

CHEMISTRY (CHEM)

CHEM 1003. Introductory Chemistry. (3 Credits)

This course is a non-laboratory course that introduces the student to the principles and concepts of chemistry. It also gives students practice with the mathematical techniques used in the sciences.

CHEM 1204. Elements of General and Biological Chemistry. (4 Credits)

This course introduces the student to elements of general, organic, and biological chemistry and is recommended for students seeking a career in nursing. Note: Advisor placement, satisfactory performance on the chemistry placement exam, or completion of CHEM 1003 or MATH 1280 with a C- or better is required.

Prerequisites: (CHEM 100, 100, MATH 128, 128, CHEM 1003, 1003, MATH 1280, 1280 or minimum score of 0000 in 'CHEM 1003').

CHEM 1414. General Chemistry I. (4 Credits)

This course introduces the student to general concepts of chemistry including atomic and molecular structure, reaction stoichiometry, thermodynamics, periodic trends, gas laws, and intermolecular forces.

Note: Advisor placement, satisfactory performance on the chemistry placement exam, or completion of CHEM 1003 or CHEM 1204 with a C- or better is required.

Prerequisites: (CHEM 100, 100, 105, 105, 1003, 1003, 1204, 1204 or minimum score of 0000 in 'CHEM 1003').

CHEM 1424. General Chemistry II. (4 Credits)

This course is a continuation of Chemistry 1414 including thermodynamics, equilibrium, acid-base theory, reaction kinetics, and electrochemistry.

Prerequisites: (CHEM 141, 141, 1414 or 1414).

CHEM 2204. Analytical Chemistry. (4 Credits)

This course introduces the student to the application of chemical principles for the purpose of chemical analysis as well as the many associated skills such as sampling, sample preparation, treatment of data, etc. necessary to obtain valid information on the chemical composition of matter.

Prerequisites: (CHEM 1424 or 142).

CHEM 2304. Descriptive Inorganic Chemistry. (4 Credits)

This course introduces the student to the descriptive chemistry of the elements, with a focus on selected elements from within the representative or main groups. Topics to be covered include periodic trends, reactivity patterns, and structure as well as "real world" applications and some chemical history as it applies to the topics presented.

Prerequisites: (CHEM 142 or 1424).

CHEM 2414. Organic Chemistry I. (4 Credits)

This course introduces the student to organic synthesis and reaction mechanisms, focusing specifically on the chemistry of alkanes, alkenes, alkynes and alcohols. Substitution and elimination concepts are covered along with acid-base chemistry and stereochemistry.

Prerequisites: (CHEM 142 or 1424).

CHEM 2424. Organic Chemistry II. (4 Credits)

This course is a continuation of Chemistry 241, covering instrumental analysis of organic compounds, chemistry of aromatic systems, carbonyl chemistry, and the chemistry of amines. Laboratory consists of several multi-week projects including multi-step synthesis and unknown identifications.

Prerequisites: (CHEM 241 or 2414).

CHEM 3214. Biochemistry. (4 Credits)

This course introduces the student to the ways in which atoms and molecules function to produce life processes. Topics include aqueous interactions and bioenergetics; structure and function of nucleic acids, proteins, carbohydrates, and lipids; enzyme function and kinetics; and an overview of major metabolic pathways. Students will become familiar with and proficient using molecular visualization, data fitting, and kinetic simulation software. Note: A C- or better in CHEM 2104, 2424, or consent of the instructor is required for enrollment.

Prerequisites: (CHEM 215, 242 or 2424).

CHEM 3404. Physical Chemistry: Thermodynamics. (4 Credits)

This course introduces the student to the study of the states of matter, equilibrium, thermodynamics, the properties of solutions, the rates of chemical and physical processes, and the concepts and equations of statistical thermodynamics.

Prerequisites: (CHEM 142 or 1424) and (MATH 201, 201, 2010 or 2010).

CHEM 3504. Physical Chemistry: Quantum and Spectroscopy. (4 Credits)

This course is a study of quantum theory, electronic structure of atoms and molecules, group theory, computational chemistry and spectroscopy.

Prerequisites: (CHEM 142 or 1424) and (MATH 202 or 2020).

CHEM 3990. Chemistry Internship. (1-4 Credits)

This course provides credit for chemistry majors who obtain laboratory or field experience outside of the typical academic environment. The experience must be approved in advance by the Department Chair. Note: 16 credit hours of chemistry and consent of the instructor is required for enrollment. Students may enroll in this course multiple times, up to a max of 4 credits.

CHEM 4224. Advanced Biochemistry. (4 Credits)

This course deepens the student's appreciation of life processes and the chemical concepts that underlie them. Topics include metabolic pathways involving carbohydrates, lipids, proteins, and nucleic acids; photosynthesis; the flow of information in biological systems; and content that will be student chosen. Software programs will be utilized, including those introduced in CHEM 3214.

Prerequisites: (CHEM 425 or 3214).

CHEM 4334. Advanced Organic Chemistry. (4 Credits)

This course is an advanced survey of modern organic chemistry focusing on synthesis using the retrosynthetic approach. Selected topics include classical organic syntheses in addition to pharmaceutical drug applications and process development synthesis.

Prerequisites: (CHEM 242 or 2424).

CHEM 4424. Advanced Inorganic Chemistry. (4 Credits)

This course provides advanced treatment of the chemistry of transition metal compounds and organometallic compounds, including discussions of symmetry and group theory, bonding theory, structure of solids, kinetics and mechanisms for reactions, Lewis acid/base chemistry, and others.

Prerequisites: (CHEM 235 or 2304) and (CHEM 342 or 3504).

CHEM 4524. Instrumental Analysis. (4 Credits)

This course is an in-depth study of the use of instruments in chemical analysis. Topics include the basic theory and techniques of instrumental methods of analysis, with emphasis on spectrophotometry, NMR, and gas and liquid chromatography. Note: A C- or better in CHEM 225 or consent of the instructor is required for enrollment.

Prerequisites: (CHEM 2204 or 225).

CHEM 4911. Chemistry Senior Seminar I. (1 Credit)

This course involves review and presentation of freshman and sophomore level chemistry topics with a strong focus on a senior-level understanding of the topics and the development of scientific presentation skills. Note: Students must have completed 20 credits in CHEM coursework prior to enrollment. (May be concurrently enrolled in 4 of the 20 credits.)

CHEM 4921. Chemistry Senior Seminar II. (1 Credit)

This course helps students learn the important skill of understanding literature articles from high-level journals well enough to present the findings in an articulate fashion.

Prerequisites: (CHEM 491 or 4911).

CHEM 4990. Undergraduate Research. (1-4 Credits)

This course provides the student the opportunity to work on a research topic under the direction of a member of the chemistry faculty. The experience must be approved in advance by the Department Chair. Note: Students must have completed 8 credits of chemistry and have the consent of the instructor prior to enrollment.