CHEMISTRY (CHEM)

# Course numbers with the # symbol included (e.g. #400) have not been taught in the last 3 years.

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 D-.
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 D-.
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 designed 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 - Instrumental Methods of Chemical Analysis
Credits: 3
Theory, instrumentation, and application of methods such as atomic absorption, coulometry, emission spectrography, gas and liquid chromatography, IR and UV-VIS absorption spectrophotometry, and mass spectrometry to chemical analysis. Prereq: quantitative analysis; physical chemistry as a pre- or co requisite;/ or permission.
Grade Mode: Letter Grading

CHEM 874 - Inorganic Chemistry
Credits: 3
Intermediate level overviews of modern inorganic chemistry including structure, bonding, and reactivity. Prereq: organic chemistry; physical chemistry;/ or permission.
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 878 - Special Topics
Credits: 2-4
New or specialized topics not covered in regular course offerings. May be repeated. Prereq: permission. Lab. (Not offered every year.)
Grade Mode: Letter Grading

CHEM 897 - Thesis/Problems
Credits: 1-10
Conferences, library, and experimental work in some field of chemistry. Cr/F.
Repeat Rule: May be repeated for a maximum of 10 credits.
Grade Mode: Graduate Credit/Fail grading

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

CHEM 901 - Theoretical Organic Chemistry I
Credits: 3
A continuation of CHEM 900. (Not offered every year.)
Grade Mode: Letter 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 #905 - Advanced Physical Chemistry I
Credits: 3
Introduction to topics in quantum mechanics and group theory, which form the background of all areas of modern 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 917 - Advanced Special Topics
Credits: 2-4
Advanced courses dealing with specialized sub-disciplines in chemistry. (Not offered every year.)
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 926 - Physical Chemistry of Condensed Phases
Credits: 3
Thermodynamics and kinetics of molecules and ions in solution and at interfaces.
Grade Mode: Letter Grading

CHEM 927 - Chemical Kinetics and Reaction Dynamics
Credits: 3
The course reviews macroscopic chemical kinetics, then investigates the microscopic origins of rate laws. Scattering theory. Transition state theory. Unimolecular and bimolecular reactions.
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. Prereq: CHEM 935 or permission. (Not offered every year.)
Grade Mode: Letter Grading

CHEM 933 - Chemical Separations
Credits: 3
The use of various separation techniques prior to analysis; separations as methods of analysis. Prereq: CHEM 934 or permission. (Not offered every year.)
Grade Mode: Letter Grading

CHEM 934 - Chemical Equilibria
Credits: 3
Formulation and solution of chemical equilibrium problems of relevance to analytical chemistry. (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. Cr/F.
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. Cr/F.
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. Cr/F.
Grade Mode: Graduate Credit/Fail grading

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

CHEM 999 - Doctoral Research
Credits: 0
Cr/F.
Grade Mode: Graduate Credit/Fail grading