

# Chemistry

Chemistry majors and minors must earn a minimum grade of C- in all chemistry courses.

## LOWER DIVISION

**CHEM 100. From Stars to Rocks: Being a Scientist in the 21st Century** (3). Introduction to the impact of astronomy, chemistry, physics, and geology on student life and society, practical aspects of the study of the disciplines and associated careers from different perspectives. [GE.]

**CHEM 107. Fundamentals of Chemistry** (4). Terminal course. Fundamental concepts and applications of general and inorganic chemistry. [Letter grade only. Prereq: ELM score of 42 or higher. Weekly: 3 hrs lect, 3 hrs lab. GE.]

**CHEM 109. General Chemistry I** (5) **FS**. Fundamental concepts: chemical foundations, stoichiometry, chemical reactions, gases, thermochemistry, atomic theory, bonding, liquids, solutions. For students in science, engineering, and related majors. [Letter grade only. Prereq: math remediation completed or not required. Weekly: 3 hrs lect, 3 hrs lab, 1 hr disc. GE.]

**CHEM 110. General Chemistry II** (5) **FS**. Fundamental concepts: kinetics; equilibrium; acids and bases; acid-base, solubility, and complex ion equilibria; entropy and free energy; electrochemistry; qualitative analysis. For students in science, engineering, and related majors. [Letter grade only. Prereq: CHEM 109. Weekly: 3 hrs lect, 6 hrs lab.]

**CHEM 128. Introduction to Organic Chemistry** (3). An introductory course in organic chemistry for natural resource majors. Topics will include structure and bonding, nomenclature, and common functional groups and their reactivity. [Prereq: CHEM 107. Weekly: 2 hrs lect, 3 hrs lab.]

**CHEM 198. Supplemental Instruction** (1). Collaborative work for students enrolled in chemistry. [CR/NC. Rep.]

## UPPER DIVISION

**CHEM 308. Alchemy** (3). Inquiry into materials, methods, and processes of alchemy from perspectives of alchemist, contemporary chemistry. [GE.]

**CHEM 310. Inorganic Chemistry I** (3). Advanced concepts: nuclear properties, molecular symmetry, bonding, metallic and ionic solids, acids and bases, oxidation-reduction, non-aqueous media, chemistry and organometallic compounds of the representative elements. [Letter grade only. Prereq: CHEM 110 with a grade of C- or higher.]

**CHEM 321 - CHEM 322. Organic Chemistry** (5 & 5). One-year sequence. Chemical bonding, physical properties, stereochemistry, reaction mechanisms, synthesis. [Letter grade only. Prereq for CHEM 321: CHEM 110 with a grade of C- or higher. Prereq for CHEM 322: CHEM 321 with a grade of C- or higher; must take CHEM 323 concurrently. Weekly each semester: 3 hrs lect, 6 hrs lab.]

**CHEM 323. Nuclear Magnetic Resonance Spectroscopy (NMR) Techniques** (1). Operate NMR spectrometer; prepare samples. Individual projects. [Prereq: CHEM 321. Coreq: CHEM 322. CR/NC.]

**CHEM 328. Brief Organic Chemistry** (4) **FS**. For majors in biological science/natural resource areas. Nomenclature, physical properties, synthesis, and reactions of compounds representing major functional group categories. Reaction mechanisms emphasized. [Letter grade only. Prereq: CHEM 107 with a grade of C- or higher or CHEM 110 with a grade of C- or higher. Weekly: 3 hrs lect, 3 hrs lab.]

**CHEM 330. Molecular Modeling** (3). Apply molecular modeling and computational chemistry methods [semiempirical, ab initio, and density functional] to problems in organic and inorganic chemistry, biochemistry, and molecular biology. [Prereq: CHEM 328 or CHEM 322 (C). Weekly: 2 hrs lect, 3 hrs lab.]

**CHEM 341. Quantitative Analysis** (5) **F**. Principles and methods of classical chemical analysis. Introduction to instrumental methods. For chemistry majors and others who require a rigorous treatment of solution equilibria and training in precise quantitative lab techniques. [Prereq: CHEM 110 with a grade of C- or higher. Weekly: 3 hrs lect, 6 hrs lab.]

**CHEM 361. Physical Chemistry I** (3). Application of quantitative mathematical methods to fundamental chemical systems: equilibrium thermodynamics and chemical kinetics. [Prereq: CHEM 341 (C); PHYX 107 or PHYX 110 (C); MATH 205 or MATH 210; all with grades of C- or higher. Weekly: 2 hrs lect, 2 hrs activ.]

**CHEM 362. Physical Chemistry II** (3). Application of quantitative mathematical methods to fundamental chemical systems: quantum theory, spectroscopy, and statistical thermodynamics. [Prereq: CHEM 321; CHEM 361 all with a grade of C- or higher. Weekly: 2 hrs lect, 2 hrs activ.]

**CHEM 363. Physical Chemistry II Lab** (2). Experimental application of quantitative mathematical methods to fundamental chemical systems: laboratory investigations in equilibrium thermodynamics, chemical kinetics, quantum theory, spectroscopy, and statistical thermodynamics. [Prereq: CHEM 341 with a grade of C- or higher and CHEM 362 (C). Weekly: 6 hrs lab.]

 **CHEM 370. Earth System Chemistry** (3). Chemistry of the earth, including elemental cycling and speciation in the environment, the impact of man on biogeochemical processes, and the effects of climate change on the chemical/physical interactions occurring within and between the atmosphere, hydrosphere, and biosphere. [Prereq: CHEM 107 with a grade of C- or higher or CHEM 110 with a grade of C- or higher. Cannot be taken CR/NC.]

**CHEM 399. Supplemental Work in Chemistry** (1-3). Directed study for transfer student whose prior coursework is not equivalent to corresponding courses at HSU. [Prereq: DA. Rep.]

**CHEM 410. Inorganic Chemistry II** (3). Advanced concepts: chemistry and organometallic compounds of the transition metals, the lanthanoids, and the actinoids; reaction mechanisms; catalysis; solid state chemistry. [Prereq: CHEM 310. Offered alternate years.]

**CHEM 410L. Inorganic Chemistry II Lab** (2). Advanced laboratory and instrumentation techniques: synthesis, characterization, and reactions of inorganic and organometallic compounds. [Letter grade only. Prereq: CHEM 310 with a grade of C- or higher and CHEM 410 (C). Weekly: 6 hrs lab. Offered alternate years.]

**CHEM 431 - 432. Biochemistry** (5-5). One-year lect/lab sequence. Biochemical energetics, introductory metabolism, nature and mechanism of action of enzymes. [Prereq for CHEM 431: CHEM 110, any calculus course, and either CHEM 322 or CHEM 328 with a grade of C- or higher. Prereq for CHEM 432: CHEM 431 with a grade of C- or higher. Weekly: 3 hrs lect, 6 hrs lab.]

**CHEM 438. Introductory Biochemistry** (4). Brief course in biochemistry. The chemistry of amino acids, proteins, nucleic acids, lipids and carbohydrates. Includes enzyme kinetics, bioenergetics, structure and function of biological membranes, discussion of common laboratory methods. [Prereq: CHEM 322 or CHEM 328 with a grade of C- or higher. Weekly: 3 hrs lect, 1 hr disc.]

**CHEM 441. Instrumental Analysis** (4). Principles and methods. For chemistry majors and others requiring training in instrumental techniques of analysis. [Prereq: CHEM 341. Weekly: 2 hrs lect, 6 hrs lab.]

**CHEM 480. Selected Topics in Advanced Chemistry** (1-4). [Prereq: IA. Rep.]

**CHEM 485. Seminar in Chemistry** (1). Seminar presentations on current chemistry topics by majors with senior standing in chemistry. Capstone course. All chemistry majors are encouraged to attend. [Prereq: senior standing. Rep.]

**CHEM 495. Undergraduate Research** (1-3). Individual investigation of selected problem. Conference, reading, research. Final written report. For students showing outstanding ability. [Prereq: IA. Rep.]

**CHEM 499. Directed Study** (1-4). [Prereq: IA. Rep.]

## GRADUATE

**CHEM 599. Independent Study** (1-3). [Prereq: IA. Rep.]