

# COURSES FOR CHEMISTRY AND BIOCHEMISTRY

## Chemistry and Biochemistry Courses

### CH501 Introductory Inorganic Chemistry

Hours 4

Three lectures and one three-hour laboratory. Survey in areas of coordination, main-group, and organometallic chemistry. Laboratory experiments involve the preparation, purification, and identification of inorganic compounds. This course is designed for students in the chemistry MSC degree and the accelerated masters program. This course will not satisfy any course requirements for the chemistry PhD degree.

### CH505 Medicinal Chemistry

Hours 3

Detailed investigation of the drug design process. Includes lead discovery, target identification and validation, pharmacodynamics, pharmacokinetics, and drug delivery systems. Chemical modification to improve efficacy will be emphasized.

### CH519 Integrated Foundational Chemistry: Physical/Analytical

Hours 3

Foundational course in graduate chemistry emphasizing the concepts that underpin and connect all chemistry sub disciplines.

### CH520 Integrated Foundational Chemistry: Structure/Bonding

Hours 3

Foundational course in graduate chemistry emphasizing the concepts that underpin and connect all chemistry sub disciplines.

### CH524 Adv Anl Ch I Spec Meth

Hours 3

Provides graduate students with knowledge of the fundamental aspects of various modern methods of spectroscopic analysis. Reference to analytical applications and experimental methods is made, where relevant.

### CH526 Chemometrics

Hours 3

Chemometrics involves the application of statistical and mathematical methods to chemistry. Areas of emphasis will be data and error analysis, calibration, experimental design, signal processing and transform procedures, and data description and enhancement.

### CH530 Intro Grad Org Chem

Hours 3

Generally, this course is for entering graduate students whose undergraduate training in organic chemistry is insufficient.

### CH531 Adv Organ Chem I-Physical

Hours 3

Theory and mechanism of organic transformations, detailed evaluation of organic structure, molecular dynamics, molecular orbital interactions, molecular symmetry, stereochemistry of reactions, and energetics of reaction paths.

### CH532 Adv Org Ch II React Synt

Hours 3

Fundamentals of organic transformations and advanced synthetic methodology with application to the synthesis of complex organic structures.

### CH549 Adv Ph Ch II Atom/Mol

Hours 3

*No description available*

### CH561 Biochemistry I

Hours 3

First-semester course in basic biochemistry. Structure and properties of biological molecules, including proteins, DNA, RNA, carbohydrates, lipids, and enzyme cofactors and prosthetic groups. Introduction to intermediary metabolism and glycolysis. Offered fall semester.

### CH562 Biochemistry II

Hours 3

Continuation of basic one-year course in biochemistry. Intermediary metabolism, TCA cycle, oxidative phosphorylation, and catabolism of biomolecules. Biosynthesis of amino acids, nucleotides, carbohydrates, and lipids. DNA and RNA replication, with introduction to recombinant technology. Protein biosynthesis and membrane transport. Offered spring semester.

### CH563 Biochemistry Lab

Hours 3

One lecture and one six-hour laboratory. Biochemical techniques within the structure of a semester-long research project. Topics include protein purification and chromatography, spectroscopy, electrophoresis, kinetics, and DNA manipulation.

### CH564 Adv Biophysical Chem

Hours 3

The study of physical techniques applied to the development and experimental verification of biochemical hypotheses. Examples include forms of spectroscopy, treatment of multiple equilibria, and enzyme kinetics. Examples of applications are drawn from such areas as oxygen transport, oxidative phosphorylation, and photosynthesis.

### CH565 Adv Bio-Inorganic Chem

Hours 3

Study of current knowledge on the roles of metal ions in biological systems, including structural and catalytic functions. Topics include bio-coordination chemistry, spectroscopic and magnetic methods, and kinetics.

### CH566 Bioorganic Reaction Mechanisms

Hours 3

This course will be divided into two main areas. We will begin with methods for studying enzyme reaction mechanisms. This section will include steady-state enzyme kinetics, derivation of rate equations, enzyme inhibition, isotope exchange methods, pH and viscosity effects, kinetic isotope effects, and site-directed mutagenesis. We will then utilize these methods in order to investigate the chemical mechanisms enzymes use to catalyze specific reactions (hydrolysis; group transfer; 1,1 hydrogen shift; 1,2 hydrogen shift; C-C bond formations; and redox chemistry). We will also cover the chemistry associated with several cofactors required by enzymes (flavins, thiamin pyrophosphate, tetrahydrofolate, etc).

**CH570 Research Techniques Chemistry**

Hours 1-6

Independent study in chemistry to learn the tools of chemical research.

**CH583 Introduction to Research in Chemistry**

Hours 1

Introduction to UA Chemistry and Biochemistry research projects through interactive seminars with all departmental faculty members and through select faculty interviews.

**CH584 Literature and Communication in Graduate Chemistry**

Hours 3

This course is an introduction to researching chemistry literature. Topics covered will primarily be related to scientific critical analysis and effective scientific communication, both written and oral. Students will receive structured guidance from the class instructor (s), chemistry faculty, and their class peers throughout the semester to assist with writing a chemistry research paper and delivering an oral presentation. Successful completion of this course will fulfill the literature seminar requirements (written research paper and seminar) for chemistry graduate students.

**CH585 Chemistry Seminars**

Hours 1

Course requires attendance at presentations given by graduate students and outside speakers. All graduate students in residence are required to register for seminar during academic semesters except when the student has received permission from the departmental Director of Graduate Studies.

**CH586 Research Seminar**

Hours 1

Presentation of doctoral dissertation or Plan I Master's thesis research results.

Prerequisite(s): CH 585

**CH599 Thesis Research**

Hours 1-6

*No description available*

**CH601 Adv Inor Chi:Strct Mth**

Hours 3

*No description available*

**CH605 Spec Topics Inorg Chem**

SP

Hours 3

*No description available*

Special Topics Course

**CH609 Organometallic Chem**

Hours 3

Structure, bonding, and reactivity of organotransition metallic compounds, mechanisms of transformations and fundamental reaction types, applications to catalysis and organic synthesis.

**CH615 Solid State Materials Chemistry**

Hours 3

This course is designed for students interested in pursuing research in materials chemistry. This course looks at materials science from the chemist's point of view and uses chemistry language.

**CH618 Crystallography and X-ray Diffraction**

Hours 3

Fundamentals in crystallographic methods for representing atomic structure and their practical application in x-ray diffraction methods. Topics include space groups, miller indices, reciprocal lattice formalism, diffraction of a wave by a lattice, and crystal structure solution and refinement.

**CH621 Trends In Analytical Chem**

Hours 3

*No description available*

**CH625 Electrochemistry**

Hours 3

This course is designed to teach the fundamental aspects of electrochemistry and the application of electrochemical methods to chemical/engineering problems. Electrochemistry studies the relationship between electricity and chemical reactions. It has significant applications in areas such as environmental remediation, energy storage, and healthcare.

**CH626 Surface Analytical Techniques**

Hours 3

Introduces the student to the instrumentation and techniques used to study surfaces and interfaces. Spectroscopic, microscopic, desorption, and vacuum techniques are covered.

**CH627 Mass Spectrometry**

Hours 3

Deals with all areas of mass spectrometry (MS), including single and multiple stage MS and chromatography/MS. The emphasis is on fundamental principles and instrumentation, as well as applications and data interpretation.

**CH635 Sel Topics In Org Chem**

SP

Hours 3

*No description available*

Special Topics Course

**CH637 Spectroscopic Techniq**

Hours 3

Fundamentals of spectroscopic techniques for structure determination of organic molecules. Theory and application of IR, NMR, and MS in organic chemistry.

**CH660 Adv Research Techniques Chem**

Hours 1-6

Independent study in chemistry to learn advanced research techniques used in all areas of chemical research.

**CH680 Initial Research Review**

Hours 1

MS and PHD students present their initial research project progress to their thesis or dissertation committee, respectively.

**CH681 Oral Candidacy Exam**

Hours 1

PHD students prepare and present a third-year research report and defend an original research proposal in front of their dissertation committee.

Prerequisite(s): CH 680

**CH699 Dissertation Research**

Hours 1-12

Research efforts for dissertation content.

Prerequisite(s): CH 681