

UNIVERSITY OF CALGARY  
DEPARTMENT OF CHEMISTRY  
COURSE SYLLABUS  
FALL 2014

**COURSE: CHEMISTRY 453, Advanced Organic Chemistry**

LEC	DAYS	TIME	ROOM	INSTRUCTOR	OFFICE	PHONE	EMAIL	OFFICE HOURS
L01	MWF	11:00-11:50	SB 142	Dr. T.G. Back	SB 217	220-6256	<a href="mailto:tgback@ucalgary.ca">tgback@ucalgary.ca</a>	TBA

**TEXTBOOK:** "Advanced Organic Chemistry" by B. Miller, Pearson-Prentice Hall, 2nd edition (2004).

**TOPICS COVERED AND SUGGESTED READING:**

Hückel MO theory. Molecular mechanics principles. Frontier MO interactions and their application to: electrocyclic reactions, cycloadditions, sigmatropic rearrangements. Woodward-Hoffmann rules for pericyclic reactions. Photochemistry. Reactive intermediates (carbocations, free radicals, carbanions, carbenes and nitrenes, as time permits). Methods for studying reaction mechanisms.

The first entry (Jones) is the textbook used in recent years for Chemistry 355 and it will be useful for looking up background material; the other texts are also available from the Bookstore. The second entry (Miller) is the recommended text for Chem 453. It provides coverage of course material except for Huckel MO Theory and Molecular Mechanics. The third entry (Hehre) is optional and provides useful further information about computational methods such as those used in the Molecular Modeling experiments.

1. "**Organic Chemistry**" by M. Jones, 3rd ed., Norton, New York (2005) or later editions, or any similar textbook.
2. "**Advanced Organic Chemistry - Reactions and Mechanisms**" by B. Miller, Prentice-Hall 2nd edition (2004).
3. "**The Molecular Modeling Workbook for Organic Chemistry**" by W.J. Hehre et. al., Wavefunction, Inc. (1998).

**LABORATORY EXPERIMENTS:**

Modeling organic structures and reactions using molecular mechanics and MO methods. Synthetic projects designed to illustrate basic principles: Synthesis of Azulene. Photochemical Synthesis of Benzopinacol. Chemiluminescence. Research project combining both experimental and theoretical approaches: Resolution of Racemic Ibuprofen.

**SUPPLEMENTARY READING:**

The following texts contain material that is relevant to the course. Students are advised to consult them for additional information and insight into the material presented in lectures. They are available in the Reserve Reading Room of the library as well as in the Bookstore.

1. "**Frontier Orbitals and Organic Chemical Reactions**" by I. Fleming, J. Wiley & Sons, Chichester (1976).
2. "**Orbital Interaction Theory of Organic Chemistry**" by A. Rauk, J. Wiley & Sons, N.Y. (1994).
3. "**Mechanism and Theory in Organic Chemistry**" by T.H. Lowry and K.S. Richardson, Harper & Row, N.Y. (1976), or later editions.