CHEMISTRY (CHEM)

CHEM 100 - FOUNDATIONS OF CHEMISTRY
This course covers some fundamentals of chemistry: properties of matter, units and unit conversations, chemical bonding, stoichiometry, thermochimistry. The focus will be on concepts, skills, and abilities needed for success in subsequent chemistry courses. This course is appropriate for non-scientists and science majors with little or no chemistry background, or who need additionally assistance with math concepts. It meets the university general education requirement for natural science. Not for major credit in the sciences. 
Credits: 3
Attributes: Natural Science
Prerequisites: MATH 095 or MATH 096 (may be taken concurrently)
Course Notes: Not for major credit in Chemistry or Biology.

CHEM 201 - GENERAL CHEMISTRY I
Stoichiometry, atomic structure, chemical periodicity, chemical bonding, properties of matter, and thermochemistry. Laboratory required.
Credits: 2,3
Attributes: Lab Course, Natural Science
Prerequisites: MATH 121 (may be taken concurrently)

CHEM 202 - GENERAL CHEMISTRY II
Solutions, chemical kinetics, chemical equilibrium, acid-base theory, solubility products, complexation, and electrochemistry. Laboratory required.
Credits: 2,3
Attributes: Lab Course, Natural Science
Prerequisites: CHEM 201 and MATH 121

CHEM 210 - SURVEY OF ORGANIC CHEMISTRY
An overview of organic chemistry for students who need only one semester of organic chemistry. This course will explain basic concepts of organic chemistry, including nomenclature, structure (including stereochemistry), reactions, reaction mechanisms, and synthetic uses of alkenes, alkynes, alkyl halides, alcohols, amines, carbonyl compounds, aromatic compounds, and organometallic compounds, as well as peptide and protein chemistry. Laboratory experiments on these topics are an integral part of the course.
Credits: 2,3
Attributes: Lab Course, Natural Science
Prerequisites: CHEM 201 and CHEM 202

CHEM 211 - ORGANIC CHEMISTRY I
This represents the first part of a two-semester sequence. Laboratory experiments represent an integral part of this course. Students will learn basic concepts of organic chemistry: nomenclature, structures (including stereochemistry) and reactions of alkenes, alkynes, alkyl halides (electrophilic addition, nucleophilic substitution and elimination, etc) and alcohols. Students will understand electron delocalization, organic acid and bases, and be able to perform basic laboratory procedures: synthesis, purification, and identification of organic compounds.
Credits: 2,3
Attributes: Lab Course, Natural Science
Prerequisites: CHEM 201 and CHEM 202

CHEM 212 - ORGANIC CHEMISTRY II
This represents the second part of two-semester sequence. Laboratory experiments represent an integral part of this course. Students will extend their knowledge of basic concepts of organic chemistry, including the structure, reaction mechanisms, and synthetic uses of a variety of organic molecules, including alcohols, amines, and carbonyl, aromatic, and organometallic compounds. The laboratory includes the synthesis, purification, and identification of organic compounds as well as instrumental methods in organic chemistry.
Credits: 2,3
Attributes: Lab Course, Natural Science
Prerequisites: CHEM 211 and CHEM 202 and CHEM 201

CHEM 237 - QUANTITATIVE ENVIRONMENTAL ANALYSIS
Classical wet chemical methods for quantitative chemical analysis. Emphasis on environmental chemistry applications. Topics include a review of stoichiometry; statistical treatment of data; and mathematical treatment of acid-base, solubility, complexometric and electrochemical equilibria. Required laboratory provides experience in classical volumetric, gravimetric, potentiometric, and photometric methods of analysis; representative field sampling techniques; and quality assurance/quality control techniques.
Credits: 2,3
Attributes: Lab Course, Natural Science
Prerequisites: CHEM 202

CHEM 313 - ADVANCED ORGANIC CHEMISTRY LAB
Spectrometric methods for determining the structures of organic compounds. Mass spectrometry, proton and carbon FT-NMR, infrared, ultraviolet, and visible spectroscopy. Laboratory includes synthesis of organic compounds and applied spectroscopic methods.
Credits: 2,3
Attributes: Lab Course, Natural Science
Prerequisites: CHEM 212 and CHEM 202
Course Notes: Lecture and Lab course

CHEM 318 - SYNTHETIC ORGANIC CHEMISTRY
Advanced methods in the synthesis of organic compounds, especially those of biological or pharmaceutical interest. Topics include stereo- and regiospecific reagents for organic transformations, including enzyme mediated synthesis, polypeptide and polynucleotide synthesis, and natural product synthesis.
Credits: 3
Attributes: Natural Science
Prerequisites: CHEM 202 and CHEM 212

CHEM 319 - ORGANOMETALLIC CHEMISTRY
The structure, bonding, and reactions of compounds formed between the metallic elements (primarily d block) and carbon (organic groups). Classes of compounds to be discussed include metal alkyls, aryls, hydrides, carbonyl, alkenes, and arenes. The application of organometallic compound in organic synthesis and homogeneous catalysis.
Credits: 3
Attributes: Natural Science
Prerequisites: CHEM 202 and CHEM 212

CHEM 321 - PHYSICAL CHEMISTRY: THERMODYNAMICS
First, second, and third law of thermodynamics, chemical equilibrium, phase equilibrium and kinetic theory of gases.
Credits: 2,3
Attributes: Natural Science
Prerequisites: CHEM 202 and CHEM 212 and MATH 232 and PHYS 202 and PHYS 234
CHEM 322 - PHYSICAL CHEMISTRY: QUANTUM MECHANICS
Fundamentals of quantum mechanics, angular momentum, electronic structure of atoms and molecules, and introduction to spectroscopy.
Credits: 2,3
Attributes: Natural Science
Prerequisites: PHYS 234 and MATH 232 and CHEM 202 and CHEM 212 and PHYS 202

CHEM 323 - ATOMIC AND MOLECULAR SPECTROSCOPY
Introduction to quantum theory followed by atomic spectroscopy, molecular rotational, vibrational and electronic spectroscopy, and group theory.
Credits: 2,3
Attributes: Natural Science
Prerequisites: CHEM 202 and CHEM 212 and MATH 232 and PHYS 202 and PHYS 234

CHEM 337 - INSTRUMENTAL ANALYSIS
Basic theories and experimental techniques of instrumental methods of analysis including ultraviolet-visible and fluorescence spectroscopy, atomic absorption, gas and liquid chromatography, and mass spectrometry. Laboratory includes experiments involves all of these instrumental techniques to analyze a variety of samples.
Credits: 2,3
Attributes: Lab Course, Natural Science
Prerequisites: CHEM 201 and CHEM 202 and CHEM 211 and CHEM 212
Course Notes: Lecture and Lab course

CHEM 341 - INORGANIC CHEMISTRY
Survey of theoretical and synthetic inorganic chemistry. Atomic theory, bonding theory, crystal structure, chemical periodicity, coordination compounds, acid-base systems, and molecular symmetry.
Credits: 3
Attributes: Lab Course, Natural Science
Prerequisites: CHEM 202 and CHEM 212

CHEM 344 - BIOINORGANIC CHEMISTRY
Study of biological molecules containing inorganic ligands or other components, their interactions and biological significance.
Credits: 3
Attributes: Natural Science
Prerequisites: CHEM 212 and CHEM 202
Course Notes: BIOL 301 recommended.

CHEM 347 - ADVANCED INORGANIC CHEMISTRY LAB
Synthesis and characterization of compounds of the p block (main group) and d block (transition metal) elements, including inorganic compounds of biological interest and air-sensitive complexes. Spectroscopic characterization methods include vibrational (IR and Raman), electronic absorption (UV-Vis-NIR) and emission, and multinuclear NMR. Lecture covers the theoretical and practical background for physical methods in experimental inorganic chemistry.
Credits: 2,3
Attributes: Lab Course, Natural Science
Prerequisites: CHEM 202 and CHEM 212
Course Notes: Must register for CHEM 347 lab section.

CHEM 352 - MEDICINAL CHEMISTRY
Chemistry and pharmacology of the principal classes of drugs; history of the development of medicinal chemistry; mechanisms of drug action; relationships between molecular structure and biological activity; the literature of medicinal chemistry; evaluation of potential drugs; perspective on the design of new drugs.
Credits: 3
Attributes: Natural Science
Prerequisites: CHEM 202 and CHEM 212

CHEM 381 - POLYMER CHEMISTRY
Synthesis, physical and analytical characterization, and use of polymers, including fibers, plastics, coatings, and resins. Morphology and rheology of polymers.
Credits: 3
Attributes: Natural Science
Prerequisites: CHEM 202 or CHEM 212

CHEM 391 - CHEMISTRY INTERNSHIP
Off-campus work experience with an approved organization.
Credits: 3
Attributes: Natural Science
Course Notes: School approval

CHEM 392 - RESEARCH IN CHEMISTRY
Independent science laboratory research experience under the guidance of a faculty researcher; 1 to 3 semester hours total may be applied toward the BS degree. Students may register in consecutive semesters.
Credits: 1-3
Attributes: Natural Science
Course Notes: Consent of instructor. $100 per semester hour. Students must arrange for independent laboratory research, experience with a science faculty member, prior to registration.

CHEM 393 - CHEMISTRY SEMINAR
Experience in technical presentations and library research skills. Outside seminar speakers. The chemistry exit assessment examination is part of the course.
Credits: 1
Attributes: Natural Science

CHEM 395 - INDEPENDENT STUDY
Independent library research culminating in a formal review paper on a topic approved by the instructor.
Credits: 1-3
Attributes: Natural Science
Course Notes: Consent of instructor, Students must arrange for a library independent study, with an instructor prior to registration, may register for only 1 SH per semester up to two semesters.