CHEMISTRY (CHEM)

CHEM 1A. General Chemistry I. 5 Units
Prerequisite(s): High school chemistry and college algebra; sufficient performance on the college algebra diagnostic test, or equivalent; passing score on a standardized Chemistry diagnostic exam given prior to each semester, or a minimum grade of "C" in CHEM 4.
General Education Area/Graduation Requirement: Physical Science (B1), Laboratory (B3)
Term Typically Offered: Fall, Spring

Fundamental principles and concepts of chemistry, including stoichiometry; thermochemistry; atomic and molecular structure; solution chemistry, including acid-base chemistry; quantum theory; bonding and intermolecular forces; and chemical kinetics. Lecture three hours, laboratory three hours, discussion one hour.
Note: Not open to enrollment by engineering majors, who should take CHEM 1E, General Chemistry for Engineering.

CHEM 1B. General Chemistry II. 5 Units
Prerequisite(s): CHEM 1A with a passing grade of C or better.
Term Typically Offered: Fall, Spring

Continuation of the development of fundamental principles of chemistry and application of principles developed in CHEM 1A. The laboratory work emphasizes applications of equilibrium principles, including some qualitative analysis, coordination chemistry and bioinorganic chemistry. Lecture three hours, laboratory six hours. Knowledge of word processing and spreadsheet software is recommended.
Note: This course requires personal protective equipment (PPE) or safety training.

CHEM 1E. General Chemistry for Engineering. 4 Units
Prerequisite(s): High school chemistry; Math 30 or eligibility to take MATH 30 as evidenced by the calculus readiness diagnostic exam; passing score on a standardized Chemistry diagnostic exam given prior to each semester, or minimum grade of "C" in CHEM 4
Term Typically Offered: Fall, Spring

A one-semester chemistry course for engineering students covering the fundamental principles and concepts of chemistry important to engineering applications. Lecture topics include atomic and molecular structure, solution chemistry, equilibrium, oxidation-reduction, thermochemistry; intermolecular forces; electrochemistry; radiochemistry; polymers; metallic bonding and alloys; chemical diffusion and kinetics. Lecture three hours, Lab three hours.
Note: Enrollment in this course is restricted to engineering majors.

CHEM 4. Chemical Calculations. 3 Units
Prerequisite(s): High school algebra and college algebra; sufficient performance on the college algebra diagnostic test, or equivalent.
Term Typically Offered: Fall, Spring, Summer

Introductory chemistry for students who plan to major in a scientific field. Appropriate for students desiring to prepare themselves for Chemistry 1A. Emphasizes chemical nomenclature and techniques of chemical problem solving. Topics covered include: dimensional analysis; conversions between measuring units; weight, mole and chemical equations; density; elementary gas laws; heat and temperature; elementary acid and base chemistry; oxidation and reduction; solutions. Three hours lecture.

CHEM 6A. Introduction to General Chemistry. 5 Units
Prerequisite(s): One year high school algebra; high school chemistry recommended.
General Education Area/Graduation Requirement: Laboratory (B3), Physical Science (B1)
Term Typically Offered: Fall, Spring

Structure of atoms, molecules and ions; their interactions including stoichiometry, equilibria, and oxidation-reduction. Does not fulfill the requirements for more advanced study in chemistry and cannot be counted toward a major or minor in chemistry. Lecture three hours, discussion one hour, laboratory three hours.

CHEM 6B. Introduction to Organic and Biological Chemistry. 5 Units
Prerequisite(s): CHEM 1A or CHEM 6A, or a high school chemistry course and passing a qualifying exam given in the first laboratory period.
Term Typically Offered: Fall, Spring

Introduction to structure and chemical and physical properties of the major classes of organic compounds; introduction to the structure, property and roles of biological polymers such as polysaccharides, proteins (including enzymes) and nucleic acids; introduction to the fundamental metabolic pathways of energy metabolism. Does not fulfill the requirement for more advanced study in chemistry and cannot be counted toward a major or minor in chemistry. Lecture three hours; discussion one hour; laboratory three hours.
Note: This course requires personal protective equipment (PPE) and safety training as part of the course occurs in a laboratory.

CHEM 20. Organic Chemistry Lecture--Brief Course. 3 Units
Prerequisite(s): CHEM 1B.
Term Typically Offered: Fall, Spring, Summer

Basic principles of organic chemistry. Recommended for students majoring in life-sciences, but not recommended for preprofessional students.

CHEM 20L. Introductory Organic Chemistry Laboratory. 1 Unit
Prerequisite(s): CHEM 20; CHEM 20 may be taken concurrently.
Term Typically Offered: Fall, Spring

Basic organic experimental techniques. Experimental topics include: melting points, purification of solids, distillation, chromatography, extraction, and functional group qualitative analysis. Specifically designed for Biological Sciences majors and others who want to meet the Chemistry minor requirements for a lower division organic laboratory. Laboratory three hours.

CHEM 24. Organic Chemistry Lecture I. 3 Units
Prerequisite(s): CHEM 1B.
Term Typically Offered: Fall, Spring, Summer

Introduction to the basic principles of organic chemistry, including nomenclature, properties and reactions of various classes of organic compounds. Reaction mechanisms will be emphasized.
Note: Required for chemistry majors and recommended for preprofessional students.

CHEM 25. Organic Chemistry Laboratory. 3 Units
Prerequisite(s): CHEM 24, CHEM 124; CHEM 124 may be taken concurrently.
Term Typically Offered: Fall, Spring, Summer

Basic organic experimental techniques including the preparation, separation, purification and identification of organic compounds. Discussion one hour, laboratory six hours.

CHEM 31. Quantitative Analysis. 4 Units
Prerequisite(s): CHEM 1B.
Term Typically Offered: Fall, Spring

Chemical measurements including associated statistics, chemical equilibrium in aqueous solutions, volumetric analysis, and an introduction to spectrophotometry and chromatography. Lecture two hours, laboratory six hours.

CHEM 89. Introduction to Undergraduate Research. 1 - 3 Units
Term Typically Offered: Fall, Spring

Introduction to undergraduate research which requires students to become familiar lab safety policies, SDSs, and SOPs in the research lab (if applicable), attend group meetings (if applicable) and learn methods of experimental, educational and/or computational design. Students must show proficiency in these requirements in order to receive a final grade. Credit/No Credit

CHEM 101. Science in the Public Debate. 3 Units
Prerequisite(s): ENGL 20
General Education Area/Graduation Requirement: Further Studies in Area B (B5), Upper Division Further Studies in Area B5
Term Typically Offered: Fall, Spring

This course provides students with an introduction to the history, philosophy and practice of modern science, and examines how the social environment influences scientific analysis. Students apply this understanding to the critical evaluation of scientific sources in current social debates surrounding scientific topics.
Note: Does not fulfill credit requirements for the major or minor in chemistry.

CHEM 106. Chemical Concepts. 3 Units
Prerequisite(s): GEOL 8 or BIO 7 and ENGL 20 or an equivalent second semester composition course. Fee course.
General Education Area/Graduation Requirement: Upper Division Further Studies in Area B5, Further Studies in Area B (B5)
Term Typically Offered: Fall, Spring

Principles and concepts of chemistry with applications in the home and environment. Satisfies the upper division chemistry requirement for the multiple-subject teaching credential. Lecture one hour, discussion and activity four hours. Does not fulfill credit requirements for the major or minor in chemistry.
Fee course.

CHEM 110. Inorganic Chemistry Lecture. 3 Units
Prerequisite(s): CHEM 125, CHEM 140B or CHEM 142 instructor permission; CHEM 140B may be taken concurrently, however, students are encouraged to complete CHEM 140B and CHEM 141 first.
Corequisite(s): CHEM 110L.
Term Typically Offered: Fall only

Application of atomic structure, the periodic law, molecular structure and bonding principles, electrochemical principles and other selected models and concepts to theoretical and descriptive inorganic chemistry. Physical and chemical properties of selected elements and inorganic compounds are studied.

CHEM 110L. Advanced Inorganic Chemistry Laboratory. 2 Units
Prerequisite(s): CHEM 125, ENGL 20 or an equivalent second semester composition course.
Corequisite(s): CHEM 110.
Term Typically Offered: Fall only

Preparation, purification and instrumental studies of inorganic compounds. Instrumental and experimental techniques will include EPR, magnetic susceptibility, FTIR, UV-VIS spectroscopy and inert atmosphere techniques.

CHEM 124. Organic Chemistry Lecture II. 3 Units
Prerequisite(s): CHEM 24 or instructor permission; concurrent enrollment in CHEM 25 recommended.
Term Typically Offered: Fall, Spring, Summer

Continued discussion of the principles of organic chemistry, including nomenclature, properties, and reactions of various classes of organic compounds and spectroscopic analysis. Reaction mechanisms will be emphasized.

CHEM 125. Advanced Organic Chemistry Laboratory. 3 Units
Prerequisite(s): CHEM 25, CHEM 124, ENGL 20 or an equivalent second semester composition course.
General Education Area/Graduation Requirement: Upper Division Further Studies in Area B5, Further Studies in Area B (B5)
Term Typically Offered: Fall, Spring

Focuses on advanced organic laboratory techniques and instrumental methods of analysis. Not intended for pre-health professional majors. Discussion one hour, laboratory six hours.

CHEM 126. Physical Organic Chemistry. 3 Units
Prerequisite(s): CHEM 124, and CHEM 140B or CHEM 142, or instructor permission.
Corequisite(s): CHEM 140B or CHEM 142 may be taken concurrently.
Term Typically Offered: Fall, Spring

Study of mechanistic organic chemistry, the physical tools used to study reaction mechanisms, and the relationship between structure and reactivity. Topics include bonding theories, stereoelectronic effects, transition state theory, thermodynamics, kinetic analysis, isotope effects, linear free energy relationships, and application of frontier molecular orbital theory to examine reactions including pericyclic reactions.
Note: Students who have taken CHEM 126 at Sacramento State cannot take CHEM 226 for credit.

CHEM 128. Organic Synthesis. 3 Units
Prerequisite(s): CHEM 124.
Term Typically Offered: Spring only

Application of functional group reactions to multistep syntheses. Recently developed synthetic methods and literature searching will be emphasized.

CHEM 133. Chemical Instrumentation. 4 Units
Prerequisite(s): CHEM 31, concurrent enrollment in CHEM 140B or completion of CHEM 142: ENGL 20 or an equivalent second semester composition course. Graded: Graded Student. Units: 4.0
Term Typically Offered: Spring only

Modern instrumentation and methods for chemical analysis. Function of electronics and computers in instruments. Theory and use of instruments in the areas of electrochemistry, spectroscopy, mass spectrometry and chromatography. Lecture two hours, laboratory six hours.

CHEM 140A. Physical Chemistry Lecture I. 3 Units
Prerequisite(s): CHEM 1B, CHEM 24, CHEM 31, MATH 32, PHYS 5A, PHYS 5B, or PHYS 11A, PHYS 11B, PHYS 11C; PHYS 11B may be taken concurrently.
Term Typically Offered: Fall only

Introduction to chemical thermodynamics and kinetics.

CHEM 140B. Physical Chemistry Lecture II. 3 Units
Prerequisite(s): CHEM 140A.
Term Typically Offered: Spring only

Introduction to molecular quantum chemistry, structure of matter, molecular spectroscopy, and statistical thermodynamics.

CHEM 141. Physical Chemistry Laboratory. 3 Units
Prerequisite(s): ENGL 20 or an equivalent second semester composition course; CHEM 140A, CHEM 140B or CHEM 142, instructor permission; CHEM 140B may be taken concurrently.
Term Typically Offered: Fall, Spring

Selected exercises in the practice of physio-chemical laboratory methods. Lecture one hour, laboratory six hours.

CHEM 142. Introduction to Physical Chemistry. 4 Units
Prerequisite(s): CHEM 1B, CHEM 24, PHYS 5A, PHYS 5B, MATH 31.
Term Typically Offered: Fall, Spring

Introductory presentation of the theoretical and practical aspects of thermodynamics, quantum chemistry, spectroscopy, and kinetics. As time permits, other topics will be: solution chemistry, hydrodynamics, electrochemistry, and crystallography.
Note: Not acceptable for the BS or the BA without concentration.

CHEM 145. Applications of Computational Chemistry. 3 Units
Prerequisite(s): CHEM 140A and CHEM 140B or CHEM 142, or instructor permission.
Term Typically Offered: Fall only – odd years

Brief introduction/background in computational theory, with emphasis on chemical/biochemical applications. Demonstration/instruction of widely used modeling/computational software. Covering techniques including molecular mechanics, semi-imperical methods and "ab initio" methods. Application of computational methods to thermodynamics, kinetics, spectra, electrochemistry, molecular properties. Lecture three hours.
Note: 1) CHEM 245 students will complete an additional research project beyond that expected of students in CHEM 145; 2) Students who have taken CHEM 145 at Sacramento State cannot take CHEM 245 for credit.

CHEM 160A. Structure and Function of Biological Molecules. 3 Units
Prerequisite(s): CHEM 124; MATH 26A or MATH 30 is recommended. Fall only.
Term Typically Offered: Fall only

The chemistry and biochemistry of amino acids, proteins, nucleic acids, lipids and carbohydrates. Also includes enzyme kinetics, the structure and function of biological membranes and discussion of some common laboratory methods. Lecture three hours.

CHEM 160B. Metabolism and Regulation of Biological Systems. 3 Units
Prerequisite(s): CHEM 160A or equivalent course; one year of organic chemistry. Spring only.
Term Typically Offered: Spring only

The bioenergetics and regulation of anaerobic and aerobic metabolic pathways. Major topics include glycolysis, Kreb's cycle, fatty acid and amino acid oxidation, lipid biosynthesis and photosynthesis. Particular emphasis is given to pathway regulation and integration. Lecture three hours.

CHEM 161. General Biochemistry. 3 Units
Prerequisite(s): CHEM 20 or CHEM 124; one year of biological science is recommended.
Term Typically Offered: Fall, Spring, Summer

Introduction to the structure and function of biological molecules (carbohydrates, lipids, proteins, nucleic acids, enzymes and hormones), enzyme kinetics, the structure and function of membranes, and the bioenergetics and regulation of major anaerobic and aerobic metabolic pathways.

CHEM 162. General Biochemistry Laboratory. 3 Units
Prerequisite(s): CHEM 31; CHEM 160A or CHEM 161 (either CHEM 160A or CHEM 161 may be taken concurrently); ENGL 20 or an equivalent second semester composition course.
Term Typically Offered: Fall, Spring

Introduction to fundamental laboratory techniques for the purification and analysis of biological molecules, including chromatographic separation of amino acids and proteins, electrophoretic separation of proteins and nucleic acids, enzyme kinetics, and basic bioinformatics. Discussion one hour, laboratory six hours.

CHEM 164. Advanced Biochemistry Laboratory. 3 Units
Prerequisite(s): CHEM 162 or equivalent; ENGL 20 or an equivalent second semester composition course.
Term Typically Offered: Fall, Spring

Capstone course which emphasizes biochemical laboratory experimental design and trouble-shooting skills. Common biochemistry laboratory techniques are applied in semester-long individual student projects. Discussion one hour, laboratory six hours.

CHEM 167. Biochemistry of Aging. 3 Units
Prerequisite(s): One semester of Biochemistry (Chem160A or Chem161)
Term Typically Offered: Spring only

Aging is a process that has always intrigued humans, yet its causes and mechanisms have remained elusive. This course provides an introduction to modern aging research. It will cover theories and definitions of aging, and explore how organisms age. We will discuss in detail events at the biochemical level that contribute to the aging process. Using this molecular understanding of aging, we will lastly explore anti-aging interventions and means to increase life spans.
Note: At least one UD Biology course recommended (may be taken concurrently)

CHEM 189A. Undergraduate Research. 1 - 3 Units
Prerequisite(s): ENGL 20 or equivalent
Term Typically Offered: Fall, Spring

Directed undergraduate research involving a project that requires use of chemical literature and experimental design. A comprehensive written report and/or scientific poster must be submitted to receive a final grade.
Note: Only three units of CHEM 189A-C may be applied toward the major requirement in chemistry for the BA or BS degrees.

CHEM 189B. Intermediate Undergraduate Research. 1 - 3 Units
Prerequisite(s): ENGL 20 or equivalent and CHEM 189A
Term Typically Offered: Fall, Spring

Continuing directed undergraduate research involving a project with emphasis on experimentation and data analysis. A comprehensive written report and/or scientific poster must be submitted to receive a final grade.
Note: Only three units of CHEM 189A-C may be applied toward the major requirement in chemistry for the BA or BS degrees.

CHEM 189C. Advanced Undergraduate Research. 1 - 3 Units
Prerequisite(s): ENGL 20 and CHEM 189B
Term Typically Offered: Fall, Spring

Culminating directed undergraduate research with emphasis on comprehensive data analysis and formulation of conclusions. A comprehensive written report and/or scientific poster must be submitted to receive a final grade.
Note: Only three units of CHEM 189A-C may be applied toward the major requirement in chemistry for the BA or BS degrees.

CHEM 189D. Culminating Advanced Undergraduate Research. 1 - 3 Units
Prerequisite(s): ENGL 20 and CHEM 189C
Term Typically Offered: Fall, Spring

Extension of culminating undergraduate research with emphasis on finalizing data analysis and writing experimental methods for potential publication. A comprehensive written report (if a scientific poster was completed in 189C) and/or scientific poster (if a written report was completed in 189C) must be submitted to receive a final grade.
Credit/No Credit

CHEM 194. Chemistry-Related Work Experience. 6 - 12 Units
Prerequisite(s): Open only to upper division students and consent of Department Chair. Units may not be applied toward a major in Chemistry or Biochemistry.
Term Typically Offered: Fall, Spring

Supervised employment in a Chemistry related company or agency. Placement is arranged through the Department and the Cooperative Education Program office. Requires completion of a 3-6 month work assignment and a written report.
Credit/No Credit

CHEM 198. Senior Research. 3 Units
Prerequisite(s): One upper division chemistry laboratory class, ENGL 20 or an equivalent second semester composition course and instructor and department chair permission.
Term Typically Offered: Fall, Spring

The student will conduct an independent study of a chemical research topic that is based on experimental techniques or advanced computer modeling. Significant use of chemical literature and information retrieval is required. A well-written, comprehensive, and well-documented final report must be submitted to receive a final grade. A weekly seminar is required. Seminar one hour, laboratory activities are a minimum of six hours per week.

CHEM 198H. Chemistry Honors Thesis. 3 Units
Prerequisite(s): Open only to students who meet the Chemistry Honors Program criteria; CHEM 198 may be taken concurrently.
Term Typically Offered: Spring only

Completion of an undergraduate honors thesis and attendance at chemistry seminars. Students will develop a written thesis containing background, methodology, results, and discussion of an experimental or computational research project involving their own original data.

CHEM 200. Research Methods in Chemistry. 3 Units
Prerequisite(s): Must be a Chemistry graduate student or have instructor permission
Term Typically Offered: Fall, Spring

This course is designed to improve the ability of graduate students to research and interpret the chemical literature. Students work through a series of exercises in preparation for a major writing project such as a thesis proposal or a thesis chapter/section. Exercises include analysis of primary research articles, peer review of student writing samples, and presentation of scientific information. These activities will improve students' understanding of how scientific questions are developed and posed through proposals and dissemination of research results.

CHEM 220. Spectrometric Identification of Compounds. 3 Units
Term Typically Offered: Fall only

Theory, interpretation, and application of ultraviolet, infrared, nuclear magnetic resonance and mass spectra for the elucidation of organic compounds.

CHEM 226. Physical Organic Chemistry. 3 Units
Prerequisite(s): Enrollment in Chemistry master's degree program or instructor permission
Term Typically Offered: Fall, Spring

Study of mechanistic organic chemistry, the physical tools used to study reaction mechanisms, and the relationship between structure and reactivity. Topics include bonding theories, stereoelectronic effects, transition state theory, thermodynamics, kinetic analysis, isotope effects, linear free energy relationships, and application of frontier molecular orbital theory to examine reactions including pericyclic reactions.
Note: Students who have taken CHEM 126 at Sacramento State cannot take CHEM 226 for credit.

CHEM 230. Separation Methods in Chemistry. 3 Units
Term Typically Offered: Fall only – even years

Theoretical and practical aspects of separation sciences. Methods of separations that are included are liquid-liquid extraction and ion exchange, gas, and liquid chromatography. Lecture three hours.

CHEM 245. Applications of Computational Chemistry. 3 Units
Term Typically Offered: Fall only – odd years

Brief introduction/background in computational theory, with emphasis on chemical/biochemical applications. Demonstration/instruction of widely used modeling/instruction of software. Covering techniques including molecular mechanics, semi-imperical methods and "ab initio" methods. Application of computational methods to thermodynamics, kinetics, spectra, electrochemistry, molecular properties. Lecture three hours.
Note: 1) CHEM 245 students will complete an additional research project beyond that expected of students in CHEM 145; 2) Students who have taken CHEM 145 at Sacramento State cannot take CHEM 245 for credit.

CHEM 250. Selected Topics in Chemistry. 3 Units
Prerequisite(s): Enrollment in MS Chemistry graduate program or instructor permission.
Term Typically Offered: Fall, Spring

Intensive coverage of one or more advanced topics in chemistry. A variety of learning/teaching methodologies may be employed including lecture, team projects, computer modeling, oral presentations and poster projects. May be team-taught.
Note: May be team-taught. May be repeated once for credit if topics are different.

CHEM 251. Topics in Interdisciplinary Chemistry. 3 Units
Prerequisite(s): enrollment in Chemistry master's degree program or permission of instructor.
Term Typically Offered: Fall, Spring

Lecture course focusing on interdisciplinary topics in chemistry and related fields. Course activities may include literature review, individual and/or group oral presentations, independent research project. May be team-taught.

CHEM 252. Topics in Synthetic Chemistry. 3 Units
Prerequisite(s): enrollment in Chemistry master's degree program or permission of instructor.
Term Typically Offered: Fall, Spring

Lecture course focusing on synthetic chemistry. Focus may be on biochemical, inorganic, or organic synthetic chemistry. Course activities may include literature review, individual and/or group oral presentations, independent research project. May be team-taught.

CHEM 253. Topics in Applied Chemistry. 3 Units
Prerequisite(s): enrollment in Chemistry master's degree program or permission of instructor.
Term Typically Offered: Fall, Spring

Lecture course focusing on applications of chemistry to a variety of fields. Areas of focus my include biological, environmental, materials, and pharmaceutical applications. Course activities may include literature review, individual and/or group oral presentations, independent research project. May be team-taught.

CHEM 254. Topics in Physical Chemistry. 3 Units
Prerequisite(s): enrollment in Chemistry master's degree program or permission of instructor.
Term Typically Offered: Fall, Spring

Lecture course focusing on topics in physical chemistry. Areas of focus may include content areas such as quantum mechanics, physical/organic or biophysical chemistry, an/or in-depth treatment of structure analysis and determination. Course activities may include literature review, individual and/or group oral presentations, independent research project. May be team-taught.

CHEM 255. Topics in Chemistry Education. 3 Units
Prerequisite(s): enrollment in Chemistry master's degree program or permission of instructor.
Term Typically Offered: Fall, Spring

Intensive coverage of one or more advanced topics in chemistry. A variety of learning/teaching methodologies may be employed, including lecture, team projects, computer modeling, oral presentations and poster projects. May be team-taught.

CHEM 260. Protein Biochemistry. 3 Units
Prerequisite(s): One semester of biochemistry.
Term Typically Offered: Spring only – odd years

Provides a comprehensive review of proteins, with emphasis on protein structure and structure/function relationships. Topics include methods for structure determination, stability and folding, catalysis and denovo protein design. Topical examples from the literature, particularly those related to disease states, are used to illustrate fundamental principles of protein structure and function.

CHEM 261. Nucleic Acid Chemistry. 3 Units
Prerequisite(s): Undergraduate course in biochemistry.
Term Typically Offered: Fall, Spring

The recent biochemical literature will be used to study the structural, chemical, and physical properties of nucleic acids. Chemical mechanisms of mutation , protein-nucleic acid interactions, and DNA-drug interactions will be used to illustrate these properties.

CHEM 267. Biochemistry of Aging. 3 Units
Prerequisite(s): One semester of Biochemistry At least one UD Biology course recommended(may be taken concurrently). Paired with CHEM 167
Term Typically Offered: Spring only

Aging is a process that has always intrigued humans, yet its causes and mechanisms have remained elusive. This course provides an introduction to modern aging research. It will cover theories and definitions of aging, and explore how organisms age. We will discuss in detail events at the biochemical level that contribute to the aging process. Using this molecular understanding of aging, we will lastly explore anti-aging interventions and means to increase life spans.

CHEM 294. Seminar In Chemistry. 0.5 Units
Term Typically Offered: Fall, Spring

Student presentations of topics from the chemical literature; presentations of current chemistry topics from speakers in academia, industry, and government positions. May be repeated for a total of 2 units.
Note: Grade of C/NC will be based on attendance and successful presentation of a seminar.

Credit/No Credit

CHEM 296. Experimental Offerings in Chemistry. 1 Unit
Prerequisite(s): Instructor approval.
Term Typically Offered: Fall, Spring

Presentation and discussion of graduate student and faculty research and current literature with emphasis on critical evaluation of research design, data analysis and presentation techniques. One hour discussion.
Note: May be taken up to four times for credit, but only one unit may be applied to the University's requirement for 200-level courses.

Credit/No Credit

CHEM 299. Special Problems. 1 - 6 Units
Term Typically Offered: Fall, Spring

Graduate research. Approval must be obtained from a departmental committee and the faculty member under whom the work is to be conducted. Written report must be submitted before a final grade is given.
Credit/No Credit

CHEM 500. Culminating Experience. 2 - 4 Units
Prerequisite(s): Advanced to candidacy and chair permission of his/her thesis committee.
Term Typically Offered: Fall, Spring

Completion of a thesis or project approved for the Master's degree. Should be taken in final semester prior to the completion of all requirements for the degree. Number of units of credit is determined by the candidate's master's degree advisory committee.