CHEMISTRY (CHE)

NOTE: All prerequisites for Chemistry (CHE) courses must be completed with a grade of "C-" or better.

Laboratory Course Policy: Space in laboratory courses is limited. To ensure the best possible service to all students, failure to attend the first laboratory and lecture sessions associated with a laboratory course may result in administrative removal from the course.

Chemistry (CHE) Courses

CHE 1004. Chemistry for Allied Health Sciences. (3-3) 4 Credit Hours. (TCCN = CHEM 1405)
Introduction to atomic structure, chemical bonding, stoichiometry, states of matter, inorganic chemical reactions, and acids and bases. The course has a laboratory component to introduce general chemical laboratory techniques, principles, and methods to reinforce lecture topics. For majors in occupational therapy, prenursing, and dental hygiene. May not be applied to a major or minor in chemistry, biology, or clinical laboratory sciences. (Formerly CHE 1003 and CHE 1011. Credit cannot be earned for both CHE 1003 and CHE 1004.) Course Fees: IUC1 $15; L001 $30; LRS1 $60; STSI $28.

CHE 1014. Elementary Organic and Biochemistry. (3-3) 4 Credit Hours. (TCCN = CHEM 1407)
Prerequisite: A grade of "C-" or better in CHE 1004 (or CHE 1003 in previous catalogs). A survey of the structures and reactions of some important functional groups of organic chemistry, and the relationship of these functional groups to the chemistry of lipids, carbohydrates, nucleic acids, and proteins. May not be applied to a major or minor in chemistry. Laboratory examination of the properties of some simple organic and biological chemicals; topics include solubility, crystallization, organic reactions, titration, enzyme action, sugars, and vitamins which will directly reinforce lecture topics. (Formerly CHE 1013 and CHE 1203. Credit can be earned for only ONE of the following: CHE 1013 or CHE 1014 or CHE 1203.) Course Fees: IUC1 $15; L001 $30; LRS1 $60; STSI $28.

CHE 1073. Basic Chemistry. (3-0) 3 Credit Hours.
A preparatory class for CHE 1103. This course focuses on traditionally difficult concepts encountered in CHE 1103. Topics include but are not limited to: dimensional analysis, significant figures, inorganic nomenclature, and qualitative and quantitative analyses of basic chemical reactions. May not be applied to a B.S. or B.A. in Chemistry. Generally offered: Fall, Spring, Summer. Course Fees: LRS1 $45; STSI $21.

CHE 1083. Introduction to the Molecular Structure of Matter. (3-0) 3 Credit Hours.
This course is an introduction to the structure of matter, with focus on the molecules of carbon that comprise living systems. Topics include covalent and ionic bonding, molecular structure, shape, and stability, isomers, organic functional groups and charge distribution in molecules, and bonding in solids. May be applied toward the Core Curriculum requirement in Life and Physical Sciences. (Same as CHE 1004. Credit cannot be earned for both CHE 1004 and CHE 1083.) Course Fees: LRC1 $12; LRS1 $45; STSI $21.

CHE 1093. Introduction to Molecular Transformations. (3-0) 3 Credit Hours.
Prerequisite: A grade of "C-" or better in CHE 1083 and in MAT 1073 or higher. This course is an introduction to the chemical reactions of matter, with focus on basic organic reactions that take place in living systems. Topics include classification of reactions, stoichiometry, reaction energetics, chemical equilibrium, acid-base chemistry, complex equilibria and reaction kinetics. May be applied toward the Core Curriculum requirement in Life and Physical Sciences. (Same as CHE 1014. Credit cannot be earned for both CHE 1014 and CHE 1093.) Course Fees: DL01 $75; LRC1 $12; LRS1 $45; STSI $21.

CHE 1103. General Chemistry I. (3-0) 3 Credit Hours. (TCCN = CHEM 1311)
Prerequisite: AP Chemistry Score of 3 or greater, or a grade of "C-" or better in CHE 1073, or above 70% mastery in the ALEKS Chemistry assessment. Concurrent enrollment in CHE 1121 is recommended. An introduction to descriptive inorganic chemistry and atomic-molecular structure, including such fundamental concepts as the periodic system of elements, valency, chemical bonding, reactions and reaction mechanisms, stoichiometry, equilibria, acids and bases, thermodynamics, molecular-kinetic theory, and states of matter. Credit cannot be earned for both CHE 1103 and CHE 1143. Generally offered: Fall, Spring, Summer. Course Fees: LRS1 $45; STSI $21.

CHE 1113. General Chemistry II. (3-0) 3 Credit Hours. (TCCN = CHEM 1312)
Prerequisite: A grade of "C-" or better in CHE 1103 or the equivalent. A continuation of CHE 1103. Elementary inorganic and physical chemistry; topics include solutions, electrolytes, oxidation-reduction reactions, reaction trends, coordination chemistry, basic thermodynamics, chemical kinetics, and nuclear chemistry. Primarily for science majors. Credit cannot be earned for more than one of the following: CHE 1113, CHE 1153, or CHE 1303. Generally offered: Fall, Spring, Summer. Course Fees: LRS1 $45; STSI $21.

CHE 1121. General Chemistry I Laboratory. (1-4) 1 Credit Hour. (TCCN = CHEM 1111)
Prerequisite: A grade of "C-" or better or concurrent enrollment in CHE 1103 (or CHE 1143 in previous catalogs). An introduction to chemical problem solving and the basic operations of the chemical laboratory, and a survey of inorganic chemical reactions. This course consists of problem sessions, lecture-demonstrations, and/or laboratory experience. Laboratory to accompany CHE 1103 and CHE 1143. This laboratory includes a lecture component. (Formerly CHE 1122. Credit cannot be earned for both CHE 1121 and CHE 1122.) Generally offered: Fall, Spring, Summer. Course Fees: IUC1 $15; L001 $30; LRS1 $15; STSI $7.

CHE 1131. General Chemistry II Laboratory. (1-4) 1 Credit Hour. (TCCN = CHEM 1112)
Prerequisites: A grade of "C-" or better in CHE 1103 and CHE 1121, and a grade of "C-" or better or concurrent enrollment in CHE 1113 (or CHE 1153 in previous catalogs). Techniques of qualitative and quantitative chemical analysis, illustrated primarily via inorganic chemical systems and their reactions. Laboratory to accompany CHE 1113. This laboratory includes a lecture component. (Formerly CHE 1312 and CHE 1312. Credit cannot be earned for more than one of the following: CHE 1131, CHE 1132 or CHE 1312.) Generally offered: Fall, Spring, Summer. Course Fees: IUC1 $15; L001 $30; LRS1 $15; STSI $7.
CHE 2603. Organic Chemistry I. (3-0) 3 Credit Hours. (TCCN = CHEM 2323)
Prerequisite: A grade of "C-" or better in CHE 1113 (or CHE 1153 in previous catalogs). A study of the fundamentals of organic structure, reaction mechanisms, synthesis and spectroscopy. Primarily for majors other than chemistry and biochemistry. Discussion and problems amplify and clarify the course topics. (Same as CHE 2703. Formerly CHE 2203, CHE 2204, and CHE 2604. Credit cannot be earned for more than one of the following: CHE 2203, CHE 2204, CHE 2603, CHE 2604, or CHE 2703). Generally offered: Fall, Spring, Summer. Course Fees: LRS1 $45; STSI $21.

CHE 2612. Organic Chemistry I Laboratory. (1-4) 2 Credit Hours.
Prerequisites: A grade of "C-" or better or concurrent enrollment in CHE 1131 and CHE 2603. The first of two semesters of organic chemistry laboratory. Qualitative analysis and determination of the physical constants of organic compounds. Separation, identification, and elementary synthesis of organic compounds. Laboratory techniques—crystallization, distillation, chromatographic and spectrosopic techniques (IR, NMR, MS)—are emphasized. This laboratory includes a lecture component. (Formerly CHE 2242. Credit cannot be earned for both CHE 2612 and CHE 2242.) Generally offered: Fall, Spring, Summer. Course Fees: IUC1 $15; L001 $30; LRS1 $30; STSI $14.

CHE 2703. Organic Chemistry I for Majors. (3-0) 3 Credit Hours.
Prerequisite: A grade of "C-" or better in CHE 1113 (or CHE 1153 in previous catalog). An in-depth study of the organic structure, reaction mechanisms, synthesis and spectroscopy. Primarily for chemistry and biochemistry majors. Discussion and practice of problems amplifying and clarifying the course. (Same as CHE 2603. Formerly CHE 2203, CHE 2204, and CHE 2604. Credit cannot be earned for more than one of the following: CHE 2203, CHE 2204, CHE 2603, CHE 2604, or CHE 2703.) Course Fees: LRS1 $45; STSI $21.

CHE 2803. Quantitative Topics for Chemists. (3-0) 3 Credit Hours.
Prerequisite: A grade of "C-" or better in MAT 1224. This course is intended for students majoring in chemistry and serves as a prerequisite for the introductory courses in physical chemistry. Topics include: power series, linear algebra, determinants, matrices, vector spaces, multi-variable calculus (partial differentiation, multiple integrals), complex variables, ordinary differential equations, numerical analysis, and numerical methods in integration, probability, statistics, regression methods and symbolic programming. (Formerly CHE 2802. Credit cannot be earned for both CHE 2802 and CHE 2803.) Generally offered: Spring. Course Fees: LRS1 $45; STSI $21.

CHE 3214. Analytical Chemistry. (2-5) 4 Credit Hours.
Prerequisites: A grade of "C-" or better in CHE 1113 (or CHE 1153 in previous catalogs) and CHE 1131. Topics in quantitative analysis including wet chemical and basic instrumental analysis; gravimetric, volumetric, electrochemical and spectrophotometric determinations combined with error analysis; fundamentals of chemical separations; applications of stoichiometry and chemical equilibria to design efficient analytical protocols. (Formerly CHE 3103 and CHE 3213. Credit cannot be earned for more than one of the following: CHE 3103, CHE 3213, or CHE 3214.) Generally offered: Fall, Spring. Differential Tuition: $200. Course Fees: IUC1 $15; L001 $30.

CHE 3464. Descriptive Inorganic Chemistry. (3-3) 4 Credit Hours.
Prerequisites: A grade of "C-" or better in CHE 1113 (or CHE 1153 in previous catalogs) and CHE 1131; concurrent enrollment in CHE 2603 recommended. The basic principles of inorganic chemistry applied to the properties, reactions, and periodicity of inorganic elements and compounds. Includes the synthesis and characterization of inorganic compounds and the use of specialized laboratory techniques. (Formerly CHE 3264. Credit cannot be earned for both CHE 3464 and CHE 3264.) Generally offered: Fall, Spring. Differential Tuition: $200. Course Fees: IUC1 $15; L001 $30.

CHE 3643. Organic Chemistry II. (3-0) 3 Credit Hours.
Prerequisite: A grade of "C-" or better in CHE 2603 (or CHE 2703). Continuing study of fundamentals of organic structure, reaction mechanisms, synthesis and spectroscopy. A continuation of CHE 2603. Primarily for majors other than chemistry and biochemistry. (Same as CHE 3703. Formerly CHE 2303 and CHE 2623. Credit cannot be earned for more than one of the following: CHE 2303, CHE 2623, CHE 3703, or CHE 3643.) Generally offered: Fall, Spring, Summer. Differential Tuition: $150.

CHE 3652. Organic Chemistry II Laboratory. (1-4) 2 Credit Hours.
Prerequisites: Grades of "C-" or better in CHE 2603 (or CHE 2703) and CHE 2604. Quantitative and continuing qualitative study of organic reactions and molecular structure through functional group interactions and spectroscopic techniques. Simple and multistep syntheses of organic compounds. A continuation of CHE 2612. This laboratory includes a lecture component. (Formerly CHE 2342 and CHE 2632. Credit cannot be earned for more than one of the following: CHE 2342, CHE 2632 or CHE 3652.) Generally offered: Fall, Spring, Summer. Differential Tuition: $100. Course Fees: IUC1 $15; L001 $30.

CHE 3703. Organic Chemistry II for Majors. (3-0) 3 Credit Hours.
Prerequisite: A grade of "C-" or better in CHE 2703 (or CHE 2603). Continuing study of fundamentals of organic structure, reaction mechanisms, synthesis and spectroscopy. A continuation of CHE 2703. Primarily for chemistry and biochemistry majors. (Same as CHE 3643. Formerly CHE 2303 and CHE 2623. Credit cannot be earned for more than one of the following: CHE 2303, CHE 2623, CHE 3703, or CHE 3643.) Differential Tuition: $150.

CHE 3804. Physical Chemistry I and Laboratory. (3-3) 4 Credit Hours.
Prerequisites: A grade of "C-" or better in CHE 1113 (or CHE 1153 in previous catalogs), CHE 1131, CHE 2803, PHY 1963 and PHY 1971. The laws of thermodynamics; free energy and chemical potential; ideal and nonideal gases; equilibria; solutions; kinetic theory of gases; kinetics. Laboratory study of selected physicochemical principles and methods to reinforce lecture topics. Data acquisition, data analysis, and report writing are stressed. (Formerly CHE 3204 and CHE 3803/3811. Credit cannot be earned for more than one of the following: CHE 3204, CHE 3803/3811, or CHE 3804.) (Formerly titled "Thermodynamics and Kinetics") Generally offered: Fall. Differential Tuition: $200. Course Fees: IUC1 $15; L001 $30.
CHE 3824. Physical Chemistry II and Laboratory. (3-3) 4 Credit Hours.
Prerequisites: A grade of "C-" or better in CHE 1113 (or CHE 1153 in previous catalogs), CHE 2803, PHY 1963 and PHY 1971. Introduction to atomic and molecular quantum chemistry; group theory; electronic, rotational, vibrational, and electronic spectroscopies; and statistical mechanics including ensembles and their use in deriving thermodynamic properties using quantum level information. Laboratory study of selected physiochemical principles and methods to reinforce lecture topics. Data acquisition, data analysis, and report writing are stressed. (Formerly CHE 3224 and CHE 3823/3831. Credit cannot be earned for more than one of the following: CHE 3224, CHE 3823/3831, or CHE 3824.) (Formerly titled "Quantum Mechanics, Spectroscopy, and Statistical Mechanics.") Generally offered: Spring. Differential Tuition: $200. Course Fees: IUC1 $15; L001 $30.

CHE 3854. Basic Biophysical Chemistry Lecture/Lab. (3-3) 4 Credit Hours.
Prerequisites: A grade of "C-" or better in CHE 2603, MAT 1214, PHY 1963 (or PHY 1623), and PHY 1971 (or PHY 1631). The primary goal of this course is to help students develop a fundamental understanding of the physical principles that drive biological processes, particularly as applied to proteins. Topics covered include protein structure, molecular thermodynamics, structure simulation, basic statistical mechanics, quantum mechanics and spectroscopy. This course cannot be used as an upper-division chemistry elective by students pursuing a B.S. in Chemistry. Generally offered: Spring. Differential Tuition: $200. Course Fees: IUC1 $15; L001 $30.

CHE 4213. Instrumental Analysis. (2-5) 3 Credit Hours.
Prerequisites: A grade of "C-" or better in CHE 3214 and CHE 3652. Grade of "C-" or better or concurrent enrollment in CHE 3824 (or CHE 3854). The physical and chemical principles of modern instrumental techniques used for chemical analysis. Topics include emission, absorption, magnetic resonance, and FTIR spectrosopies, mass spectrometry, and chromatography. The use of spectrometric and chromatographic instrumentation in the separation, identification, and quantitation of compounds in chemical systems. (Formerly CHE 4103. Credit cannot be earned for both CHE 4213 and CHE 4103.) Generally offered: Spring. Differential Tuition: $150. Course Fees: IUC1 $15; L001 $30.

CHE 4303. Biochemistry I. (3-0) 3 Credit Hours.
Prerequisite: A grade of "C-" or better in CHE 3643. Structure and function relationships of biologically important molecules; energy production, storage and utilization; amino acids, nucleic acids, peptides and proteins; intermediary metabolism. (Formerly CHE 4503. Credit cannot be earned from both CHE 4303 and CHE 4503. Credit cannot be earned for both CHE 4303 and BIO 3513. BIO 3513 cannot be taken as a chemistry elective.) Generally offered: Fall, Spring. Differential Tuition: $150.

CHE 4313. Biochemistry II. (3-0) 3 Credit Hours.
Prerequisites: A grade of "C" or better in CHE 4303. Structure and function relationships of biologically important molecules continued; description of advanced biophysical techniques; amino acid metabolism and metabolism integration; lipids, fatty acids, steroid, membrane metabolism; cell signaling. Differential Tuition: $150.

CHE 4332. Biochemistry II Laboratory. (0-4) 2 Credit Hours.
Prerequisites: CHE 4303 and BIO 3362, and completion or concurrent enrollment in CHE 4313. A laboratory course emphasizing biochemical lab techniques used in protein purification and purity analysis, plasmid DNA prep, determination and restriction digest. Differential Tuition: $150. Course Fees: IUC1 $15; L001 $30.

CHE 4463. Inorganic Chemistry. (3-0) 3 Credit Hours.
Prerequisites: A grade of "C-" or better in CHE 3464, and completion of or concurrent enrollment in CHE 3804 or CHE 3854. Study of the structure, bonding, and properties of inorganic compounds; acid-base theory, crystalline state, coordination chemistry, and other advanced topics. (Formerly CHE 4263. Credit cannot be earned for both CHE 4463 and CHE 4263.) Generally offered: Fall. Differential Tuition: $150.

CHE 4613. Introduction to Polymer Chemistry. (3-0) 3 Credit Hours.
Prerequisites: A grade of "C-" or better in CHE 3703 and CHE 3643. Fundamental concepts of polymer chemistry, including mechanisms for synthesis, kinetics, and copolymerization; molecular weight, stereoisomerism, morphology, solubility, and thermal transitions; visco- and rubber elasticity; and the molecular basis for physical properties. (Formerly CHE 4203. Credit cannot be earned for both CHE 4613 and CHE 4203.) Differential Tuition: $150.

CHE 4853. Computational Chemistry. (3-0) 3 Credit Hours.
Prerequisite: A grade of "C-" or better in CHE 3824 or consent of instructor. The application of molecular mechanical, molecular orbital, and density functional methods to problems of molecular structure, property, reactivity, and spectroscopy. Generally offered: Summer. Differential Tuition: $150.

CHE 4883. Introduction to Mass Spectrometry. (2-3) 3 Credit Hours.
Prerequisite: A grade of "C-" or better in CHE 3804 (or CHE 3854), or consent of instructor. The basic principles of interpreting mass spectra and how they are produced. The effect the method of ion production has on the observed mass spectra, and the theory and operation of various types of mass spectrometers will be covered. The basic theory of ion-molecule reactions and principles and practice of biological mass spectrometry and other advanced topics will be presented. (Formerly CHE 4383. Credit cannot be earned for both CHE 4883 and CHE 4383.) Differential Tuition: $150. Course Fees: IUC1 $15; L001 $30.

CHE 4911. Independent Study. (0-0) 1 Credit Hour.
Prerequisites: Permission in writing (form available) from the instructor, the student's advisor, the Department Chair, and Dean of the College in which this course is offered. Independent reading, research, discussion, and/or writing under the direction of a faculty member. May be repeated for credit, but not more than 6 semester credit hours, regardless of discipline, will apply to a bachelor's degree. Differential Tuition: $50.

CHE 4912. Independent Study. (0-0) 2 Credit Hours.
Prerequisites: Permission in writing (form available) from the instructor, the student's advisor, the Department Chair, and Dean of the College in which this course is offered. Independent reading, research, discussion, and/or writing under the direction of a faculty member. May be repeated for credit, but not more than 6 semester credit hours, regardless of discipline, will apply to a bachelor's degree. Differential Tuition: $100.

CHE 4913. Independent Study. (0-0) 3 Credit Hours.
Prerequisites: Permission in writing (form available) from the instructor, the student's advisor, the Department Chair, and Dean of the College in which this course is offered. Independent reading, research, discussion, and/or writing under the direction of a faculty member. May be repeated for credit, but not more than 6 semester credit hours, regardless of discipline, will apply to a bachelor's degree. Differential Tuition: $150.

CHE 4923. Special Project in Chemistry. (0-0) 3 Credit Hours.
Prerequisite: Consent of Department Chair (form available in department office). A special laboratory research or library readings project under the direction of a faculty member that results in a report. Limited to science majors in their final year of undergraduate study. Differential Tuition: $150.
CHE 4953. Special Studies in Chemistry. (3-0) 3 Credit Hours.
Prerequisites: Upper-division standing and consent of instructor. An organized course offering the opportunity for specialized study not normally or not often available as part of the regular course offerings. Special Studies may be repeated for credit when the topics vary, but not more than 6 semester credit hours, regardless of discipline, will apply to a bachelor's degree. Generally offered: Fall, Spring, Summer. Differential Tuition: $150.

CHE 4971. Proseminar. (0-3) 1 Credit Hour.
Prerequisite: A grade of "C-" or better in CHE 3643. Oral reports on current publications in chemistry and chemical technology using important chemical reference materials and periodicals. May be repeated for credit, but not more than 2 semester credit hours may be applied toward the degree. Generally offered: Fall, Spring. Differential Tuition: $50.

CHE 4993. Honors Research. (0-0) 3 Credit Hours.
Prerequisites: Enrollment limited to candidates for College Honors during their last two semesters; approval by the College Honors Committee. Supervised research and preparation of an honors thesis. May be repeated only once with approval. Generally offered: Fall, Spring. Differential Tuition: $150.