Chemistry 513: Organic Mechanisms and Structure
(Physical Organic Chemistry)
Spring 2015

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Office: STC 339 Research labs: STC 325, 328, 329

Office Hours: Monday-Friday 11:00 am - 12:00 pm and by appointment

Lectures: W 6:20-9:20 pm, Rockwall Campus room 143
W 6:20 – 9:20 pm, Commerce campus BA 244

Text: Advanced Organic Chemistry, Part A: Structure and Mechanisms, by Francis A. Carey and Richard J. Sundberg, 5th edition, 2007, published by Springer, ISBN: 978-0-387-44897-8 (hard cover) and 978-0-387-68346-1 (soft cover), or electronic version e-ISBN: 978-0-387-44899-3

This course will focus on two fundamental topics: the structures of organic compounds and an in-depth examination of the mechanisms of the reactions that they undergo. Along these lines, this course will introduce the tools utilized in physical organic chemistry for probing reaction mechanisms. I will supplement the text with several examples of current interest from the literature. Thus, a parallel focus of this class will be the introduction of the student to a critical reading of current literature as it applies to structure and mechanism in organic chemistry.

Grading

There will be three examinations plus a final examination. If you score well on the final exam, it will replace the lowest of your three prior examinations. Each exam will constitute 25% of the course grade. The final letter grade will be based on a standard scale 90-100% A, 80-89% B, 70-79% C, 60-69% D, and below 60% F. The grades may be curved, if warranted.

Sunday, April 5, 2015 is the last day to drop a course and receive a Q.

There will be absolutely no make-ups for exams. If you miss an examination, you will be assigned a zero for that assignment.

Tentative Schedule

January 21	Chapter 2. Stereochemistry, Stereoselectivity in reactions
January 28	Finish Chapter 2, Chapter 1 – Bonding Models
February 4	Chapter 1 – Conformational analysis, Strain and Stability
February 11	Solutions and Non-Covalent Binding Forces (outside reading)
February 18	**Exam #1 – Chapters 1-2**
February 25	Chapter 8 – All things aromaticity
March 4	Chapter 10 – Pericyclic reactions
March 11	Chapter 10 – Pericyclic reactions
March 18	No class: Spring Break
March 25	**Exam #2 – (Chapters 8, 10)**
April 1	Chapter 3. Structural effects on stability and reactivity
April 8	Finish chapter 3
April 15	Chapter 4. Nucleophilic substitutions

April 22	Chapter 5. Elimination reactions
April 29	Chapter 11. Free radical reactions
May 6	**Exam #3 – Chapters 3, 4, 5,**

May 13 – **Final Exam Chapters 1, 2, 3, 4, 5, 8, 10, 11**

Supplemental Reading

1. Modern Physical Organic Chemistry, By Eric V. Anslyn, Dennis A. Dougherty - University Science (2006) - ISBN 1891389319
2. Jerry March, *Advanced Organic Chemistry: Reactions, Mechanisms, and Structure,* forth edition, John Wiley & Sons, **1992**.
3. Thomas H. Lowry and Kathleen Schueller Richardson, *Mechanism and Theory in Organic Chemistry*, third edition, Harper & Row Publishers, **1987**.
4. Reinhard Bruckner, *Advanced Organic Chemistry: Reaction Mechanisms,* Harcourt/Academic Press, **2002**.
5. Bernard Miller, *Advanced Organic Chemistry: Reactions and Mechanisms*, 2nd edition.

These five textbooks provide a different perspective on most of the covered topics

Attendance Policy: All students are expected to attend classes on a regular basis. The Department of Chemistry adheres to the attendance policy set by the University as stated in the most current Undergraduate Catalog. The attendance record is taken from a daily sign-in sheet. A student who is late by more than 5 minutes or fails to sign the sign-in sheet will be counted as missing a lecture. Excessive absence is defined as missing more than 10% of the lectures or more than 10% of the laboratory sessions without excusable reasons. Excessive absence will be reported to the Dean of the College and the Dean of Students. In addition, **according to the TAMU-Commerce Procedure 13.99.99.R0.01, if a student has excessive absences, the instructor may drop the student from the course**. The instructor will only excuse an absence if the student provides, with appropriate documentation, an excusable reason allowed by the TAMU-Commerce Procedure 13.99.99.R0.01. Good class attendance will be necessary in order to pass this course.

Student Conduct Policy: All students enrolled at the University shall follow the tenets of common decency and acceptable behavior conducive to a positive learning environment (see Student¹s Guidebook, Policies and Procedures, Conduct, TAMU-Commerce Procedure 13.02.99.R0.06). Any student engaging in disruptive behavior will be dismissed from class on the first offence. A second offence may constitute dismissal from the course with a failing grade.

Cheating and other Breaches of Academic Conduct: Academic cheating, plagiarism, and other forms of academic misconduct may result in removal of the student from class with a failing grade or may in extreme cases result in suspension or expulsion from the University as described in the Code of Student Conduct section of the Student¹s Guidebook A&M-Commerce Procedure 13.99.99.R0.10.

Students with Disabilities:
The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you have a disability requiring an accommodation, please contact: Office of Student Disability Resources and Services, Texas A&M University-Commerce, Gee Library, Room 132, Phone (903) 886-5150 or (903) 886-5835 Fax (903) 468-8148, StudentDisabilityServices@tamuc.edu

Lecture Learning Outcomes / Course Objectives

Upon completion of the course, the students will have general content knowledge pertaining to:

1. Know the nature of the bonding in organic compounds (molecular orbital theory and the hybridization model)
2. Relate the structure and functional groups found in a given molecule to their physical and chemical properties. This includes learning to predict reactivity of molecules.
3. Understand stereochemistry in thorough detail including the relationships between molecules such as enantiomers, diastereomers, meso compounds, stereoselectivity in reactions, etc. (including stereochemistry resulting from stereogenic centers and axis of chirality)
4. Understand conformational aspects of organic molecules, including hyperconjugation, the anomeric effect, steric and torsional strain anddiaxial interactions in ring compounds.
5. Know detailed mechanistic pathways in reactions such as substitution, elimination (E1, E2, E1CB), addition, free radical, carbene, and pericyclic reactions.
6. Understand a variety of intermolecular forces in solution, including pi-stacking, hydrogen bonding, dipole-dipole interactions, hydrophobic forces, ion-dipole interactions and London dispersion forces.