

Fall 2009  
Chemistry 427/627  
"Intermediate Organic Chemistry"

MWF 12:45-1:40      CST 1-019

Professor Daniel A. Clark

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Office Hours: By appointment, between 9AM and 5 PM

**Course Description:** This course is suitable for advanced undergraduate students who wish to broaden their knowledge of organic chemistry and for graduate students who desire a broad review and would like to expand on their undergraduate knowledge. We will cover reaction mechanisms, conformational analysis, and rationalization of stereochemistry in a more in depth fashion than most introductory courses. The ability to write reasonable reaction mechanisms and rationalizing stereochemical outcomes for common organic transformations will be stressed.

<b>Grading:</b>	4 Hour Exams (100 points ea)	400 pts
	7 Problem Sets (25 points ea)	175 pts
	5 Quizzes (20 points ea)	100 pts
	Total	675 pts

**If you are unable to make one of these exams please see Dr. Clark IMMEDIATELY.**

**Problem Sets:** There will be seven (7) problem sets during the course of the semester. Problem sets are due by 1200 (noon) in my office (CST 3-008) or my mailbox in the chemistry office (CST 1-014). Late problem sets will have a five (5) point deduction for every day they are turned in late (*i.e.* 5 points deducted if turned in after 12 noon on the first day, 10 points deducted if turned in after 12 noon the next day, *etc.*).

**Text Book:** Grossman, Robert, B. *The Art of Writing Reasonable Organic Reaction Mechanisms*, 2<sup>nd</sup> Ed. Springer-Verlag, 2003. This course will cover approximately the first five chapters of the text.

**Reading Assignments:** Recommended additional reading may be given throughout the course. These assignments will be given in the form of literature references which you (the student) will need to locate in the library (via internet, or physically going and getting the reference!).

**If you require any special considerations or accommodations due to a disability please see Dr. Clark IMMEDIATELY.**

## Chem 427/627 Outline

### I. The Basics

- A. Nomenclature
- B. Drawing organic molecules
- C. Electronegativity and Dipoles
- D. Resonance structures, Aromaticity and Antiaromaticity
- E. Acidity and Basicity
- F. Driving forces in reactions
- G. General principles on writing reaction mechanisms

### II. Conformational Analysis

- A. Acyclic structures
- B. Cyclic structures

### III. Polar Reactions under Basic Conditions

- A. The  $S_N2$  reaction
- B. Nucleophilic substitution and elimination at aromatic carbons
- C. Eliminations at saturated carbons
- D. Nucleophilic addition to carbonyls
- E. Nitrogen nucleophiles
- F. Carbon nucleophiles
- G. Base promoted rearrangements

### IV. Polar reactions under acidic conditions

- A. Carbocations
- B. Electrophilic addition to olefins
- C. Acid catalyzed reactions of carbonyls
- D. Electrophilic aromatic substitution
- E. Electrophilic heteroatoms

### V. Pericyclic reactions

- A. Electrocyclic reactions
- B. Cycloadditions
- C. Sigmatropic rearrangements
- D. FMO view of pericyclic processes

### VI. Free radical reactions

- A. Formation of radicals
- B. Thermodynamic feasibility of radical reactions
- C. Radical inhibitors
- D. Reactions of radicals
- E. Fragmentations
- F. Rearrangements
- G. Radical Anions

### VII. Carbenes

- A. Singlet vs. Triplet carbenes
- B. Formation of carbenes
- C. Reactions of carbenes