CH - CHEMISTRY (CH)

*Course Fees are Per Credit Hour

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) Course Fees: \$60

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: \$60

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) Course Fees: \$60

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: \$60

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: A minimum score of 22 on the ACT Science Reasoning Subtest, OR a minimum combined score of 1030 on the SAT, OR concurrent enrollment in CH 111S. Corequisite: CH 111L. (Fall, Spring, Summer) Course Fees: \$60

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: A minimum score of 22 on the ACT Science Reasoning Subtest, OR a minimum combined score of 1030 on the SAT, OR CH 101. Prerequisite or Corequisite: CH 111L. (Fall, Spring, Summer)

Course Fees: \$60

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. Prerequisite or Corequisite: CH 111 or CH 111H. (Fall, Spring, Summer) Course Fees: \$60

CH 111S. General Chemistry Supplemental Instruction. (1 Credit)

This course aims to support student success in General Chemistry through the promotion of active, collaborative learning involving critical thinking and transferable study skills. The course addresses the topics in CH 111 as well as time management, note-taking, textbook reading, comprehension and memory, critical thinking, test-taking strategies, and campus resources. CH 111 is a corequisite for this course. Corequisite: CH 111. (Fall, Spring)

Course Fees: \$60

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, 111L, or advanced placement. (Fall, Spring, Summer)

Course Fees: \$60

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. Prerequisite or Corequisite: CH 112L. (Fall, Spring, Summer) Course Fees: \$60

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. Prerequisite or Corequisite: CH 112 or CH 112H. (Fall, Spring, Summer) Course Fees: \$60

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)

Course Fees: \$60

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: CH 111, 111L, 112, 112L with a grade of C or better. (Fall, Summer) Course Fees: \$60

CH 311CH. Organic Chemistry - China Onsite. (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: CH 111, 111L, 112, 112L with a grade of C or better. (Fall, 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, Summer)

Course Fees: \$60

CH 311LC. 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, Summer)

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) Course Fees: \$60

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: \$60

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)

Course Fees: \$60

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: \$60

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 322LW unless already completed. Prerequisites: CH 311 and CH 311L. Corequisite: CH 322LW. (Spring) Course Fees: \$60

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) Course Fees: \$60

CH 331. Foundations of Biochemistry. (3 Credits)

An introduction to biochemical principles and chemical interpretations of biological phenomena. Topics include the structure and function of macromolecules and fundamentals of bioenergetics and metabolism. Prerequisites: CH 312, CH 312L. (Fall, Summer) Course Fees: \$60

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) Course Fees: \$60

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: \$60

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: \$60

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, 112L, MA 122 or 126 or concurrently, PH 241 or PH 251. (Fall, Odd-numbered years) Course Fees: \$60

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, Odd-numbered years) Course Fees: \$60

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, 381L. (Spring, Even-numbered years) Course Fees: \$60

CH 382L. Physical Chemistry Laboratory. (1 Credit)

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. One 3-hour laboratory period per week. (Spring, Evennumbered years)

Course Fees: \$60

CH 431. 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. Prerequisite: CH 331. (Spring, Odd-numbered years) Course Fees: \$60

CH 434. Advanced Inorganic 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. Prerequisites: CH 312, CH 312L or concurrently or by permission of instructor. (Fall, Even-numbered years) Course Fees: \$60

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. (Spring)

Course Fees: \$60

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. Prerequisites: CH 312, 312L, or by permission of instructor. (Spring, Even-numbered years) Course Fees: \$60

CH 442L. Biochemistry Laboratory. (2 Credits)

Biochemistry Laboratory is an experiential learning course. Students collaborate on authentic research projects to investigate the functions of proteins using both computational and wet lab methods. Two three-hour laboratory periods per week. Prerequisite: CH 331. (Spring, Odd-numbered years)

Course Fees: \$60

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 and CH 381L or MA 126 and PH 343. (Spring)

Course Fees: \$60

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) Course Fees: \$60

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) Course Fees: \$60

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. International students must receive approval from the Office of International Affairs prior to course registration. (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. International students must receive approval from the Office of International Affairs prior to course registration May not be repeated. Prerequisites: CH 382, 382L, or departmental approval. (Fall, Spring, Summer) Course Fees: \$60

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. International students must receive approval from the Office of International Affairs prior to course registration. Prerequisite: CH 495. (Fall, Spring, Summer) Course Fees: \$60

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. International students must receive approval from the Office of International Affairs prior to course registration. Prerequisite: CH 496. (Fall, Spring, Summer) Course Fees: \$60

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. International students must receive approval from the Office of International Affairs prior to course registration. Prerequisite: CH 497. (Fall, Spring, Summer) Course Fees: \$60