# CHEMISTRY (CHEM)

Visit the Course Schedule Search website to find out when courses will be offered during the academic year.

*Read more about the courses within this subject prefix in the descriptions provided below.*

**CHEM 800 - Introduction to Chemistry Teaching and Research Practices**
**Credits:** 1
Introduction to professional responsibilities, safety, and ethics of teaching and research. Theory-based teaching, learning, and assessment, and reflective practice. Departmental research overview and seminar participation. Pre-semester sessions and periodic seminars during semester.
**Grade Mode:** Graduate Credit/Fail grading

**CHEM 801 - Modern Tools for Researchers in the Chemical Sciences**
**Credits:** 1
Series of professional development workshops on essential research skills, including intellectual property, literature searching and management, data management, building individual development plan and ethical concerns in chemistry.
**Grade Mode:** Graduate Credit/Fail grading

**CHEM 802 - Critical Thinking for Chemists**
**Credits:** 1
Students begin writing their Thesis Research Proposal document and participate in structured peer-review of evolving drafts. They also participate in a claim-and-question process in which peers challenge claims made in the document and authors explain them. The activities prepare students to present and discuss their proposal with their committee after the end of the semester.
**Prerequisite(s):** CHEM 801 with a minimum grade of B-.
**Grade Mode:** Graduate Credit/Fail grading

**CHEM 803 - Creative Thinking for Chemists**
**Credits:** 1
Students engage in a specific focus on the creative process in scientific research and the formal processes of research proposal development by inspection of existing proposals, discussion of grant agency functions, and developing an original research idea that undergoes a mock panel review.
**Prerequisite(s):** CHEM 802 with a minimum grade of B-.
**Grade Mode:** Graduate Credit/Fail grading

**CHEM 808 - Spectroscopic Investigations of Organic Molecules**
**Credits:** 3
Identification and structural analysis of chemical compounds by selected instrumental methods. Typical topics include proton and carbon-13 NMR spectroscopy, IR and UV spectroscopy, and mass spectrometry.
**Grade Mode:** Letter Grading

**CHEM 840 - Chemical Biology**
**Credits:** 3
How does the COVID vaccine work? What is an antibody conjugate? What is bioconjugation? How do we see mRNA in living cells? How do we evolve enzymes? Chemical Biology is the interdisciplinary study of the chemical and chemical reactions involved to probe, manipulate, and control biological systems in vitro and in vivo. This course is designated for biologists, chemists, and engineers who want to understand cutting-edge and relevant research techniques used in modern medicine.
**Prerequisite(s):** (CHEM 547 with a minimum grade of D- and CHEM 548 with a minimum grade of D-) or (CHEM 651 with a minimum grade of D- and CHEM 652 with a minimum grade of D-).
**Grade Mode:** Letter Grading

**CHEM 855 - Advanced Organic Chemistry**
**Credits:** 3
An overview of organic chemistry at the intermediate levels. Aspects of synthetic organic chemistry and physical organic chemistry, including stereochemistry, are covered.
**Grade Mode:** Letter Grading

**CHEM 862 - Advanced Chemical Analysis Instrumentation**
**Credits:** 3
Theory, instrumentation, and application of methods to qualitative identification and quantitative measurement of trace chemical substances including environmental pollutants. Includes methods of such as atomic spectroscopy, gas and liquid chromatography, IR and UV-VIS spectrophotometry, electrochemistry, fluorescence, mass spectrometry, X-ray techniques.
**Grade Mode:** Letter Grading

**CHEM 874 - Inorganic Chemistry**
**Credits:** 3
Intermediate level overviews of modern inorganic chemistry including structure, bonding, and reactivity. Coursework in organic chemistry and physical chemistry required.
**Grade Mode:** Letter Grading

**CHEM 876 - Physical Chemistry III**
**Credits:** 3
Application of quantum theory to atomic electron structure, spectroscopy, and molecular structure.
**Grade Mode:** Letter Grading

**CHEM 895 - Special Topics**
**Credits:** 2-4
New or specialized topics not covered in regular course offerings. May be repeated. Lab. (Not offered every year.)
**Grade Mode:** Letter Grading

**CHEM 899 - Thesis/Problems**
**Credits:** 1-10
Conferences, library, and experimental work in some field of chemistry.
**Repeat Rule:** May be repeated for a maximum of 10 credits.
**Grade Mode:** Graduate Credit/Fail grading

**CHEM 902 - Theoretical Organic Chemistry II**
**Credits:** 3
A continuation of CHEM 901. (Not offered every year.)
**Grade Mode:** Letter Grading

**CHEM 903 - Advanced Inorganic Chemistry I**
**Credits:** 3
Survey of important advanced topics in concepts of modern inorganic chemistry.
**Grade Mode:** Letter Grading

**CHEM 904 - Advanced Inorganic Chemistry II**
**Credits:** 3
Overview of current trends in inorganic research, including transition metal reactions and mechanisms and organometallic chemistry. (Not offered every year.)
**Grade Mode:** Letter Grading

**CHEM 911 - Synthetic Organic Chemistry I**
**Credits:** 4
Fundamentals of synthetic organic methodology and applications in multiple syntheses. Fourth hour recitation session.
**Grade Mode:** Letter Grading

**CHEM 918 - Advanced Special Topics**
**Credits:** 2-4
Advanced courses dealing with specialized sub-disciplines in chemistry. (Not offered every year.)
**Grade Mode:** Letter Grading

**CHEM 925 - Surface Chemistry**
**Credits:** 3
Bulk and surface structure of solids, experimental methods of surface characterization, molecule-surface interactions, principles of homogeneous and heterogeneous catalysis. This course typically discusses adsorption/desorption kinetics, surface reaction mechanisms, adsorption isotherms, volcano plots, zeolite catalysis, applications to renewable energy, photovoltaics, nanoscience, all from a chemical standpoint.
**Grade Mode:** Letter Grading

**CHEM 930 - Advanced Optical Methods**
**Credits:** 3
Techniques of chemical identification and analysis utilizing optical instrumentation from the standpoint of theory and application. Topics include UV-visible absorption, luminescence, atomic spectroscopy, IR, NMR, x-ray methods, and mass spectrometry. (Not offered every year.)
**Grade Mode:** Letter Grading

**CHEM 935 - Advanced Analytical Chemistry**
**Credits:** 3
Advanced analytical chemical methods, including: potentiometry and voltammetry, X-ray fluorescence, electron spectroscopy, scanning electron microscopy and modern methods of mass spectrometry.
**Grade Mode:** Letter Grading

**CHEM 991 - Graduate Presentation Portfolio**
**Credits:** 1
A graduate course for Chemistry Master of Science students designed to provide them with expertise in preparing, organizing, and giving research presentations.
**Grade Mode:** Graduate Credit/Fail grading

**CHEM 992 - Graduate Writing Portfolio**
**Credits:** 1
A graduate course for students to acquire and practice appropriate professional data documentation and writing skills.
**Grade Mode:** Graduate Credit/Fail grading

**CHEM 995 - Colloquium**
**Credits:** 1-4
A) Inorganic Chemistry; B) Organic Chemistry; C) Theoretical Organic Chemistry; D) Physical Chemistry; E) Analytical Chemistry; F) Chemical Education. (Not offered every year.)
**Repeat Rule:** May be repeated for a maximum of 12 credits.
**Grade Mode:** Letter Grading

**CHEM 997 - Seminar**
**Credits:** 1
Presentation and discussion of recent investigations in chemistry.
**Grade Mode:** Graduate Credit/Fail grading

**CHEM 998 - Seminar**
**Credits:** 1
Presentation and discussion of recent investigations in chemistry.
**Grade Mode:** Graduate Credit/Fail grading

**CHEM 999 - Doctoral Research**
**Credits:** 0
Doctoral Research.
**Grade Mode:** Graduate Credit/Fail grading
**Special Fee:** Yes