

CHEMISTRY

CHEM 0100 PREPARATION FOR GENERAL CHEMISTRY 3 cr.

Course for students who intend to take CHEM 0110 later, but whose science and mathematics backgrounds are weak. Through intensive drill, this course seeks to acquaint students with skills required in CHEM 0110, CHEM 0120.

Prerequisite: None

CHEM 0110 GENERAL CHEMISTRY 1 4 cr.

Introductory course dealing with the structure of matter, stoichiometry, and the principal classes of chemical equilibrium. Most applications taken from the field of inorganic chemistry. No prior work in chemistry required for admission. Three hours of lecture and four hours of laboratory and recitation per week.

Prerequisite: None. Corequisite: MATH 0020 or MATH 0031.

CHEM 0120 GENERAL CHEMISTRY 2 4 cr.

Introductory course dealing with the structure of matter, stoichiometry, and the principal classes of chemical equilibrium. Most applications taken from the field of inorganic chemistry. Three hours of lecture and four hours of laboratory and recitation per week.

Prerequisite: CHEM 0110.

CHEM 0250 INTRODUCTORY ANALYTICAL CHEMISTRY 3 cr.

Expands and extends the treatment of equilibria discussed in CHEM 0120. Introduced are electro analytical methods, emission and absorption spectrophotometry, and modern separation methods, particularly chromatography. Normally the laboratory is part of the course and should be taken concurrently. Three hours of lecture per week.

Prerequisite: CHEM 0120 or CHEM 0970. Corequisite: CHEM 0260.

CHEM 0260 INTRODUCTORY ANALYTICAL CHEMISTRY LABORATORY 1 cr.

Deals with titrimetry, potentiometry, emission and absorption spectrophotometry, gravimetric analysis, and ion exchange column chromatography. Trace analysis of common pollutants is included. One four-hour laboratory per week.

Corequisite: CHEM 0250.

CHEM 1130 **INORGANIC CHEMISTRY** **3 cr.**

Modern bonding theories are developed to the level that permits some understanding of the effects of structure and bonding on chemical properties. Periodic relationships are discussed and applied to selected families of elements. Emphasis is placed on those aspects of structure, bonding and periodic relationships that are helpful in unifying a large body of chemical knowledge. Selected topics of current interest in inorganic chemistry are discussed.

Prerequisite: CHEM 0320.

CHEM 1250 **INSTRUMENTAL ANALYSIS** **3 cr.**

The basic principles and instrumentation of important methods and their application to analysis and research problems. The coverage includes spectroscopic and electrochemical methods and chromatography. Equilibrium and dynamic aspects of each are considered.

Prerequisites: CHEM 0250, CHEM 0260. Corequisite: CHEM 1255.

CHEM 1255 **INSTRUMENTAL ANALYSIS LABORATORY** **1 cr.**

Students will be introduced to state-of-the-art instrumentation being used in contemporary analytical chemistry.

Corequisite: CHEM 1250.

CHEM 1275 **INTRODUCTION TO CHEMOMETRICS** **3 cr.**

This course is an introduction to mathematical and statistical methods and techniques for analysis of data and results generated by various instrumental methods of chemical analysis (e.g., UV-visible, fluorescence, NMR, and FTIR spectrometric methods, gas and liquid chromatographic methods, GC/MS, voltammetric methods), which are capable of producing large amounts of data for multiple samples and analytes in a single experiment. Topics to be covered include review of descriptive statistics, rejection and retention of outlier data, significance testing involving two or more data sets, matrix operations, analyte quantitation via univariate and multivariate calibration (e.g., direct and inverse calibration and quantitation) and regression (e.g., ordinary (OLS), inverse (ILS), and partial least squares (PLS), principal component (PC), and singular value decomposition (SVD) regression) methods, and analyte identification via pattern recognition methods (e.g., principal component analysis (PCA), factor analysis (FA), and singular value decomposition (SVD)). Emphasis will be placed on multivariate systems, and approaches for determination of multiple analyte concentrations in such systems using various chemometric tools. Software such as Microsoft® Excel™ and MATLAB® will be used extensively for analysis of large and small amounts of analytical data. The assessments for this course will be take-away assignments to be completed independently by the students.

Prerequisite: CHEM 0250.

CHEM 1311 ADVANCED ORGANIC CHEMISTRY 3 cr.

Advanced Organic Chemistry will cover several advanced topics of Organic Chemistry including: named organic reactions, other advanced reactions including stereoselective and stereospecific reactions, cycloaddition reactions, sigmatropic rearrangements, and organometallic reactions; mechanisms, synthetic applications. A detailed study of reactive intermediates, equilibria, and through the study of all of these topics, the principles of Physical Chemistry will be applied to the product distribution or organic reactions.

Prerequisites: CHEM 0320, CHEM 0340.

CHEM 1380 TECHNIQUES OF ORGANIC RESEARCH 2 cr.

Serves as a guide to the interpretation of ultraviolet, infrared, nuclear magnetic resonance and mass spectra of organic compounds.

Prerequisite: CHEM 0320.

CHEM 1410 PHYSICAL CHEMISTRY 1 3 cr.

Dealing with quantum theory, atomic and molecular structure, symmetry, spectroscopy and diffraction methods.

Prerequisites: CHEM 0320, CHEM 0340; MATH 0240.

CHEM 1420 PHYSICAL CHEMISTRY 2 3 cr.

Dealing with gases, kinetic theory, chemical thermodynamics, equilibria, and chemical kinetics.

Prerequisite: CHEM 1410.

CHEM 1430 PHYSICAL CHEMISTRY LABORATORY 1 1 cr.

Approximately eight experiments are performed during the term. Experiments are selected to illustrate important principles of Physical Chemistry and to make the student familiar with important experimental methods. Intended to make the student think critically about reliability of experimental results and to attempt to interpret them in the light of his previous chemical experience.

Prerequisite: CHEM 1410. Corequisite: Chem 1420.

CHEM 1461 MOLECULAR MODELING 3 cr.

Provides a basic understanding of various methods used in molecular modeling computer programs and provide hands-on experience with several modeling programs. Background theory for various methods, including ab initio, semi-empirical, and molecular mechanics, will be discussed, and the techniques will then be used to examine chemical systems.

Prerequisite: CHEM 1410.

CHEM 1700 UNDERGRADUATE RESEARCH SEMINAR 1 cr.

Seminar given by faculty on undergraduate research opportunities in chemistry. Open to all students regardless of departmental affiliation, but is designed especially to help those students who may take CHEM 1710 in their selection of a research project.

Note: Instructor Permission Required.

CHEM 1702 UNDERGRADUATE RESEARCH WRITING 3 cr.

Seminar given by faculty on undergraduate research opportunities in chemistry which will include a major research paper. This course is designed for chemistry majors.

CHEM 1710 UNDERGRADUATE RESEARCH 1-6 cr.

Elective course where a research project is carried out under the direction of a member of the chemistry faculty. It is for the serious student who wishes to expand his scholarly interests. Approximately four hours research per week per credit; usually no more than three credits per term.

Note: Instructor Permission Required.

CHEM 1720 UNDERGRAD TEACHING EXPERIENCE 1-4 cr.

Students can gain teaching experience by serving as instructors in one of the undergraduate chemistry lab courses.

Note: Department Consent Required.

CHEM 1902 DIRECTED STUDY 1-6 cr.

Directed study in a specific area of chemistry to enhance preparation for undergraduate research.

Note: Department Consent Required.

CHEM 1950 CHEMISTRY LAB INTERNSHIP 1 1-3 cr.

Internship opportunities in Chemistry lab.

Note: Instructor Permission Required.

CHEM 1951 CHEMISTRY LAB INTERNSHIP 2 1-3 cr.

Internship opportunities in Chemistry lab.

Note: Instructor Permission Required.

CHEM 1952

ANALYTICAL LABORATORY INTERNSHIP

1-2 cr.

Provides the student with an opportunity to gain teaching experience in the Analytical Chemistry laboratory.

Prerequisite: Instructor Permission Required.