CHEM 523 (OPUS 1671)  
Advanced Organic Chemistry III  
Instructor: Nathan Jui

This course is designed to complete the four semester graduate organic chemistry sequence which also includes Chem 521, 522 and 524. The material covered in this course requires a thorough knowledge of physical organic chemistry, basic structural theory, organic reactions, stereochemistry, and spectroscopy. The course focuses on modern concepts and strategies for the synthesis of a broad range of organic compounds including natural and non-natural products.

CHEM 524 (OPUS 1672)  
Spectroscopy In Organic Chemistry  
Instructor: Lanny Liebeskind

Chemistry 524 is a problem-solving course in spectroscopic and spectrometric techniques used for the structural characterization of organic compounds. Methods to be studied include nuclear magnetic resonance spectroscopy (1H, 13C, 2D), infrared spectroscopy, and mass spectrometry. A major part of the course will be focused on problem-solving techniques, including the integrated application of spectroscopic and spectrometry techniques to determine structures of polyfunctionalized organic compounds.

Prerequisites: Chem 221 and 222 or equivalent (one full year of introductory organic chemistry); Chem 521 is highly recommended.


CHEM 534 (OPUS 1673)  
Advanced Physical Chemistry IV  
Instructor: Michael Heaven

This course will examine the principles that govern the interactions of atoms and molecules with electromagnetic radiation. The topics covered will include rotational, vibrational and electronic spectroscopy. For each sub-topic we will examine the quantum mechanical energy level structures associated with the atoms or molecules, and the spectra that arise from transitions between stationary states. Familiarity with basic quantum mechanics and perturbation theory is assumed. This course will be of value to students working in both experimental and theoretical research areas.
CHEM 535 (OPUS 1687)  
Physical Methods in Experimental Chemistry  
Instructor: Tianquan Lian

This course will provide an introduction to the experimental techniques of modern physical chemistry. It will cover theoretical and practical issues pertaining to equipment (including lasers, optical elements, and detectors) as well as experimental design.

CHEM 552 (OPUS 1674)  
Advanced Inorganic Chemistry II  
Instructor: Richard Dyer

The central goal of bioinorganic chemistry is to elucidate the structures and reactivities of metal centers within biomolecules. The physical methods used to explore the nature of the metal environment within a biomolecule have been critical to progress in this field. This course will explore the fundamentals of physical methods and their specific applications to problems in bioinorganic chemistry, including electronic absorbance and emission, infrared, Raman, CD, MCD, EPR and X-Ray absorption spectroscopies. Students will be evaluated on the basis of problem sets, examinations and a class presentation.


CHEM 553 – 1 (OPUS 1675)  
Advanced Inorganic Chemistry III  
Instructor: Craig Hill

This course focuses on the mechanisms of inorganic and organometallic reactions. The course provides both intellectual background and practical methods required for effective research in this area and in condensed phase reaction mechanisms in general. The methods to be covered include kinetics, product distribution, pertinent spectroscopic studies and the use of modern software for data processing. The subjects to be covered include determination of association stoichiometry and binding constants, rate laws, activation parameters and other features of complex mechanisms. The convergence of experimental and theoretical mechanisms and pitfalls in the study of reactions will be addressed.

CHEM 572 -1 (OPUS 1688)  
Advanced Biophysical Chemistry  
Instructor: David Lynn

This course covers advanced topics in biophysical chemistry and focuses on the design and properties of dynamic chemical networks as well as the structural analysis of native and synthetic biomolecular assemblies.
CHEM 575R – 1 (OPUS 1689)  
TuTh 10:00 am – 11:15 am  
Physical Biochemistry  
Instructor: Vincent Conticello

The course involves the application of physical chemical approaches to study biological macromolecules. Topics will include the study of biomacromolecular structure, stability, and mechanism. Physical/analytical methods will be applied to understand the structure and function of biological macromolecules.

CHEM 597R -1 (OPUS 1676)  
Fr 11:30 am – 12:45 pm  
Directed Study ("Library Course"/"Proposal Course")  
Instructors: Richard Doty, Frank McDonald

This course is required for all first-year graduate students and BS/MS students in the Chemistry Department. The primary goal of this course will be the guided development of a research proposal, based on the student's research project. Class meetings will be conducted in a workshop format. Specific aims include careful planning for "proof-of-principle" experiments leading to the second-year research report later in the calendar year, and building proposal-development skills in support of the third-year and fourth-year proposal requirements. Students will receive one credit for the course, to be graded pass/fail.

Prerequisites are first-year graduate student status, or senior status in the BS/MS degree program.

Recommended Text: Writing science: how to write papers that get cited and proposals that get funded, by Joshua Schimel (2012, Oxford University Press).

CHEM 722 (OPUS 2491)  
TuTh 2:30 pm – 3:45 pm  
Special Topics in Biomolecular Chemistry – Nucleic Acids  
Christine Dunham

This course covers advanced topics in Biomolecular Chemistry and focuses on Nucleic Acid Chemistry. Special emphasis will be on the structure and function of nucleic acids and the recruitment of regulatory proteins involved in gene expression.

Prerequisites: undergraduate Biochemistry is highly recommended. Please talk to the instructor for more information regarding this requirement.

CHEM 729R – 1 (OPUS 1678)  
TuTh 11:30 am – 12:45 pm  
Special Topics in Chemistry – Organometallics  
Instructor: Simon Blakey

Organometallic Chemistry for Organic Synthesis: This course aims to provide an overview of organotransition metal chemistry with an introduction to bonding and a focus on catalysis. The course will provide coverage of the fundamentals of organometallic chemistry, the elementary reactions of these complexes, and many
catalytic processes occurring through organometallic intermediates. Key course goals include developing a knowledge of the historical discoveries that lead to the inception of the most important organometallic reactions in use today, the development of a deep understanding of reactivity, including the origins of selectivity in transition metal catalyzed processes, and the differences in reactivity between different metals, and ultimately the understanding of practical considerations for synthetic application and new reaction development.

Prerequisites: Chem 521 and Chem 522


Additional Course Options:

CHEM 599R: Thesis Research (OPUS 1677)
CHEM 791R: Chemistry Seminar (OPUS 1680) ← all divisions!
CHEM 799R: Advanced Research (OPUS 1684)

Reminders About Courses:

- You must enroll in at least 9 hours to be considered a full-time student.
- You must be enrolled full time in the semester in which you plan to graduate.
- You will be automatically enrolled in TATT 600, CHEM 597R, and JPE 600 in the semesters in which these courses are required.
- Students who do not submit a milestone requirement in a given semester will receive a failing research grade. They will receive an incomplete if the P.I. confirms that the student has a plan to complete a requirement. This applies to: Second Year Research Report, Third Year Proposals, ANY Annual Report, and the Original Research Proposal. An incomplete or U in a research course will automatically place you on probation.