

# CHEMISTRY (CHEM)

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

## CHEM 800 - Chemistry Teaching Seminar

**Credits:** 1

Introduction for graduate students to their role as chemistry teaching assistants: professional responsibilities, safety, and ethics; theory-based teaching, learning, and assessment; reflective practice. Pre-semester sessions and periodic seminars during semester. Cr/F.

## CHEM 802 - Critical and Creative Thinking for Chemists

**Credits:** 1

Students prepare two proposals, one based on their research and a second based on an original idea. They develop critical thinking skills by critiquing proposals from other students. Lectures discuss topics relative to research proposal development including presentation, coming up with new ideas, keeping up with the chemical literature and research costs.

## 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.

## 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.

## 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.

## 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.

## CHEM 876 - Physical Chemistry III

**Credits:** 3

Application of quantum theory to atomic electron structure, spectroscopy, and molecular structure.

## CHEM 895 - 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.)

## CHEM 899 - Thesis/Problems

**Credits:** 1-10

Conferences, library, and experimental work in some field of chemistry. May be repeated to a maximum of 10 credits. Cr/F.

## CHEM 902 - Theoretical Organic Chemistry II

**Credits:** 3

A continuation of CHEM 901. (Not offered every year.)

## CHEM 903 - Advanced Inorganic Chemistry I

**Credits:** 3

Survey of important advanced topics in concepts of modern inorganic chemistry.

## 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.)

## 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.)

## CHEM 911 - Synthetic Organic Chemistry I

**Credits:** 4

Fundamentals of synthetic organic methodology and applications in multiple syntheses. Fourth hour recitation session.

## CHEM 917 - Special Topics in Organic Chemistry

**Credits:** 2-4

Advanced courses dealing with specialized sub-disciplines of organic chemistry. (Not offered every year.)

## CHEM 918 - Special Topics in Organic Chemistry

**Credits:** 2-4

Advanced courses dealing with specialized sub-disciplines of organic chemistry. (Not offered every year.)

## 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.

## CHEM 926 - Physical Chemistry of Condensed Phases

**Credits:** 3

Thermodynamics and kinetics of molecules and ions in solution and at interfaces.

## 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.

## 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.)

## 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.)

**CHEM 934 - Chemical Equilibria**

**Credits:** 3

Formulation and solution of chemical equilibrium problems of relevance to analytical chemistry. (Not offered every year.)

**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.

**CHEM 947 - Inorganic Biochemistry**

**Credits:** 3

Introduction to the inorganic chemistry and biochemistry of the interactions of metals with proteins, nucleic acids, and other biomolecules. Relevant small metal complexes (model compounds) and synthetic chelating agents are also covered. Prereq: CHEM 903 or permission. (Offered every other year.)

**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.

**CHEM 992 - Graduate Writing Portfolio**

**Credits:** 1

A graduate course for Chemistry Master of Science students to acquire and practice appropriate professional data documentation and writing skills. Cr/F.

**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. Sections of the course may be taken to a total of 12 credits. (Not offered every year.)

**CHEM 996 - Colloquium**

**Credits:** 1-4

A) Inorganic Chemistry; B) Organic Chemistry; C) Theoretical Organic Chemistry; D) Physical Chemistry; E) Analytical Chemistry; F) Chemical Education. Sections of the course may be taken to a total of 12 credits. (Not offered every year.)

**CHEM 997 - Seminar**

**Credits:** 1

Presentation and discussion of recent investigations in chemistry. Cr/F.

**CHEM 998 - Seminar**

**Credits:** 1

Presentation and discussion of recent investigations in chemistry. Cr/F.

**CHEM 999 - Doctoral Research**

**Credits:** 0

Cr/F.