Advanced Inorganic and Organic Chemistry (spring 2026) 8 or 16 credits

Faculty: Lydia McKinstry, Ph.D., Lab I 2008, x5262

Description: This program has been designed to solidify and build upon basic concepts of general inorganic chemistry and organic chemistry. Students are encouraged to enroll in the entire 16-credit offering but may also choose from one of the two 8-credit components. All program activities, including lectures, workshops, and laboratory work, will place heavy emphasis on the use of primary chemical literature and problem solving.

In the Advanced Inorganic Chemistry (8 credit option) portion of this program, students will study topics in atomic structure, bonding models, molecular symmetry, group theory and its applications, molecular orbital theory, acid-base chemistry, solid-state structure, band theory of solids as applied to metals, semi-metals, and semiconductors. We will then use these experiences to study the chemistry of transition metal compounds (the study of coordination compounds), paying special attention to the bonding models including crystal field and ligand field theory as they apply to bonding in octahedral and tetrahedral coordination complexes. The prerequisite for this 8-credit component is one year of general chemistry with laboratory.

In the Advanced Organic Chemistry (8 credit option) portion of the program, we will pursue the molecular factors that govern reaction mechanisms and outcomes. We will examine modern synthesis strategies such as retrosynthetic analysis by 'ionic formalism' and functional group 'keyed' transforms. Topics will also include organometallic chemistry and asymmetric synthesis methods. Fundamental theories of modern analytical instrumentation will be examined as they pertain to organic analysis. Molecular structure problems will be solved using rational data interpretation strategies. The laboratory work will stress application of the theories and techniques of synthesis in the preparation and purification of organic compounds. This work may involve complex manipulations including the handling of air- and moisture-sensitive reagents. Advanced Organic Laboratory will also emphasize application of the theories and techniques of instrumental analysis in the characterization of compounds synthesized. The prerequisite for this 8-credit component is one year of sophomore/junior level organic chemistry with laboratory.

Tentative Schedule:

Tuesday	Wednesday	Thursday	Friday
9:00-12:00 Lecture/Workshop	9:00-12:00 Lecture/Workshop	9:00-12:00 Lecture/Workshop	9:00-4:00 Laboratory
1:00-3:00 Lecture/Workshop		1:00-3:00 Lecture/Workshop	

Tentative Credit Equivalencies:

*8 - Advanced Inorganic Chemistry

*8 - Advanced Organic Chemistry with Laboratory