CHEMISTRY COURSES

CHEM 111  FUNDAMENTALS OF CHEMISTRY I (4)
Corequisites: MATH 102 or 103 or equivalent or consent of the instructor. Three hours lecture and three hours laboratory. This course covers fundamental principles and concepts necessary for a successful understanding of major aspects of chemistry. Major topics include atomic structure, periodicity, bonding, and intermolecular forces.

CHEM 112  FUNDAMENTALS OF CHEMISTRY II (4)
Prerequisites: CHEM 111 Corequisites: MATH 102 or 103 or equivalent or consent of the instructor. Three hours lecture and three hours laboratory. This course is a continuation of CHEM 111 and continues to cover fundamental principles and concepts necessary for a successful understanding of major aspects of chemistry. Major topics for this course include chemical reactions, thermodynamics, kinetics, equilibrium, acid/base chemistry, and electrochemistry.

CHEM 127  THE CHEMISTRY OF LIFE (4)
This is an introductory course in general, organic, and biological chemistry recommended for, but not restricted to, those who are preparing for nursing. Major concepts include atomic structure, chemical bonding, acid/base chemistry, carbon containing compounds, and biomolecules (carbohydrates, proteins, and lipids). The laboratory is designed to investigate the role chemistry plays in biological life processes.

CHEM 206  ENVIRONMENTAL CHEMISTRY (4)
Prerequisite: Satisfactory completion of CHEM 111. Three hours lecture and three hours laboratory. This course can substitute for CHEM 112 for environmental science majors only. This course focuses on the application of fundamental chemical principles to environmental problems. Laboratory techniques and field collection methods used in modern environmental analysis are introduced to assess aspects of water quality, atmospheric chemical reactions, and soil chemistry.

CHEM 238  INTRODUCTION TO RESEARCH (1-3)
Prerequisite: Consent of supervising instructor. This course provides the beginning student the opportunity to conduct lab, field, or library research under the supervision of a faculty member. Credit is dependent upon the scope of the work.

CHEM 221  ORGANIC CHEMISTRY I (4)
Prerequisites: CHEM 111 And CHEM 112 with a grade of C- or better. Three hours lecture and three hours of laboratory. The fundamentals of organic chemistry are presented with emphasis on the nomenclature, stereochemistry and reaction mechanisms that functional groups undergo. In addition this course serves as an introduction to the organic chemistry laboratory techniques used to synthesize, purify, and analyze organic compounds. Spectroscopic and instrumental methods of analysis are also examined with a focus on IR spectroscopy. The traditional lecture style in combination with in-class group problem solving is used to present concepts.
CHEM 222       ORGANIC CHEMISTRY II (4)
Prerequisites: CHEM 221 with a grade of C- or better. Three hours lecture and Three hours laboratory. The fundamentals of organic chemistry are further explored. The nomenclature, stereochemistry and reaction mechanisms of specific functional groups are expanded upon. This semester emphasizes the multistep synthesis of small organic compounds. An exploration into retrosynthetic analysis is done. The traditional lecture style in combination with in-class group problem solving is used to present concepts. In addition this course serves to equip students with more advanced organic laboratory techniques used to synthesize, purify, and analyze organic compounds. Further spectroscopic and instrumental methods of analysis are examined with emphasis on H\(^1\) and C\(^{13}\) NMR and MS.

CHEM 242W       RESEARCH METHODOLOGY IN CHEMISTRY [Writing Enriched] Prerequisites: CHEM 111-112 and ENGL 111W-112W or ENGL 223W. One hour lecture and three hours laboratory. This course introduces the student to chemistry research protocols including experimental design, conducting a literature review, and introductory instrumentation. Students will create and present an independent research proposal based on their review of the chemical literature.

CHEM 320       INTRODUCTORY BIOCHEMISTRY (4) Prerequisites: CHEM 221-222. Three hours lecture and three hours laboratory. This course is a study of the structure and function of biological macromolecules and the relation of chemistry to metabolic processes. Biochemistry is especially recommended for biology majors and pre-health science students.

CHEM 352       ADVANCED ORGANIC CHEMISTRY (3) Prerequisites: CHEM 222 or consent of instructor. Three hours lecture. This course explores advanced topics in organic chemical bonding and reactivity, including molecular orbital theory, stereochemistry, stereoelectronic effects, molecular rearrangements, structure-reactivity relationships, pericyclic reactions, additions, and condensations. These concepts are applied in the study of organic synthesis and determination of mechanisms. Modern spectroscopic methods, including mass spectrometry, infrared spectroscopy, and one- and two-dimensional nuclear magnetic resonance spectroscopy will be emphasized. Structure determination using a combination of methods will also be emphasized.

CHEM 359       ANALYTICAL CHEMISTRY I (4) Prerequisites: CHEM 112. Three hours lecture and three hours laboratory. This course focuses on the theory and practice of modern analytical chemistry including volumetric and electrochemical methods, sample collection, preparation, and sample validation. Laboratory work is designed to complement this study.

CHEM 360       ANALYTICAL CHEMISTRY II (4) Prerequisite: CHEM 359. Three hours lecture and three hours laboratory. This course examines theoretical and experimental aspects of instrumental analysis with an emphasis on modern chromatographic, spectroscopic, and electrochemical methods.
CHEM 397  INDEPENDENT STUDY IN CHEMISTRY (1-3)  Prerequisites: Approval of faculty sponsor and school dean; junior or senior standing. This course provides students the opportunity to pursue individual study of topics not covered in other available courses. The area for investigation is developed in consultation with a faculty sponsor and credit is dependent on the nature of the work. May be repeated for no more than six credits.

CHEM 398  SPECIAL TOPICS IN CHEMISTRY (1-3)  [credit depends on topic]  Prerequisite: A background of work in the discipline or prior consent of instructor. This course will focus on an aspect of the discipline not otherwise covered by the regularly offered courses. The topic will vary according to professor and term; consequently, more than one may be taken by a student during his/her matriculation.

CHEM 399  INTERNSHIP IN CHEMISTRY (1-12)  Prerequisites: Juniors or seniors with a 2.25 minimum QPA; approval of written proposal by internship coordinator and supervising faculty prior to registration. This internship is offered to provide practical experience in applications of chemical knowledge while under the supervision of a qualified professional. Internship opportunities are limited. Only three hours of this course may be applied toward the chemistry major. (See "Internships."

CHEM 421  PHYSICAL CHEMISTRY I (4)  Prerequisites: CHEM 242W, PHYS 141-142 or 161-162, MATH 211. Strongly recommended: MATH 301. Three hours lecture and three hours laboratory. This course focuses on theoretical and experimental principles of chemistry that are used to explain and interpret observations made on states of matter. This course focuses on an in-depth understanding of equilibrium thermodynamics and chemical kinetics. Key topics include internal energy, work, enthalpy, entropy, Helmholtz free energy, Gibb's free energy, chemical potential as they relate to the solids, liquids, gases, and mixtures. Students keep a journal-style laboratory notebook and submit reports consistent with American Chemical Society style guidelines.

CHEM 422  PHYSICAL CHEMISTRY II (4)  Prerequisites: CHEM 421. Three hours lecture and three hours laboratory. This course focuses on the theoretical and experimental principles of chemistry that are used to explain and interpret chemical data. This course will focus on chemical quantum mechanics with a particular emphasis on the Schrodinger equation and the postulates of quantum mechanics. Quantum mechanical models will be developed for the particle-in-a-box, harmonic oscillator, rigid rotor, and hydrogen atom. These models will be studied as they relate to spectroscopic properties of atoms and molecules. In addition, computational methods in chemistry will be investigated. Students keep a journal-style laboratory notebook and submit reports consistent with American Chemical Society style guidelines.

CHEM 428  INDIVIDUAL RESEARCH IN CHEMISTRY (1-6)  Prerequisites: Junior or senior standing; consent of supervising instructor. This independent opportunity to conduct a field, laboratory, or literary study project culminates in a formal paper and/or presentation as
directed by the supervising instructor. Credit is dependent on the nature of the work but may not exceed three credit hours per semester.

CHEM 441 CHEMISTRY SEMINAR (1) Prerequisite: Senior standing or consent of instructor. Two hours lecture. This capstone course focuses on advanced scientific written and oral communication skills, scientific philosophy, research methodology, and scientific reasoning.

CHEM 461 SENIOR PROJECT I (2) Prerequisites: Senior standing and completion of CHEM 242W. Students will conduct an individual research project under the guidance of a faculty member. Students are expected to meet weekly with their peers and faculty to discuss progress. Students will present periodic written and oral reports of their progress and keep accurate records in a research notebook.

CHEM 462 SENIOR PROJECT II (1) Prerequisites: Senior standing and completion of CHEM 461. Students will continue an individual research project under the guidance of a faculty member. Students are expected to meet weekly with their peers and faculty to discuss progress. Students will present periodic written and oral reports of their progress and keep accurate records in a research notebook. Students will present a final written research report on their project as well as present their findings at the annual Tri-College Chemistry Consortium.