

CH - CHEMISTRY (CH)

CH 1XX. Chemistry Elective. (1-3 Credits)

CH 101. Introductory Chemistry. (3 Credits)

A course in the fundamental principles of chemistry designed for students who have not had high school chemistry or students whose curriculum requires only one year of chemistry. Acceptable for credit toward general studies and certain majors including fashion merchandising and nursing. Not applicable for credit toward a chemistry major or minor. Requires concurrent enrollment in CH 101L unless already completed. (Fall, Spring, Summer)

CH 101L. Introductory Chemistry Laboratory. (1 Credit)

Laboratory for Chemistry 101 consisting of basic laboratory operations and techniques used in measuring physical and chemical properties. One 3-hour laboratory period per week. Requires concurrent enrollment in CH 101 unless already completed. (Fall, Spring, Summer)
Course Fees: \$50

CH 102. Introduction to Organic and Biochemistry. (3 Credits)

Continuation of Chemistry 101. Includes an introduction to organic chemistry and biochemistry. Acceptable for credit toward general studies or a major in nursing. Not applicable for credit toward a chemistry major or minor. Requires concurrent enrollment in CH 102L unless already completed. Prerequisite: CH 101 or 111. (Spring, Summer)

CH 102L. Introduction to Organic and Biochemistry Laboratory. (1 Credit)

Laboratory for Chemistry 102 provides further experience for developing laboratory skills and illustrating concepts presented in CH 102 lecture. One 3-hour laboratory period per week. Requires concurrent enrollment in CH 102 unless already completed. (Spring, Summer)
Course Fees: \$50

CH 111. General Chemistry. (3 Credits)

The fundamental principles and laws governing inorganic substances. Introductory materials, subatomic and atomic theory and structure, chemical bonding, molecular structure, chemical equations and calculations, thermochemistry, kinetic theory of matter and gas laws, and the periodic table. Requires concurrent enrollment in CH 111L unless already completed. Prerequisites: one unit of high school chemistry or CH 101; three units of high school mathematics through Algebra II, or MA 100 as a corequisite, and an ACT Science Reasoning Subtest score of 22 or above (combined SAT of 1030 or above). (Fall, Spring, Summer)

CH 111H. Honors General Chemistry. (3 Credits)

The fundamental principles and laws governing inorganic substances. Introductory materials, subatomic and atomic theory and structure, chemical bonding, molecular structure, chemical equations and calculations, thermochemistry, kinetic theory of matter and gas laws, and the periodic table. This course is open to students in the Honors Program and is, with department approval, also open to other qualified students and requires completion of special projects in addition to the requirements of CH 111. Requires concurrent enrollment in CH 111L unless already completed. Prerequisites: one unit of high school chemistry or CH 101; three units of high school mathematics through Algebra II, or MA 100 as a corequisite, and an ACT Science Reasoning Subtest score of 22 or above (combined SAT of 1030 or above). (Fall, Spring, Summer)

CH 111L. General Chemistry Laboratory. (1 Credit)

Laboratory for Chemistry 111 consisting of the determination of densities, chemical formulas, combining ratios, molar masses, molecular structure, group reactivities, ion identities, and specific heats and heats of solution. Requires concurrent enrollment in CH 111 unless already completed. One 3-hour laboratory period per week. (Fall, Spring, Summer)
Course Fees: \$50

CH 112. General Chemistry. (3 Credits)

Continuation of Chemistry 111. A study of chemical reactions in solution including solutions, spontaneity of reactions, free energy change, entropy change, equilibrium systems, rates of reaction, precipitation reactions, acids and bases, oxidation and reduction, and coordination compounds. The laboratory work consists of classical qualitative and quantitative procedures. A student must have a grade of C or better in CH 111 and 112 before enrolling in more advanced chemistry courses. Requires concurrent enrollment in CH 112L unless already completed. Prerequisites: CH 111, 111 L, or advanced placement. (Fall, Spring, Summer)

CH 112H. Honors General Chemistry. (3 Credits)

Continuation of Chemistry 111H. A study of chemical reactions in solution including solutions, spontaneity of reactions, free energy change, entropy change, equilibrium systems, rates of reaction, precipitation reactions, acids and bases, oxidation and reduction, and coordination compounds. The laboratory work consists of classical qualitative and quantitative procedures. This course is open to students in the Honors Program, is, with department approval, open to other qualified students, and requires completion of special projects in addition to the requirements of CH 112. A student must have a grade of C or better in CH 111 and 112 before enrolling in more advanced chemistry courses. Requires concurrent enrollment in CH 112L unless already completed. Prerequisites: CH 111 or 111H, 111L, or advanced placement. (Fall, Spring, Summer)

CH 112L. General Chemistry Laboratory. (1 Credit)

Laboratory for Chemistry 112 consisting of the qualitative and quantitative analysis of selected chemicals; the determination of rates of reaction and equilibrium constants; and the measurement of pH and acid-base titrations. Requires concurrent enrollment in CH 112 unless already completed. One 3-hour laboratory period per week. (Fall, Spring, Summer)
Course Fees: \$50

CH 299H. Honors Science Symposium. (1 Credit)

A cultural, historical, and technical exploration of natural science surveying a selection of major discoveries, failed paradigms, and unresolved questions. CH 299H is open to Honors Program Students having more than 48 hours credit or by permission of the instructor. (Spring)

CH 311. Organic Chemistry. (4 Credits)

Basic principles of organic chemistry with reference to an integrated study of aliphatic and aromatic compounds, nomenclature, classification, reactions, mechanisms, and spectroscopy. Requires concurrent enrollment in CH 311L unless already completed. Prerequisites: Grades of C or better in CH 111, 111L, 112 and 112L or credit for CH 112, CH 112L and CH 102, CH 102L. (Fall, Spring, Summer)

CH 311L. Organic Chemistry Laboratory. (1 Credit)

Laboratory for Chemistry 311. Illustrates organic chemistry laboratory techniques and preparations of selected organic compounds. Requires concurrent enrollment in CH 311 unless already completed. One 3-hour laboratory period per week. Prerequisites: CH 112, CH 112L. (Fall, Spring, Summer)
Course Fees: \$50

CH 312. Organic Chemistry. (4 Credits)

A continuation of Chemistry 311, with consideration given to heterocyclic compounds, photochemistry, polymers, and natural products. Requires concurrent enrollment in CH 312L unless already completed. Prerequisites: CH 311, 311L. (Spring, Summer)

CH 312L. Organic Chemistry Laboratory. (1 Credit)

Laboratory for Chemistry 312. A continuation of CH 311L. One 3-hour laboratory period per week. Requires concurrent enrollment in CH 312 unless already completed. Prerequisite: CH 311L. (Spring, Summer)
Course Fees: \$50

CH 321. Quantitative Analysis. (3 Credits)

Principles and techniques of gravimetric and volumetric chemical analysis. Requires concurrent enrollment in CH 321L unless already completed. Prerequisite: grades of C or better in CH 111, 111L, 112 and 112L. (Fall)

CH 321LW. Quantitative Analysis Laboratory. (2 Credits)

Laboratory for Chemistry 321 illustrating the principles and techniques of gravimetric and volumetric chemical analysis. Includes training in the preparation of technical reports. Requires concurrent enrollment in CH 321 unless already completed. Two 3-hour laboratory periods per week. Prerequisites: CH 112, 112L. (Fall)
Course Fees: \$50

CH 322. Instrumental Analysis. (3 Credits)

Principles of operation and application of instrumental methods of chemical analysis involving spectrophotometry, spectroscopy, electroanalytical methods, and chromatography. Not applicable for credit for students taking the professional chemistry major or who may otherwise have credit for CH 432. Requires concurrent enrollment in CH 322L unless already completed. Prerequisites: CH 311 and CH 311 L. (Spring)

CH 322LW. Instrumental Analysis Laboratory. (2 Credits)

Laboratory for Chemistry 322 consisting of experiments illustrating the calibration and operation of and use of data from instruments discussed in CH 322. Includes training in the preparation of technical reports. Two 3-hour laboratory periods per week. Requires concurrent enrollment in CH 322 unless already completed. Prerequisites: CH 311, 311L. (Spring)

CH 341. Applied Physical Chemistry. (3 Credits)

A survey course of physical chemistry studying equilibrium thermodynamics and chemical kinetics with a focus on environmental health and life science applications. Requires concurrent enrollment in CH 341L unless already completed. Prerequisites: grades of C or better in CH 111, 111L, 112, 112L; MA 122 or 125. (Fall)

CH 341L. Applied Physical Chemistry Laboratory. (1 Credit)

Laboratory for Chemistry 341 presents diverse experimental methods for determining properties for chemical systems. Topics covered include data reduction techniques and precision analysis. Requires concurrent enrollment in CH 341 unless already completed. One 3-hour laboratory period per week. (Fall)
Course Fees: \$50

CH 371L. Laboratory Arts. (1 Credit)

Construction and repair of glass apparatus. One 3-hour laboratory period per week. Prerequisite: two years of chemistry or consent of department. (Offered on sufficient demand)
Course Fees: \$50

CH 381. Physical Chemistry. (4 Credits)

Equations of state, equilibrium thermodynamics, and ideal and nonideal solutions. Requires concurrent enrollment in CH 381L unless already completed. Prerequisites: Grades of C or better in CH 111, 111L, 112 and 112L; MA 126 or concurrently; PH 251. (Fall)

CH 381L. Physical Chemistry Laboratory. (1 Credit)

Laboratory for Chemistry 381 consisting of experimental techniques for measuring properties of physicochemical systems. Requires concurrent enrollment in CH 381 unless already completed. One 3-hour laboratory period per week. (Fall)
Course Fees: \$50

CH 382. Physical Chemistry. (4 Credits)

A continuation of Chemistry 381 covering multicomponent phase equilibrium, electrochemistry, physical and chemical kinetics, quantum mechanics, atomic and molecular theory, and statistical mechanics. Requires concurrent enrollment in CH 382L unless already completed. Prerequisites: CH 381, 381 L. (Spring)

CH 382L. Physical Chemistry Laboratory. (2 Credits)

Laboratory for Chemistry 382 consisting of experiments in atomic and molecular spectroscopy, thermodynamics, electrochemistry, and chemical kinetics. Requires concurrent enrollment in CH 382 unless already completed. Two 3-hour laboratory periods per week. (Spring)
Course Fees: \$50

CH 432. Chemical Instrumentation. (3 Credits)

Principles of operation and application of instrumental methods of chemical analysis requiring calculus and physical chemistry in selected problems relating to spectrophotometry, spectroscopy, electroanalytical methods, and chromatography. Requires concurrent enrollment in CH 432LW unless already completed. Prerequisites: CH 311, 311L, 381, 381L. (Spring)

CH 432LW. Chemical Instrumentation Laboratory. (2 Credits)

Laboratory for Chemistry 432 consisting of the calibration, operation and use of data from instruments discussed in CH 432. Includes training in the preparation of technical reports. Two 3-hour laboratory periods per week. Requires concurrent enrollment in CH 432 unless already completed. Prerequisites: CH 381, 381L. (Spring)
Course Fees: \$50

CH 434. Advanced Organic Chemistry. (3 Credits)

An intensive study of selected topics of inorganic chemistry including atomic structure, acid base systems, selected groups of elements, group theory, and crystal field and ligand field theory as applied to coordination compounds. Requires concurrent enrollment in CH 434L unless already completed. Prerequisites: CH 381, CH 381L, or concurrently or by permission of instructor. (Spring)

CH 435L. Advanced Synthesis Laboratory. (2 Credits)

Laboratory emphasizing modern methods of synthesis and characterization of organic inorganic and organometallic compounds. Laboratory introduces students to multi-step synthesis and handling of air-sensitive compounds. Characterization of compounds includes the use of physical separation and spectroscopic techniques. Prerequisite: CH 312, CH 312L. Course fee: \$50.00. (Spring)
Course Fees: \$50

CH 437. Advanced Organic Chemistry. (3 Credits)

A study of the application of spectroscopic methods to the determination of organic structures. A review of selected organic mechanisms emphasizing classical reactive intermediates, stereochemistry, photochemistry, and orbital symmetry. Introduction to natural products chemistry. Requires concurrent enrollment in CH 437L unless already completed. Prerequisites: CH 312, 312L, 381, 381L, or by permission of instructor. (Fall)

CH 441. Biochemistry. (3 Credits)

Chemical interpretations of biological phenomena; compounds of biological significance as related to metabolism; carbohydrates, lipids, proteins, nucleic acids, and enzymes. Also listed as BI 441 but creditable only in field for which registered. Prerequisites: CH 312, 312L. (Fall)

CH 442. Advanced Biochemistry. (3 Credits)

A study of the structure and function of biochemical compounds with an emphasis on information pathways; biosynthesis and degradation of amino acids, nucleic acids, and fatty acids; and regulation of gene expression. Prerequisites: CH 441. (Spring)

CH 442L. Advanced Biochemistry Laboratory. (2 Credits)

Laboratory for Chemistry 442 provides a hands-on experience of experimental methods for the purification, detection, and analysis of biochemical compounds using current techniques and instrumentation. Two three-hour labs per week. Prerequisites: CH 441. Course Fee: \$50.00. (Spring)

CH 444. Quantum Mechanics. (3 Credits)

An introduction to quantum mechanics studying the postulates, the wave equation, operator techniques, atomic and molecular structure, and spectroscopy. Also listed as PH 444 but creditable only in field for which registered. Prerequisites: CH 381, 381L, or MA 126, PH 343. (Spring)

CH 456. Thermodynamics and Statistical Mechanics. (3 Credits)

Elements of classical statistical mechanics and thermodynamics with an introduction to quantum statistical mechanics. Also listed as PH 456 but creditable only in field for which registered. Prerequisites: CH 381, 381L. (Fall, odd-numbered years)

CH 465. Environmental Regulations. (3 Credits)

A study of the fundamental environmental laws and regulations of the United States. Primary emphasis will be on the Safe Drinking Water Act, the Clean Water Act, the Clean Air Act and the Resource Conservation and Recovery Act. Prerequisites: CH 112, 112L.

CH 471. Chemical Literature. (1 Credit)

Training in the use of chemical literature as found in technical libraries. One class period per week plus additional library assignments. Prerequisites: CH 312, 312L, 322, 322LW. (Offered on sufficient demand)

CH 480. Pre-Health Professions Internship. (1 Credit)

Designed to provide pre-health professions (pre-medicine, pre-dentistry, pre-optometry, pre-pharmacy, pre-physical therapy, pre-occupational therapy, pre-podiatry, and pre-veterinary) students direct contact with the health professions and the variety of aspects of health care delivery through supervised observation and instruction at an approved area hospital and/or private practice. Open to junior and senior pre-health professions students with a GPA not less than 3.0 and with approval of the pre-health professions advisor. Not applicable for credit toward a major or minor in biology; may be used as a general elective. Also listed as BI 480 but creditable only in field for which registered. (Fall, Spring)

CH 495. Senior Research/Internship. (1-2 Credits)

Independent research or internship on individual projects under faculty supervision for selected chemistry majors who have completed at least 64 credit hours with a minimum 3.0 overall scholastic average. Scheduled work and conferences require a minimum average of four hours per week per credit hour. Research or internship may be off campus at a preapproved site with credit depending on scope of project. May not be repeated. Prerequisites: CH 382, 382L, or departmental approval. (Fall, Spring, Summer)
Course Fees: \$50

CH 496. Senior Research /Internship. (1-2 Credits)

Independent research or internship on individual projects under faculty supervision for selected chemistry majors who have completed at least 64 credit hours with a minimum 3.0 overall scholastic average. Scheduled work and conferences require a minimum average of four hours per week per credit hour. Research or internship may be off campus at a preapproved site with credit depending on scope of project. May not be repeated. Students must receive departmental approval during the semester prior to enrolling in this course. Special fee: \$50.00 for on-campus projects. (Fall, Spring, Summer). Prerequisite: CH 495.
Course Fees: \$50

CH 497. Senior Research/Internship. (1-2 Credits)

Independent research or internship on individual projects under faculty supervision for selected chemistry majors who have completed at least 64 credit hours with a minimum 3.0 overall scholastic average. Scheduled work and conferences require a minimum average of four hours per week per credit hour. Research or internship may be off campus at a preapproved site with credit depending on scope of project. May not be repeated. Students must receive departmental approval during the semester prior to enrolling in this course. Special fee: \$50.00 for on-campus projects. (Fall, Spring, Summer). Prerequisite: CH 496.
Course Fees: \$50

CH 498. Senior Research/Internship. (1-2 Credits)

Independent research or internship on individual projects under faculty supervision for selected chemistry majors who have completed at least 64 credit hours with a minimum 3.0 overall scholastic average. Scheduled work and conferences require a minimum average of four hours per week per credit hour. Research or internship may be off campus at a preapproved site with credit depending on scope of project. May not be repeated. Students must receive departmental approval during the semester prior to enrolling in this course. Special fee: \$50.00 for on-campus projects. (Fall, Spring, Summer). Prerequisite: CH 497.
Course Fees: \$50