnetic resonance spectroscopy are also included. Laboratory exercises supplement lectures. Prerequisite(s): CHEM 2301K Offered: Fall, Spring, Summer.

CHEM 2310. Scientific Mathematics. (2 Credits)

This course is designed to acquaint students with mathematical concepts used in scientific studies including those required for the laboratory and publications. This course therefore will include mathematics review as well as applications into scientific problems.

CHEM 2320. Laboratory Research Techniques. (3 Credits)

This course provides students with hands-on training on cutting-edge techniques, technologies, and equipment that are essential for conducting general and biomedical research. It contains four modules: Basic Lab Skills, DNA, Protein Techniques and Instrumental Methods in Chemistry. Students learn experimental techniques including reagent preparation, pipetting, DNA isolation, protein purification, Agarose Gel Electrophoresis, SDS Gel Electrophoresis, conventional PCR, cell culture, Western blot, ELISA, chromatography (GC-MS) and spectroscopy (FT-IR, NMR, UV-Vis). 3 credits. Prerequisite(s): Permission of instructor. Offered: Spring, Fall .

CHEM 2415. Scientific Writing. (3 Credits)

This course is designed to acquaint learners with discove-very inquiry processes and to provide competencies for writing scientific papers. Prerequisite(s): Permission of instructor.

CHEM 3151K. Quantitative Analysis I. (4 Credits)

This course involves the study of theory and practice of gravimetric and titrimetric analysis with emphasis on solution equilibria as applied to acid-base, precipitation, and complexometric methods. The laboratory work will cover basic laboratory techniques, solution preparation, titrations, equilibrium constants, statistics, gravimetric analysis, and EDTA experiments. 4 credits. Prerequisite(s): CHEM 1212K Offered: Fall.

CHEM 3152K. Quantitative Analysis II. (4 Credits)

This course is a continuation of the study of analytical methods including oxidation-reduction, titration and an introduction to instrumental methods-potentiometric, spectrophotometric, and chromatographic. The laboratory work will cover spectroscopic methods, electrochemical methods, and chromatographic methods. Modern analytical instruments such as UV-Vis and Infrared (IR) spectrophotometers, Gas Chromatograph (GC), High Performance Liquid Chromatograph (HPLC), Atomic Absorption Spectrophotometer (AAS), and electrochemical instruments will be introduced and data from each of the methods will be analyzed. Prerequisite(s): CHEM 2351K US D.

CHEM 3221K. Physical Chemistry I. (4 Credits)

This course is a study of the fundamental laws governing matter in the gaseous state, the laws of thermodynamics (0th-3rd laws), and chemical kinetics. It will also include the applications of principles, such as solid and liquid states, solutions, phase equilibria, and electrochemistry. In this class, students will learn what constitutes the driving force for physical and chemical changes, and how it changes with temperature and pressure. The laboratory work is designed to provide students with first-hand, practical experience in making and interpreting scientific observations. Prerequisite(s): PHYS 2222K.

CHEM 3222K. Physical Chemistry II. (4 Credits)

This course introduces the theory and application of quantum theory and bonding; magnetic and spectral properties of atoms and molecules; and statistical mechanics. Prerequisite(s): MATH 2212 US C or taken concurrently. PHYS 2222K US C and CHEM 2301K US C or CHEM 2351 US C. Offered: Fall.

CHEM 3231K. Intermediate Inorganic Chemistry I. (4 Credits)

The course will focus on acquiring different conceptual tools that are necessary to understand structure-function correlations in inorganic systems. The tools include chemical forces, symmetry and point groups, qualitative molecular orbital theory and coordination chemistry. This course will cover 12 chapters in the textbook, ranging from the first principles, transition elements to bioinorganic chemistry. The laboratory work will supplement lecture material. 4 credits. Prerequisite(s): CHEM 3222K Offered: Spring .

CHEM 3232. Intermediate Inorganic Chemistry II. (3 Credits)

This course involves the study of the transition element including bonding of coordination compounds, stereo-chemistry and reactions, and an introduction to organ metallic chemistry and catalysis.

CHEM 3250K. Biochemistry I. (4 Credits)

In this course, the student examines the structure and function and of carbohydrates, amino acids and proteins, lipids, and nucleic acids. The laboratory work is designed to supplement lectures. 4 credits. Prerequisite(s): CHEM 2302K Offered: Spring, Fall, Summer.

CHEM 3252. Biochemistry II. (3 Credits)

Designed to present details of biochemical processes normally covered in the second semester of a two semester biochemistry sequence. This includes an in-depth study of the metabolism of amino acids, lipids, carbohydrates and nucleic acids; advanced enzyme kinetics; reaction mechanisms and regulatory pathways. Recombinant DNA technology will also be addressed. Prerequisite(s): CHEM 3250K Offered: Not offered on a regular basis .

CHEM 3300. Nanoscience and Nanotechnology. (3 Credits)

This course is designed for a multidisciplinary audience with a variety of backgrounds such as chemistry, biology, physics, and forensic science. It will provide an introduction into the principles and applications of the promising field of nanotechnology and nanoscience, Furthermore, it will introduce the tools and principles relevant at the nanoscale dimension, and discuss current and future nanotechnology applications in engineering, materials, physics, chemistry, biology, electronics and energy. 3 credits. Prerequisite(s): CHEM 2302K and BIOL 2107K and (PHYS 1112K or PHYS 2222K). Offered: Fall .

CHEM 3400. Polymer Science. (3 Credits)

Polymer science has diffused into the modern world with polymers finding applications in areas such as construction materials, drug design, computing hardware and optoelectronics, healthcare as well as biomedical applications. This course provides an introduction to the fundamental physical and chemical properties of polymers such as their molecular, thermal, mechanical, and electrical properties. In addition, we explore how these materials are synthesized, evaluated, and their commercial applications. 3 credits. Prerequisite(s): CHEM 2302K Offered: Fall.

CHEM 4100K. Instrumental Analysis. (4 Credits)

In this course, the student will be introduced to study the principles and applications of modern instrumental methods of analysis with special emphasis on spectrophotometric, chromatographic, electroanalytical and radiochemical techniques. The laboratory work is designed to provide the practical experience on state-of-the-art analytical instruments such as NMR, IR spectrophotometer and Scanning Electron Microscope. Prerequisite(s): CHEM 3222K US C Offered: Spring.

CHEM 4110. Chemical Literature I. (1 Credit)

This course is designed to acquaint the student with ethics, governmental regulations of chemicals in the work place, and primary sources of information from journals to databases that are currently available. 1 credit. Prerequisite(s): Senior Status Offered: Fall.

CHEM 4111. Junior Seminar. (1 Credit)

This course is designed to train students in using science literature and presenting scientific information. Students will review scientific writing styles and presentation formats, prepare a poster presentation, and observe and evaluate scientific presentations by invited guest, ASU faculty and senior students. Prerequisite(s): Junior Status.

CHEM 4120. Senior Research I. (1 Credit)

In this course, students will present preliminary plans/ background of their senior research proposals following a review of the current literature. 1 Credit. Prerequisite(s): CHEM 4111 Offered: Fall.

CHEM 4130K. Senior Research II. (3 Credits)

In this course, students select a research area in chemistry and the final written report is completed as a senior thesis (Off campus research experience or industrial co-op/ internships may be substituted if taken at the junior/senior level). 3 credits. Prerequisite(s): CHEM 4120 Offered: Spring, Fall.

CHEM 4140. Advanced Biochemistry. (3 Credits)

This course examines detailed biochemical pathways and elucidates the nature and mechanism of these reactions with special emphasis on the quantification of the chemical components of cells. Prerequisite(s): CHEM 3250K US C.

CHEM 4150K. Computational Chemistry. (4 Credits)

Computer application of molecular orbital calculation using semiempirical and abinitio programs incorporating molecular modeling aspects are investigated in this course. Prerequisite(s): CHEM 3222K US.

CHEM 4160. Special Topics in Chemistry. (2 Credits)

Must be enrolled in one of the following Class(s): Junior, Senior - This course is designed to allow students and faculty to explore some topics in greater detail than in a regular classroom setting, or to allow the introduction of such additional topics as specific areas of biochemistry, chemical physics, polymer chemistry, bio-analytical and environmental chemistry. Prerequisite(s): Permission of Instructor (may be repeated twice)

CHEM 4170K. Special Laboratory Problems. (2 Credits)

This course is similar to Special Topics in Chemistry (CHEM 4160) but involves laboratory experiences. Prerequisite(s): Senior status and permission of Instructor. 2 credits. Offered: Not offered on a regular basis .

CHEM 4180K. Topics in Research Techniques. (4 Credits)

This course examines relevant methods and techniques that are used in biomedical research. Prerequisite(s): Permission of instructor.

CHEM 4200K. Environmental Chemistry. (4 Credits)

This course will include an overview of the earth and its atmosphere and a study of the chemical processes that occur in this environment. The chemical structures and toxic properties of chemical pollutants and the reactions in the environment will be included, as well as a discussion of the sources for chemical contamination and methods for controlling pollution. Prerequisite(s): CHEM 2302K and MATH 1113 Offered: Not offered on a regular basis .

CHEM 4210K. Nanoscale Analytical Methods. (4 Credits)

This course provides an introduction to the novelty, the challenge and the excitement of nanoscale science and technology. This course is designed to explore the principles of nanoscale analytical methods that are essential to nanoscience and nanomaterial chemistry. This course will also provide fundamental theoretical and practical knowledge of nanomaterials. The Students will be introduced to applications and characterizations of nanomaterials. Prerequisite(s): CHEM 2352K Offered: Not offered on a regular basis .