CHEMISTRY COURSES (CHEM)

CHEM 103-104 FUNDAMENTALS OF CHEMISTRY (3, 3) *Each semester: Three hours lecture. Corequisites: MATH 102 or 103 or equivalent or consent of the instructor; CHEM 105L-106L.* This course covers fundamental principles and concepts necessary for a successful understanding of major aspects of chemistry. Major topics include atomic structure, periodicity, bonding, thermodynamics, kinetics, equilibrium, acid/base chemistry, and electrochemistry.

CHEM 105L-106L FUNDAMENTALS OF CHEMISTRY LABORATORY (1, 1) *Corequisites: MATH 102 or 103 or equivalent or consent of the instructor; CHEM 103-104.* Three-hour laboratory to accompany CHEM 103-104.

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 103/105L.* Three hours lecture and three hours laboratory. This course can substitute for CHEM 104/106L 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 251-252 ORGANIC CHEMISTRY (3, 3) *Prerequisites: CHEM 104 and 106; Corequisite: CHEM 253L-254L must accompany the lecture.* Three hours lecture. The fundamentals of organic chemistry are presented with emphasis on the reaction mechanism and functional group reactivity. Biological examples are used to illustrate important concepts. In-class group problem solving is a key component of this course.

CHEM 253L-254L ORGANIC CHEMISTRY LABORATORY (1, 1) *Prerequisites: CHEM 104 and 106; Corequisite: CHEM 251-252 must accompany the laboratory.* Three hours laboratory. This course is an introduction to the laboratory techniques used to synthesize, purify, and analyze organic compounds. Spectroscopic and instrumental methods of analysis are emphasized. Multi-step synthesis is explored in the second semester.

CHEM 320 INTRODUCTORY BIOCHEMISTRY (4) *Prerequisites: CHEM 251-252 and 253L-254L.* 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 252 and 254L 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 104/106L.* 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 (5) *Prerequisite: CHEM 359.* Three hours lecture and six 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 410-411 PHYSICAL CHEMISTRY I-II (3, 3) *Prerequisites: CHEM 359, PHYS 161-162, MATH 211. Corequisite: CHEM 412L must accompany CHEM 411. Strongly recommended: MATH 301.* Three hours per semester. This course focuses on theoretical principles of chemistry that are used to explain and interpret observations made on states of matter: discussion of bulk properties in terms of thermodynamics, the use of spectroscopy to explore the behavior of individual atoms and molecules, and the analysis of the rates and mechanisms of chemical change.

CHEM 413L-414L PHYSICAL CHEMISTRY LABORATORY I, II (1,1) *Corequisite: CHEM 410 must accompany CHEM 413L and CHEM 411 must accompany CHEM 414L.* Six hours total (three hours each) laboratory. These two courses provide experimental investigation of the principles of physical chemistry and the techniques of physicochemical measurement. Students keep a journal-style laboratory notebook and submit reports consistent with American Chemical Society style guidelines. CHEM 413L focuses on chemical investigations using thermodynamics including calorimetry, equilibria, and electrochemistry. CHEM 414L focuses on quantum mechanical investigations with an emphasis on spectroscopy.

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 (2) *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.