

CHEMISTRY (CHM)

CHM 101. Preparing for Chemistry. 3 Credit Hours.

A course designed to provide students with the academic foundation to successfully complete the introductory chemistry course, i.e. Chemical Principles I and II. This preparation will be primarily directed toward acquiring those higher order thinking skills considered most important if students are to learn the course content of the introductory course successfully. Students will also be aided in developing the level of problem solving ability that is required to successfully complete a college level introductory chemistry course. Does not carry chemistry major or minor credit.

CHM 151. Chemical Principles I. 3 Credit Hours.

An integrated approach to many of the major concepts of chemistry with approximately equal emphasis on general descriptive chemistry and introduction to theoretical chemistry. Topics include atomic and molecular theory, periodic properties, chemical equations and stoichiometry. CHM 151 and CHM 151L are to be taken concurrently, except by permission of the department chair.
Prerequisite: A satisfactory score on the chemistry placement exam or a grade of C or better in CHM 101 or permission of the department chair.

CHM 151L. Chemical Principles I Laboratory. 1 Credit Hour.

This laboratory includes experiments in chemical synthesis, analysis, and composition and physical properties. A variety of techniques are utilized. This laboratory course addresses many of the same topics CHM 151 treats in the classroom. CHM 151 and CHM 151L are to be taken concurrently, except by permission of the department chair.

CHM 151R. Chemical Principles Recitation. 0 Credit Hour.

Chemistry 151R Principles of Chemistry I recitation is a 0-credit course in which students will engage weekly with problem solving in a cooperative environment to support the CHM151 Principles of Chemistry I course. Students will gain critical thinking skills, and a focused opportunity to practice math skills required to analyze and solve chemistry problems. The course material includes dimensional analysis, balancing chemical reactions, determining actual and theoretical yields, and using the gas law in calculations. Course assessments will count toward the grade in CHM 151. Co-requisite: CHM 151.

CHM 152. Chemical Principles II. 3 Credit Hours.

An integrated approach to many of the major concepts of chemistry with approximately equal emphasis on general descriptive chemistry and introduction to theoretical chemistry. Topics include chemical kinetics and thermodynamics, chemical equilibria, gas laws, solutions, acids and bases. CHM 152 and CHM 152L are to be taken concurrently, except by permission of the department chair.
Prerequisite: A grade of C- or better in CHM 151 or by permission of the department chair.

CHM 152L. Chemical Principles II Lab. 1 Credit Hour.

This laboratory includes experiments in chemical synthesis, analysis, separation, kinetics, and equilibrium. A variety of techniques and modern equipment are utilized. This laboratory course addresses many of the same topics CHM 152 treats in the classroom. CHM 152 and CHM 152L are to be taken concurrently, except by permission of the department chair.

CHM 152R. Chemical Principles II Recitation. 0 Credit Hour.

Chemistry 152R Principles of Chemistry II recitation is a one-semester, 0-credit course in which students will engage weekly with problem solving in a cooperative environment to support the CHM 152 Principles of Chemistry course. Students will continue to develop skills in critical thinking and math as applied to chemistry problems. The course material includes chemical energy, solutions, chemical equilibrium and kinetics, and pH calculations. Course assessment will count toward the grade in CHM 152. Co-requisite: CHM 152.

CHM 223. Organic Chemistry I. 3 Credit Hours.

The nomenclature, structure, reactions, preparations and physical properties of organic compounds are studied. Extensive use of reaction mechanisms, resonance theory and conformational analysis is used to correlate a wide variety of reactions. Topics include chemical bonding, saturated and unsaturated hydrocarbons, alkyl halides, stereochemistry, spectroscopy and other functional groups. Special emphasis is on natural products and substances of biological importance. CHM 223L is to be taken concurrently, except by permission of the department chair.
Prerequisites: CHM 152 or equivalent.

CHM 223L. Organic Chemistry 1 Lab. 1 Credit Hour.

This course will introduce fundamental organic chemistry laboratory techniques utilizing primarily microscale chemical reactions. Various skills will be developed, such as synthetic methods, purification methods (distillation, extraction, recrystallization, chromatography) and analytical techniques. The concepts of organic chemistry will be put into practice via the synthesis and study of materials of common use and theoretical interest. CHM 223 is to be taken concurrently, except by permission of the department chair.
Prerequisites: CHM 152 or equivalent.

CHM 224. Organic Chemistry II. 3 Credit Hours.

The nomenclature, structure, reactions, preparations and physical properties of organic compounds are studied. Extensive use of reaction mechanisms, resonance theory and conformational analysis is used to correlate a wide variety of reactions. Topics include aromatics, carbonyl compounds, alcohols, amines and other functional groups. Special emphasis is on natural products and substances of biological importance. The course counts for three credit hours. CHM 224L is to be taken concurrently, except by permission of department chair.
Prerequisites: CHM 223.

CHM 224L. Organic Chemistry II Lab. 1 Credit Hour.

The course will build upon the foundation of organic chemistry laboratory techniques and concepts from the first semester, utilizing primarily microscale chemical reactions and techniques. Various skills will be learned and improved upon, such as purification methods (distillation, extraction, recrystallization, chromatography), synthetic methods, and analytical techniques. Functional groups studied will include alkenes, arenes, carbonyl compounds, etc. The course counts for one credit hour. CHM 224 is to be taken concurrently except by permission of the department chair.
Prerequisites: CHM 223 and CHM 223L (or equivalents).

CHM 280. Information in Chemistry and Physical Sciences. 1 Credit Hour.

This course will introduce the changing information landscape in chemistry and the physical sciences to help students become effective database and "free web" searchers. Students will also become familiar with the social and ethical issues relating to the production and use of scientific information in an increasingly digital society.
Cross-listed Courses: LIB 280, PHY 280

CHM 311. Analytical Chemistry. 4 Credit Hours.

An integrated lecture and laboratory study of the underlying principles of the quantitative determination of substances using both gravimetric and volumetric techniques. Two lectures and six hours laboratory each week for one semester, four hours credit.

Prerequisites: CHM 224.

CHM 320. Instrumental Methods of Analysis. 3 Credit Hours.

This course continues the conceptual foundations of quantitative and qualitative analytical techniques, with a focus on spectroscopy, chromatography, and mass spectrometry. This course is usually taught every other spring semester.

Prerequisite: CHM 311 or Grade of C- or better in CHM 152.

Corequisite: CHM 322.

CHM 322. Instrumental Analysis Lab. 1 Credit Hour.

This laboratory course provides students with the opportunity to develop technical skills on research instruments that are used for qualitative and quantitative chemical analysis, such as NMR, IR, UV/vis, GCMS, and AA.

This course is usually taught every other spring semester.

Prerequisites: CHM 311L or permission of the instructor.

Corequisites: CHM 320.

CHM 327. Physical Chemistry I. 3 Credit Hours.

A survey of the physical properties of matter. The course includes a study of atomic and molecular structure and spectroscopy in the context of quantum mechanics; an examination of the properties of gases, solutions, and equilibria under the unifying principles of thermodynamics; and an exploration of such dynamical processes as chemical kinetics and transport properties.

Prerequisites: CHM 224 and MTH 146 and PHY 102 or PHY 106 or permission of the instructor.

CHM 328. Physical Chemistry II. 3 Credit Hours.

A survey of the physical properties of matter. The course includes a study of atomic and molecular structure and spectroscopy in the context of quantum mechanics; an examination of the properties of gases, solutions, and equilibria under the unifying principles of thermodynamics; and an exploration of such dynamical processes as chemical kinetics and transport properties.

Prerequisites: CHM 224 and MTH 146 AND PHY 102 or PHY 106.

CHM 331. Physical Chemistry Laboratory. 1 Credit Hour.

Laboratory investigations of thermodynamic, transport, chemical kinetic and molecular structural properties provide an introduction to experimental physical chemistry, with an emphasis on use of computers and electronic instrumentation.

Prerequisite: CHM 224.

Corequisite: CHM 327.

CHM 332. Physical Chemistry II Laboratory. 1 Credit Hour.

Laboratory investigations of thermodynamic, transport, chemical kinetic and molecular structural properties provide an introduction to experimental physical chemistry. Emphasis on use of computers and electronic instrumentation.

Prerequisite: CHM 224.

Corequisite: CHM 328.

CHM 340. Environmental Chemistry. 3 Credit Hours.

The focus of this course is on understanding the underlying chemical principles and reactions of natural systems and anthropogenic compounds in the environment. Topics such as chemistry of the atmosphere, aqueous media, pollutants and energy sources will be covered. The emphasis of the course is on chemical aspects of environmental science, so a general background in chemistry is a prerequisite.

Prerequisite: CHM 223.

Cross-listed Courses: ESS 340

CHM 390. Independent Study. 1-3 Credit Hours.

A student may pursue independent study in an area of chemistry of mutual interest to the student and a supervising faculty member. Any proposal for independent study must be approved by the department chair and the supervising faculty member prior to registration, and it must specify the number of credits sought, the topic to be studied, the methodology to be followed and the evaluation procedure. Prerequisites and corequisites: CHM 224.

CHM 435. Inorganic Chemistry. 3 Credit Hours.

A study of the principles that underlie the structures and reactivities of inorganic compounds. Included are the application of prominent bonding theories and symmetry to the study of the physical and chemical properties of chemical systems, and a survey of the chemistry of the elements.

Prerequisite: CHM 224.

CHM 436. Advanced Organic Chemistry. 3 Credit Hours.

A study of conformational, resonance and inductive effects on the rate and direction of organic reactions. Special emphasis is on the application of such effects to synthetic organic reactions.

Prerequisites: CHM 224.

CHM 450. Inorganic and Materials Laboratory. 1 Credit Hour.

The goal of the inorganic laboratory is to give students experience with a range of techniques used in the synthesis and characterization of inorganic compounds, the analysis of various classes of inorganic compounds and types of bonding encountered in the study of this compound class. Students will be given additional experience using quantitative techniques of chemical analysis to which they were exposed in pre-requisite courses and introduced to additional techniques that are widely used for chemical analysis.

Corequisite: CHM 435.

CHM 460. Biochemistry I. 3 Credit Hours.

A lecture course in the chemistry of physiologically relevant compounds. These include proteins, nucleic acids, carbohydrates and lipids. The interactions, regulation and metabolism of these compounds will be introduced. Three hours of lecture per week. Carries biology major credit.

Prerequisites: CHM 224 and BIO 191 or permission of instructor.

Cross-listed Courses: BIO 460

CHM 461. Biochemistry II. 3 Credit Hours.

This course is a continuation of CHM 460. Topics to be covered include cellular metabolism and energy production; synthesis and degradation of lipids, amino acids, nucleotides; and regulation of gene expression.

Carries biology major credit.

Prerequisite: CHM 460.

Cross-listed Courses: BIO 461

CHM 462. Biochemistry Laboratory. 2 Credit Hours.

This laboratory will introduce techniques for studying proteins, nucleic acids and lipids. Prerequisite or corequisite: CHM 460. Carries biology major credit.

Prerequisites: CHM 224 and BIO 191, or permission of instructor.

Cross-listed Courses: BIO 462

CHM 490. Internship. 1-6 Credit Hours.

This is to provide a student with research experience in the chemical industry or any other academic institution. The student intern will report as required to the chemistry faculty member assigned to evaluate his/her research experience. Does not count for CHM/BIOCHEM major or minor credit. Counts as college free elective.

Prerequisite: junior or senior status and prior approval by the department chair.

CHM 495. Research in Chemistry. 1-3 Credit Hours.

A student who wishes to undertake a research project for academic credit during a given semester must submit a research proposal prior to registration and a research report at the end of the semester. The proposal, indicating the number of credits sought, must be approved by the research director, the department chair and the academic dean. It will be kept on file in the academic dean's office. The research report will be written in the style of a chemistry journal. A copy of this report will be kept on file in the office of the chair of the chemistry department. At the end of the semester each student will present a short (15 min.) oral presentation to interested faculty and peers. Students taking this course for the first time must also take CHM 280 for no credit as part of their research.