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.).

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.).

CHE 1073. Basic Chemistry. (3-0) 3 Credit Hours.
Prerequisite: Grade of "C-" or better in MAT 1073 or concurrent enrollment. A one-semester preparatory course covering some basic concepts of inorganic chemistry, atomic-molecular structure, and related mathematics. May not be applied to a B.S. or B.A. in Chemistry.

CHE 1103. General Chemistry I. (3-0) 3 Credit Hours. (TCCN = CHEM 1311)
Prerequisites: Passing grade on Chemistry Placement Examination or grade of "C-" or better in CHE 1073, and completion of MAT 1073 with a grade of "C-" or better. 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, thermochemistry, molecular-kinetic theory, and states of matter. Credit cannot be earned for both CHE 1103 and CHE 1143.

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, electrochemistry, 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.

CHE 1120. General Chemistry I Laboratory (lecture component). (0-0) 0 Credit Hours.
Must be taken concurrently with CHE 1121 General Chemistry I Laboratory.

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). Concurrent registration in CHE 1120 is required. 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.).

CHE 1130. General Chemistry II Laboratory (lecture component). (0-0) 0 Credit Hours.
Must be taken concurrently with CHE 1131 General Chemistry II Laboratory.

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). Concurrent registration in CHE 1130 is required. Techniques of qualitative and quantitative chemical analysis, illustrated primarily via inorganic chemical systems and their reactions. Laboratory to accompany CHE 1113 and CHE 1153. This laboratory includes a lecture component. (Formerly CHE 1312 and CHE 1132. Credit cannot be earned for more than one of the following: CHE 1131, CHE 1132 or CHE 1312.).

CHE 1143. Principles of Chemistry I. (3-0) 3 Credit Hours.
Prerequisites: A score of 60 percent (%) or higher on the Chemistry Placement Examination, or a grade of "B-" or better in CHE 1073 and a grade of "B-" or better in MAT 1073, or admission through the Honors College. The first of a two-part introduction to the chemical sciences for chemistry majors and other students interested in the chemical sciences. An introduction to chemical reactions and atomic-molecular structure, including chemical formulas and stoichiometry, the periodic system of elements, electrons in atoms, valency, chemical bonding, states of matter, solutions, chemical equilibrium, and acids and bases. (Same as CHE 1103. Credit cannot be earned for both CHE 1103 and CHE 1143.).

CHE 1153. Principles of Chemistry II. (3-0) 3 Credit Hours.
Prerequisites: A grade of "C-" or better in CHE 1143 or a grade of "B-" or better in CHE 1103. A continuation of CHE 1143 for chemistry majors and other students interested in the chemical sciences. Topics include oxidation-reduction reactions, solubility, coordination complexes, thermochemistry and thermodynamics, electrochemistry, chemical kinetics, and nuclear chemistry. (Same as CHE 1113. Credit cannot be earned for both CHE 1113 and CHE 1153.).
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).
An elementary study of structure, stereochemistry, reactions, and
reaction mechanisms associated with organic compounds. Primarily
for chemistry, premed, and science majors. Discussion and practice of
problems amplifying and clarifying the course. (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, or CHE 2604.).

CHE 2610. Organic Chemistry I Laboratory (lecture component). (0-0) 0 Credit Hours.
Must be taken concurrently with CHE 2612 Organic Chemistry I Laboratory.

CHE 2612. Organic Chemistry I Laboratory. (1-4) 2 Credit Hours. (TCCN = CHEM 2223)
Prerequisites: A grade of “C-” or better or concurrent enrollment in
CHE 1131 and CHE 2603. Concurrent registration in CHE 2610 is
required. 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 spectroscopic 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.).

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).

CHE 3214. Analytical Chemistry. (2-5) 4 Credit Hours.
Prerequisites: A grade of “C-” or better in CHE 1113 (or CHE 1153) 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
equilibrium; analytical concepts; 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.).

CHE 3464. Descriptive Inorganic Chemistry. (3-3) 4 Credit Hours.
Prerequisites: A grade of “C-” or better in CHE 1113 (or CHE 1153) 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.).

CHE 3643. Organic Chemistry II. (3-0) 3 Credit Hours.
Prerequisite: A grade of “C-” or better in CHE 2603. Continuing study of
fundamentals of structure, reactions, and reaction mechanisms of
phosphorus and sulfur; polyfunctional organic compounds. A continuation
of CHE 2603. (Formerly CHE 2303 and CHE 2623. Credit cannot be
earned for more than one of the following: CHE 2303, CHE 2623, or CHE
3643.).

CHE 3650. Organic Chemistry II Laboratory (lecture component). (0-0) 0 Credit Hours.
Must be taken concurrently with CHE 3652 Organic Chemistry II Laboratory.

CHE 3652. Organic Chemistry II Laboratory. (1-4) 2 Credit Hours.
Prerequisites: Grades of “C-” or better in CHE 2603 and CHE 2612.
Concurrent registration in CHE 3650 is required. 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.).

CHE 3673. Organic Chemistry II with Biological Applications. (3-0) 3 Credit Hours.
Prerequisite: A grade of “C-” or better in CHE 2603. Continuing study of
fundamentals of structure, mechanism, and reactivity including those in
aqueous media and complex biological macromolecules. A continuation
of CHE 2603 with emphasis in topics relevant to biology. Chemistry B.S.
majors may not substitute this course for CHE 3643. Credit cannot be
earned for more than one of the following: CHE 2303, CHE 2623, CHE
3643, or CHE 3673.).

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),
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.”).
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 spectroscopies, mass spectrometry, and chromatography. The use of spectrometric and chromatographic instrumentation in the separation, identification, and quantification of compounds in chemical systems. (Formerly CHE 4103. Credit cannot be earned for both CHE 4213 and CHE 4103.).

CHE 4303. Biochemistry. (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; lipids and membranes. (Formerly CHE 4503. Credit cannot be earned from both CHE 4303 and CHE 4503.

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. A 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.).

CHE 4473. Bioinorganic Chemistry. (3-0) 3 Credit Hours.
Prerequisites: Grades of "C-" or better in CHE 3464, CHE 3804 (or CHE 3854), and either CHE 4303 or CHE 4463 (or concurrent enrollment in either CHE 4303 or CHE 4463), or consent of instructor. Study of the functions, reaction sites, mechanisms, molecular architecture, and medicinal aspects of metal ions in biological systems, including bioorganometallic compounds. A discussion of the experimental techniques will be included.

CHE 4623. Chemistry of Heterocyclic Compounds. (3-0) 3 Credit Hours.
Prerequisite: A grade of "C-" or better in CHE 3643 or consent of instructor. The chemistry of nitrogen, oxygen, and sulfur heterocycles. Five- and six-membered ring systems with one or more heteroatoms. Applications in the field of synthetic drugs. (Formerly CHE 4403. Credit cannot be earned for both CHE 4623 and CHE 4403.).

CHE 4673. Intermediate Organic Chemistry. (3-0) 3 Credit Hours.
Prerequisite: A grade of "C-" or better in CHE 3643, or consent of instructor. Building on the Organic Chemistry I and II courses, this course focuses on how to draw reasonable "electron-pushing" mechanisms for organic reactions. Acid-base concepts, stereochemistry and conformations, catalysis, and simple molecular orbital theory will be used as needed.

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.

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.).

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.

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.

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.

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.

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.

CHE 4971. Proseminar. (0-0) 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.

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.