

Chemistry

CHEM 1305: Introductory Chemistry I

A study of fundamentals and applications of chemistry for students who are not majoring in science or engineering. Students may not receive credit for both CHEM 1311 and CHEM 1305.

CHEM 1105: Introductory Chemistry I Laboratory

A study of basic chemical laboratory methods designed for students who are not majoring in science or engineering. Students may not receive credit for both CHEM 1111 and CHEM 1105.

CHEM 1307: Introductory Chemistry II

A continued study of fundamentals and applications of chemistry including surveys of organic chemistry and biochemistry. Designed for students who are not majoring in science or engineering. Students may not receive credit for both CHEM 1312 and CHEM 1307. Prerequisite: CHEM 1305/ 1105.

CHEM 1107: Introductory Chemistry II Laboratory

A continued study of basic chemical laboratory methods designed for students who are not majoring in science or engineering. Students may not receive credit for both CHEM 1112 and CHEM 1107. Prerequisite: Credit for or concurrent enrollment in CHEM 1307.

CHEM 1311: General Chemistry I

A general study of the fundamental principles of chemistry for majors in the sciences, health sciences, and engineering. Topics include measurements, fundamental properties of matter, states of matter, chemical reactions, chemical stoichiometry, periodicity of elemental properties, atomic structure, chemical bonding, molecular structure, solutions, properties of gases, and an introduction to thermodynamics and descriptive chemistry. Prerequisite: Concurrent enrollment in or credit for MATH 1314 and CHEM 1111. Chemistry in high school is strongly recommended.

CHEM 1111: General Chemistry I Laboratory

Basic chemical laboratory techniques are introduced. Prerequisite: Credit for or concurrent enrollment in CHEM 1311.

CHEM 1312: General Chemistry II

Continuation of CHEM 1311. Topics include chemical equilibrium, acid-base concepts, thermodynamics, kinetics, electrochemistry, nuclear chemistry, and an introduction to organic chemistry and descriptive inorganic chemistry. Prerequisite: CHEM 1311 and CHEM 1111.

CHEM 1112: General Chemistry II Laboratory

Continuation of CHEM 1111, including qualitative analysis; volumetric, gravimetric, and potentiometric analyses; and an introduction to chemical instrumentation. Prerequisites: Credit for CHEM 1111 and credit for or concurrent enrollment in CHEM 1312.

CHEM 3310: Analytical Chemistry

Chemical equilibrium, pH, and indicators; acid-base, oxidation-reduction, and complex formation reactions; calculations of analytical chemistry; reliability of measurements; and gravimetric and volumetric analysis. Prerequisites: CHEM 1312/1112.

CHEM 3111: Analytical Chemistry Laboratory

General experiments in inorganic quantitative analysis. Prerequisite: Credit for or concurrent enrollment in CHEM 3310.

CHEM 3320: Inorganic Chemistry

The study of basic inorganic chemistry including topics in descriptive inorganic chemistry, molecular orbital theory, bonding, inorganic reactions and mechanisms, stereochemistry, and symmetry. Prerequisites: CHEM 1312/1112.

CHEM 3121: Inorganic Chemistry Laboratory

Syntheses, characterizations, and transformations of inorganic and organometallic compounds. Prerequisite: Credit for or concurrent enrollment in CHEM 3320.

CHEM 3342: Organic Chemistry I

Emphasis on structure-reactivity relationships, nomenclature, stereochemistry, reaction pathways, and synthesis. Prerequisites: CHEM 1312/1112.

CHEM 3143: Organic Chemistry I Laboratory

Basic experiments in organic chemistry. Prerequisite: Credit for or concurrent enrollment in CHEM 3342.

CHEM 3344: Organic Chemistry II

Continuation of CHEM 3342, including an introduction to molecular biochemistry. Prerequisite: CHEM 3342.

CHEM 3145: Organic Chemistry II Laboratory

Continuation of CHEM 3143 including an introduction to the characterization of organic compounds using classical and spectroscopic methods. Prerequisite: CHEM 3143.

CHEM 3352: Physical Chemistry I

Properties of substances in the gaseous, liquid, and solid states; chemical thermodynamics; chemical equilibria; phase equilibria; and electrochemistry.

Co-requisite: CHEM 3153. Prerequisites: CHEM 3310/3111, CHEM 3344/3145, MATH 3404, PHYS 2325/2125 and PHYS 2326/2126.

CHEM 3153: Physical Chemistry I Laboratory

General experiments in physical chemistry. May be taken for graduate credit with consent of advisor. Prerequisite: Credit for or concurrent enrollment in CHEM 3352.

CHEM 3354: Physical Chemistry II

Continuation of CHEM 3352. Atomic structure, chemical bonding, chemical kinetics, statistical mechanics, and spectroscopy. Prerequisite: CHEM 3352 and MATH 3203.

CHEM 3155: Physical Chemistry II Laboratory

Continuation of CHEM 3153. Prerequisite: CHEM 3153.

CHEM 4240: Spectroscopy

Study of modern analytical methods including atomic absorption, vibrational, nuclear magnetic resonance, and mass spectroscopies. Spectral interpretation and structural correlation will be emphasized. Prerequisite: Credit for CHEM 3344 and CHEM 3145.

CHEM 4312: Instrumental Analysis

Introduction to instrumental methods of analysis and separation including electrochemical, spectroscopic, and chromatographic techniques.

Fundamental theories and instrumentation of these techniques will be emphasized. Prerequisite: CHEM 3354/3155.

CHEM 4330: Advanced Inorganic Chemistry

Theories of inorganic chemistry including atomic, molecular, and crystal structure; thermochemical and electrochemical properties; acidity; solvent systems; and coordination compounds. Prerequisite: CHEM 3320/3121 and CHEM 3354/3155 or consent of instructor.

CHEM 4334: Biochemistry

Chemistry and functions of biomolecules: proteins, carbohydrates, lipids, and nucleic acids; bioenergetics of the cell; and protein synthesis.

Prerequisites: CHEM 3344/3145.

CHEM 4135: Biochemistry Laboratory

Exercises designed to develop skills in using biochemical techniques and to illustrate the chemical and physical properties of biomolecules. Prerequisite: Credit for or concurrent enrollment in CHEM 4334.

CHEM 4346: Advanced Organic Chemistry

The advanced study of organic structure, synthesis, and reaction mechanisms. Topics include applications of molecular orbital theory and valence bond theory, organic reaction mechanisms, migrations, selective functional group interconversions, and retrosynthetic analysis of organic compounds. Prerequisite: CHEM 3344/3145 and CHEM 3354/3155.

CHEM 4191: Seminar

Reports on current literature and research in chemistry. Prerequisite: Senior standing.

CHEM 4395: Undergraduate Research

Directed chemical or biochemical research involving a problem of mutual interest to the student and a member of the chemistry faculty. An oral presentation and a written report of research results by the student are required at the conclusion of the project. Prerequisite: Senior standing and approval by faculty research advisor.

CHEM 4199 - 4399: Independent Study

Independent study in specific areas of chemistry not covered by organized undergraduate courses. A maximum of six credit hours for independent study courses may be applied toward an undergraduate degree. Prerequisite: Consent of department chair.

CHEMISTRY MINOR

A student may choose chemistry as a minor to satisfy bachelor's degree requirements with a major in another field. The minor requires a total of 24 semester hours of chemistry, with a minimum of a "C" in all courses.

Required courses include CHEM 1311/1111, CHEM 1312/1112; CHEM 3310/3111, CHEM 3342/3143, CHEM 3344/3145; and either CHEM 3320/3121 or CHEM 4334/4135.

Math

MATH 2413: Calculus I

A study of functions, limits, continuity, differentiation of algebraic and trigonometric functions, applications of the derivative, definite and indefinite integrals with applications. Co-requisite: Mathematics majors must concurrently take MATH 2113. Prerequisites: Satisfactory math score on

SAT, ACT or THEA **and** "C" or better in MATH 1316, or passing score on departmental trigonometry test, or "C" or better in MATH 2412.

MATH 2414: Calculus II

A study of differentiation and integration of transcendental functions, polar coordinates, techniques of integration, sequences, series, indeterminate forms, improper integrals. Co-requisite: Mathematics majors must concurrently take MATH 2114. Prerequisite: MATH 2413.

MATH 3203: Matrix Methods in Science and Engineering

Matrices and matrix algebra, determinants, systems of linear equations, Gaussian elimination, eigenvalues and eigenvectors, linear transformation, applications in science and engineering. Prerequisite: MATH 2414 or concurrent enrollment.

MATH 3404: Multivariate Calculus

Vector calculus in Euclidean n-space, functions of several variables, partial differentiation and multiple integration. Prerequisite: MATH 2414.

MATH 3425: Foundations of Mathematics

Study of elementary logic, intermediate set theory, relations, functions and countable number systems. Prerequisite: MATH 2414.

MATHEMATICS MINOR

A student may choose mathematics as a minor to satisfy bachelor degree programs with a major in another field. This program requires a total of 18 hours of mathematics, including MATH 2413, 2113, and 2414. At least nine semester hours of upper-division mathematics must be completed, including MATH 3425.

Physics

PHYS 1301: College Physics I

A general study of the fundamental principles of mechanics, heat, and sound. Students may not receive credit for both PHYS 1301 and PHYS 2325. Co-requisite: PHYS 1101. Prerequisite: MATH 1316. Physics in high school is strongly recommended.

PHYS 1101: College Physics I Laboratory

Basic laboratory experiments involving mechanics and heat are carried out by majors other than chemistry, computer science, and engineering. Students may not receive credit for both PHYS 1101 and PHYS 2125. Corequisite: PHYS 1301.

PHYS 1302: College Physics II

Continuation of PHYS 1301. A study of the principles of electricity, magnetism, light, and atomic and nuclear physics. Students may not receive credit for both PHYS 1302 and PHYS 2326. Co-requisite: PHYS 1102. Prerequisite: PHYS 1301/1101.

PHYS 1102: College Physics II Laboratory

Basic experiments involving electricity, magnetism, sound, and light are carried out by majors other than chemistry, computer science, and engineering. Students may not receive credit for both PHYS 1102 and PHYS 2126. Co-requisite: PHYS 1302.

PHYS 2325: University Physics I

A general study of the fundamental principles of physics for science, computer science, and engineering majors. The principles of mechanics and heat are studied using a calculus based approach. Students may not receive credit for both PHYS 1301 and PHYS 2325. Co-requisite: PHYS 2125. Prerequisite: MATH 2413. Physics in high school is strongly recommended.

PHYS 2125: University Physics I Laboratory

Basic laboratory experiments involving mechanics and heat are carried out by chemistry, computer science, and engineering majors. Students may not receive credit for both PHYS 1101 and PHYS 2125. Co-requisite: PHYS 2325.

PHYS 2326: University Physics II

Continuation of PHYS 2325. A calculus-based study of the principles of electricity, magnetism, and light. Students may not receive credit for both PHYS 1302 and PHYS 2326. Corequisite: PHYS 2126. Prerequisites: PHYS 2325/2125 and MATH 2414.

PHYS 2126: University Physics II Laboratory

Continuation of PHYS 2125. Basic experiments involving electricity, magnetism, sound, and light are carried out. Students may not receive credit for both PHYS 1102 and PHYS 2126. Co-requisite: PHYS 2326. Prerequisites: PHYS 2125.

PHYS 3101 Contemporary Physics

A qualitative introduction to contemporary fields of physics research and interest. Oral presentation required. Prerequisite: PHYS 2326 or PHYS 1302.

PHYS 3310: Classical Mechanics

A study of Newton's equations of motion, simple harmonic motion, central forces, systems of particles and collisions, nonlinear dynamics and chaos,

and Lagrangian and Hamiltonian formalisms. Prerequisites: PHYS 2325/2125 and MATH 3404.

PHYS 3320: Computational Physics

A study of methods of solving complex physical problems using computer algorithms. It will focus on the techniques as well as examples from physics that lend themselves to numerical calculations. Prerequisites: PHYS 2326/2126 and MATH 3305.

PHYS 4330: Electricity and Magnetism

A study of electrostatics, magnetostatics, electrodynamics in vacuum, Maxwell's equations and electromagnetic waves. Prerequisites: PHYS 2326/2126 and MATH 3305.

PHYS 4340: Modern Physics

An introduction to relativity and quantum theory. Einstein's theory of special relativity, the historical development of quantum theory leading to the Schrodinger equation, and applications of the Schrodinger equation will be studied. Prerequisites: PHYS 2326/2126 and MATH 3305.

PHYS 4395: Undergraduate Research

Directed physics research involving a problem of mutual interest to the student and a member of the physics faculty. An oral presentation and a written report of research results by the student are required at the conclusion of the project. May be repeated once for credit. Prerequisite: Approval of department chair.

PHYSICS MINOR

A student may choose a minor in physics to satisfy bachelor's degree requirements with a major in another field. The minor requires a total of 18 semester hours of physics. The student must take PHYS 2325/2125, PHYS 2326/2126, and PHYS 3101 for 9 semester hours. The remaining semester hours can be earned by taking any three of the following four courses: PHYS 3310, PHYS 3320, PHYS 4330, or PHYS 4340.

Biology

BIOL 1306: General Biology I

The scientific study of life at the molecular and cellular levels including mechanisms of inheritance, development and evolution. Corequisite: BIOL 1106.

BIOL 1106: General Biology I Laboratory

Experimental and observational techniques used to study life at the molecular and cellular levels including techniques in the study of inheritance and development. Corequisite: BIOL 1306.

BIOL 1307: General Biology II

The scientific study of life at the organismal, population, and community levels including form, function, reproduction, taxonomy, systematics, ecology and evolutionary history of biodiversity. Prerequisite: BIOL 1306. Corequisite: BIOL 1107.

BIOL 1107: General Biology II Laboratory

Experimental and observational techniques used to study life at the organismal, population, and community levels including morphology, physiology, reproduction, and ecology. Prerequisite: BIOL 1106. Corequisite: BIOL 1307.

Geology

GEOL 3310: Physical Geology and Astronomy

Study of processes that take place in the solid earth and the role of the earth in space.

GEOL 3314: Oceanography and Meteorology

Basic concepts of oceanography and meteorology with emphasis on the effects of the oceans and the atmosphere on man. Experimental methods used in both fields will be included.