CHEMISTRY - CHM

CHM 104 Energy, Environment, and Society **3 Credits**
Designed to provide a better understanding of energy and our environment, including man's interaction with his environment and the consequences facing society today.
Fulfills College Core: Field 6 (Natural Sciences), Global Awareness
Offered: every fall.

CHM 111 General Chemistry I **3 Credits**
General Chemistry I for science majors. Inorganic nomenclature, stoichiometry, solutions, basic chemical reactions, thermochemistry, atomic and molecular structure, periodic properties, gas laws, and states of matter. Three lectures and one recitation per week.
Corequisite: CHM 111L.
Fulfills College Core: Field 6 (Natural Sciences)
Offered: every fall.

CHM 111L General Chemistry I Laboratory **1 Credit**
Covers techniques of measurements, decantation, and filtration; use of a data acquisition system with temperature probe, pressure sensor, and spectrophotometer; analysis of data and developing a conclusion based on data trends. One three-hour lab per week.
Corequisite: CHM 111.
Offered: every fall.

CHM 112 General Chemistry II **3 Credits**
General Chemistry II for science majors. Properties of solutions (including colligative properties), kinetics, chemical equilibrium concepts, calculations involving acid/base and precipitation equilibria, thermodynamics (second and third law), electrochemistry, nuclear chemistry, and chemistry of the environment. A minimum grade of C in CHM 112 is required for all chemistry and biochemistry majors. Three lectures and one recitation per week.
Prerequisite: minimum grade of C- in CHM 111. **Corequisite:** CHM 112L.
Fulfills College Core: Field 6 (Natural Sciences)
Offered: every spring.

CHM 112L General Chemistry II Laboratory **1 Credit**
Builds on techniques developed in CHM 111L and covers solution dilution, titration, pipetting, and use of a pH electrode and current probe. One three-hour lab per week.
Prerequisite: minimum grade of C- in CHM 111L. **Corequisite:** CHM 112.
Offered: every spring.

CHM 227 Organic Chemistry I **3 Credits**
Fundamental treatment of organic chemistry. Bonding, structure, nomenclature, and stereochemistry of organic functional groups. Mechanisms and reactivity in substitution and elimination reactions. Three lectures and one recitation per week.
Prerequisite: minimum grade of C- in CHM 111 and CHM 112. **Corequisite:** CHM 227L.
Offered: every fall.

CHM 227L Organic Chemistry I Laboratory **1 Credit**
Techniques for synthesis, separation, purification, and analysis of organic compounds. One four-hour lab per week.
Prerequisite: minimum grade of C- in CHM 111L. **Corequisite:** CHM 227.
Offered: every fall.

CHM 228 Organic Chemistry II **3 Credits**
Continuation of organic chemistry. Chemistry and reaction mechanisms of unsaturated compounds, and oxygen and nitrogen-containing functional groups. Introduction to the organic chemistry of carbohydrates, lipids and peptides. Three lectures and one recitation per week.
Prerequisite: minimum grade of C- in CHM 227. **Corequisite:** CHM 228L.
Offered: every spring.

CHM 228L Organic Chemistry II Laboratory **1 Credit**
Expands on techniques for synthesis, separation, purification, and analysis of organic compounds. One four hour lab per week.
Prerequisite: minimum grade of C- in CHM 227L. **Corequisite:** CHM 228.
Offered: every spring.

CHM 230 Analytical Chemistry **3 Credits**
Principles and methodology of modern analytical chemistry presented with particular emphasis on statistical error analysis, titrations, solution equilibrium, and potentiometry. Three lectures and one recitation per week.
Prerequisite: minimum grade of C in CHM 112. **Corequisite:** CHM 230L.
Offered: spring of even-numbered years.

CHM 230L Analytical Chemistry Laboratory **1 Credit**
Fundamental techniques of quantitative analysis including titrations in multiple reaction paradigms, potentiometry, absorption spectrometry, and separation technologies. One four-hour lab per week.
Prerequisite: minimum grade of C- in CHM 112L. **Corequisite:** CHM 230.
Offered: spring of even-numbered years.

CHM 232 Environmental Analytical Chemistry **3 Credits**
Environmental applications of analytical chemistry. Sampling techniques and statistical analysis of data. Aquatic chemistry and atmospheric chemistry. Analysis with traditional methods, electroanalytical, liquid and gas chromatography, elemental spectroscopy and ion selective electrodes. Three lectures per week.
Prerequisite: CHM 112. **Corequisite:** CHM 232L.
Offered: spring of odd-numbered years.

CHM 232L Environmental Analytical Chemistry Laboratory **1 Credit**
Introduction and demonstration of fundamental techniques of quantitative analysis including titrations, potentiometry, spectrometry, chromatography, and separation technologies. One 75-minute lab per week.
Prerequisite: CHM 112L. **Corequisite:** CHM 232.
Offered: spring of odd-numbered years.

CHM 244 Inorganic Chemistry **3 Credits**
Electronic configuration of atoms, periodic classification of the elements, nature of chemical bonding, symmetry and application of group theory to molecular orbitals, structures and thermodynamics of solids, bonding in metals and semiconductors, acid/base concepts, electrochemistry, isomerism, bonding, reactions and spectroscopy of coordination compounds, and other aspects of modern inorganic chemistry. Three lectures and one recitation per week.
Prerequisite: minimum grade of C in CHM 112.
Offered: every fall.

CHM 301 Fundamental Physical Chemistry **3 Credits**
Fundamental topics in thermodynamics, kinetics, and quantum chemistry. Three lectures and one recitation per week.
Prerequisite: minimum grade of C in CHM 112, successful completion of MAT 111 or MAT 110, and a year of physics (PHY 201 & PHY 202 or PHY 223 & PHY 224).
Offered: every fall.

CHM 301L Fundamental Physical Chemistry Laboratory **1 Credit**
Selected experiments demonstrating principles of thermodynamics, including bomb calorimetry, and chemical kinetics. One four-hour lab per week.
Prerequisite: CHM 301 (or concurrent registration in CHM 301).
Fulfills College Core: Advanced Writing-Intensive
Offered: fall of odd-numbered years.

CHM 302 Modern Physical Chemistry **3 Credits**
Introduction to quantum chemistry with applications to the structure of atoms and molecules. Molecular spectroscopy. Three lectures and one recitation per week.
Prerequisite: minimum grade of C in CHM 112, CHM 244, successful completion of MAT 111 or MAT 110, MAT 112, a year of physics (PHY 201 & PHY 202 or PHY 223 & PHY 224).
Offered: spring of even-numbered years.

CHM 302L Modern Physical Chemistry Laboratory **1 Credit**
Selected spectroscopy and computational chemistry experiments with applications to molecular structure. One four-hour lab per week.
Prerequisite: CHM 302 (or concurrent registration in CHM 302).
Offered: spring of even-numbered years.

CHM 334 Spectrometric Analysis **3 Credits**
Spectrometric methods for the elucidation of chemical structures. Includes nuclear magnetic resonance, infrared, ultraviolet and mass spectrometry. Emphasis on organic compounds. Three lectures per week.
Prerequisite: CHM 228.
Offered: every fall.

CHM 334L Spectrometric Analysis Lab **1 Credit**
Nuclear magnetic resonance, infrared, ultraviolet and mass spectrometry of organic compounds. One four-hour lab per week.
Prerequisite: CHM 228L.
Offered: every fall.

CHM 402 Advanced Physical Chemistry **3 Credits**
Introduction to statistical thermodynamics. Applications of group theory to chemical bonding and molecular spectroscopy. Angular momentum coupling in atomic and molecular spectroscopy. Three lectures per week.
Prerequisites: MAT 111 & MAT 112; CHM 244; CHM 302 (may be taken concurrently); and either PHY 201 & PHY 202 or PHY 223 & PHY 224.
Offered: occasionally.

CHM 420 Materials Chemistry **3 Credits**
A survey of topics and applications in modern materials chemistry including solid state materials, semiconductors, polymers, nanomaterials, and introductions to mechanical properties, device fabrication, and structure-activity relationships.
Prerequisite: CHM 228 & CHM 244 (or concurrent registration in CHM 244). **Corequisite:** CHM 420L.
Offered: anticipated spring 2023.

CHM 430 Instrumental Analytical Chemistry **3 Credits**
Advanced instrumental methods of analysis including spectroscopy, chromatography and various electrochemical techniques. Three lectures per week.
Prerequisite: CHM 112 & CHM 228 (or concurrent registration in CHM 228).
Offered: spring of odd-numbered years.

CHM 430L Instrumental Analytical Chemistry Laboratory **1 Credit**
Atomic absorption spectroscopy, chromatography and various electrochemical techniques. One four-hour lab per week.
Prerequisite: CHM 112L & CHM 228L (or concurrent registration in CHM 228L). **Corequisite:** CHM 430.
Offered: spring of odd-numbered years.

CHM 450 Research in Chemistry **3 Credits**
Independent research under the direction of the chemistry faculty. Students are required to spend 9 hours per week conducting research. CHM 450 may be taken in place of a chemistry elective without lab. Research and consultation times to be arranged after approval of department chair.
Prerequisite: permission of department chair.
Offered: fall & spring.

CHM 451 Research in Chemistry **4 Credits**
Independent research under the direction of the chemistry faculty. Students are required to spend 12 hours per week conducting research. CHM 451 may be taken in place of a chemistry elective with lab. Research and consultation times to be arranged after approval of department chair.
Prerequisite: permission of department chair.
Offered: fall & spring.

CHM 455 Medicinal Chemistry **3 Credits**
Chemical principles are used to explain the interaction of drugs with biological targets. Strategies used in the design and development of medicines are discussed.
Prerequisite: CHM 228 & BCH 301.
Offered: spring of even-numbered years.

CHM 480 Chemistry and Biochemistry Seminar **0 Credits**
Chemistry and biochemistry majors attend seminars given by senior chemistry and biochemistry majors, and external speakers.
Prerequisite: CHM 228.
Offered: every spring.

CHM 481 Communicating Concepts in Chemistry and Biochemistry **3 Credits**
Seminar for chemistry and biochemistry majors. Introduces scientific literature and oral communication in chemistry and biochemistry. Students learn how to prepare and then deliver a polished scientific presentation. Students also attend seminars given by external speakers on chemistry and biochemistry topics.
Prerequisite: CHM 228 and CHM 480.
Fulfills College Core: Oral Communication
Offered: every spring.

CHM 490 Chemistry Internship **3 Credits**
Internships in chemical or biochemical industry under the direction of company and faculty supervisors.
Prerequisite: permission of department chair & associate dean.
Offered: fall & spring.

CHM 499 Independent Study **3-4 Credits**
Independent study under the direction of the chemistry faculty. Independent studies require an application and approval by the associate dean.
Prerequisite: permission of the instructor, department chair, & associate dean.
Offered: fall & spring.