

## Organic Chemistry 336 (Fall 2014)

Meetings: M,W,F 1:00 PM - 1:50 PM

Location: La Tourette Hall 201

Instructor: Prof. Timothy J. Hagen

Office: FR 350, Office Hours: M 2:00-3:00 pm, Th 9:30-10:30 am, and by appointment

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### Tentative Lecture Schedule

Lecture Dates	Chapters	Subject
8/25 - 9/12	1	Syllabus/Basics of Structure and Bonding: Simplified Models
	2	Structure and Bonding: Molecules
9/19		Exam 1
9/15 – 10/3	3	Structure and Bonding: Orbital Theory
	4	Acid/Base Chemistry
	5	Functional groups and nomenclature
10/10		Exam 2
10/6 – 10/24	6	Stereochemistry I: Cis-Trans Isomers and Conformation
	7	Stereochemistry II: Chiral Molecules
	8	Nucleophilic substitution Reactions
10/31		Exam 3
10/27 – 11/21	9	Elimination Reactions
	10	Functional Group Manipulation
11/21		Exam 4
11/24 – 12/5	11	Reactions of Alkenes/Alkynes
12/10/14		Final exam: Wednesday December 10, Noon-1:50 p.m.

**On-Line Course Information and Tools:** Blackboard (<https://webcourses.niu.edu>) and Organic Chemistry Now <http://now.brookscole.com/hornback2> (The access code came packaged with a new copy of the text or access code can be purchased from the publisher)

**Materials** Hornback, J.M. *Organic Chemistry*, 2nd Ed.; Brooks/Cole Cengage Learning, 2006. ISBN 978-0-534-38951-2.

**Optional texts:** Hornback, J.M. *Student Solutions Manual and Study Guide for Organic Chemistry*, 2nd Ed.; Brooks/Cole Cengage Learning, 2006. ISBN 978-0-534-39710-4.

Klein, D.R. *Organic Chemistry as a Second Language; First Semester Topics* (any edition is fine).

**Recommended:** Molecular models kit

**Class Format:** The course will be composed of lectures, in-class exams, in-class quiz and online learning tools and assessments. *It is important that you attend class, and attendance will be taken each class period.* The in-class lectures need to be supplemented by your reading of the text, working of problems and exams. If you miss a class, it is your responsibility to acquire the lecture notes and any assigned class work from a fellow classmate and you should check Blackboard each day for postings. ***Solving the problems for each chapter, with a time limit, is good practice for the exams.***

**BlackBoard Access:** You must know your student id login and password.

<https://webcourses.niu.edu/webapps/portal/frameset.jsp>

**Exams and Grades:** The course grade will be assigned based on your point totals from the exams and in-class/online quizzes. The course grade will be assigned based on your point totals from exams, quizzes and a final exam. **One exam may be dropped, and because of this no make-up exams will be given.** Under certain justified circumstances students may take tests early or late; please contact me ahead of time to make arrangements. If an exam is missed, a score of zero will be assigned. The on-line quiz will be administered through the NIU Blackboard system. If more than ten quizzes are given then the lowest score(s) will be dropped and the best ten will be used in the grade calculation.

**Final Exam:** The 200 point final exam will be comprehensive and will be given on Wednesday, Dec. 10th from 12:00 - 1:50 am. The point total is as follows:

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Exams (Best 3 of 4 at 100 pts each)	300 Points
Quiz (ten at 10 pts each)	100 Points
Final exam (Wed, 12/11/13 at 12 noon-1:50 pm)	200 points
Total Points	600 Points

**Approximate Grading Scale:** Average grade: A (100-87%), A- (86-85), B+ (84-83), B (82-75%), B- (74-70), C+ (69-68), C (67-55%), D (54-45%), F (44-0%)

**NOTE: by enrolling in this class, you are agreeing to take the exams on the scheduled dates.**

**Optional Study Group Sessions:** I will hold an optional one-hour group study session to go over material and work through problems. The time and location will be announced in class.

**Extra Credit:** THERE IS NO EXTRA CREDIT AVAILABLE.

**Requests for regrades** will be accepted for one week after the day the exams are distributed in class. To request a regrade, list the pages and numbers of the problems that you believe were graded incorrectly along with reasons for a regrade and submit this list along with the original exam. The requests will be reviewed, and exams will be returned during the next class meeting. *The instructor may make copies of exams prior to distribution to the class.* Individuals who make submissions for re-grades will have the copy of the original exam and the exam submitted for re-grading compared. Discrepancies between the two will constitute academic dishonesty and the situation will be dealt with appropriately.

**Important Dates Consult your academic adviser and the NIU website:**

<http://www.cob.niu.edu/advising/advisingHandbook.pdf>

Sunday, August 31 Last day to drop course via self-service in MyNIU.

Friday, September 5 Last day to drop course with approval of major college.

Friday, September 12 Last day to change course from credit to audit or from audit to credit.

Friday, October 17 Last day for an undergraduate to withdraw from course.

**Common Sense Conduct:** No cell phones, pagers, ipods or similar electronic devices allowed. All cell phones must be put in silent/vibrate mode and left on for emergency alerts only. Do not talk, text, etc. during class. Be quiet and respectful of the other students desire to learn. If repeated disturbances of my lecture occur, you will be required to leave class. **During exams all electronic devices are prohibited.**

**Academic Dishonesty (cheating):** Academic dishonesty includes (but is not limited to) looking at another student's exam during a testing session, allowing another student to copy your work, use of unauthorized materials (e.g., lecture notes, crib sheets, textbooks, prohibited electronic devices including smart phones, cell phones, I-pads or programmable calculators containing stored equations, formulas, or text) during exams. Violation of any of these terms will result in assignment of a score of zero for the

exam, quiz or assignment in question. **Academic dishonesty in any form will not be tolerated and may result in failure of the entire course.**

**Student Code of Conduct:** <http://www.niu.edu/communitystandards/pdf/SCC.PDF>.

**Study Groups:** This will make your organic chemistry experience more enjoyable and you will learn the material better. Research shows that by teaching someone else you will learn the material better and you will get a realistic assessment for how well you know the material.

### **General Education Course Objectives**

- Improve ability to think critically and logically
- Improve ability to reason quantitatively and to perform basic chemical computations
- Learn how to use the scientific method and theories to understand organic chemistry
- Develop an appreciation for the importance of the role of organic chemistry in everyday life
- Develop an understanding of the historical development of the field of organic chemistry

### **Learning Outcome Expectations:**

After this course, students should be able to:

- draw Lewis dot structures, calculate formal charge, understand atom electronegativity and how it creates dipoles in bonds, determine the shape of a molecule from its Lewis dot structure, identify different functional groups, and know common bonding situation for 1<sup>st</sup> and 2<sup>nd</sup> row elements.
- identify  $\sigma$  and  $\pi$  bonds, identify the hybridization of any given atom in a molecule, identify the molecular orbital occupied by electron pairs, and identify the orbitals involved in a given bond.
- know trends in bond strengths and lengths for common bonds, recognize constitutional isomers and be able to generate them from a given empirical formula, calculate degree of unsaturation, recognize and produce organic molecules drawn in shorthand, examine the structure of a compound and determine the intermolecular forces that are operating, and understand relative physical properties and how they relate to intermolecular forces.
- name simple organic molecules using the IUPAC system.
- recognize compounds that exist as cis-trans isomers and compare stabilities, use *Z* and *E* descriptors, determine the conformations about a C-C single bond and estimate relative energies, determine types and relative amounts of strain present in cyclic molecules, draw the two chair conformations of cyclohexane derivatives, and determine and compare stability of these two conformational isomers.
- identify chiral compounds and stereocenters, designate chiral center as *R* or *S*, understand the relative properties of enantiomers, recognize *meso*-stereoisomers, determine the stereochemical relationship between two compounds, understand chiral separation techniques, and draw and use Fischer projections.
- draw important resonance structures for any molecule and assign the relative importance of such structures.
- understand Bronsted acid-base theory, write an acid-base reaction, recognize Lewis acids and Lewis bases, understand the meaning of  $K_a$  and  $pK_a$  values and use them to predict equilibrium of an acid-base reaction, and understand how structure affects acidity.
- draw the mechanisms for the  $S_N1$  and  $S_N2$  reactions, recognize various nucleophiles and leaving groups and understand the factors that control their reactivities, understand the factors that control the rates of the two substitution reactions, understand the importance of stereochemistry in the substitution reactions, and apply this knowledge to predict products from a reaction mixture.
- draw the mechanisms for the  $E1$  and  $E2$  reactions, understand the factors that control the rates of the two elimination reactions, understand the implications of stereochemistry in elimination reactions, and apply this knowledge to predict products (resulting from either substitution or elimination) from a reaction mixture.
- using substitution and elimination chemistry understand how to interconvert a variety of functional groups, including alcohols, ethers, esters, alkyl halides, amines, hydrocarbons, nitriles, phosphorous and sulfur compounds, alkenes, alkynes, ketones, aldehydes, epoxides, and cyclopropanes.
- understand aromaticity, know the conditions and mechanisms for functionalizing benzenes using electrophilic aromatic substitution, nucleophilic aromatic substitution, and benzyne chemistry, understand

how substituents on the benzene ring affects its reactivity, and use this knowledge to predict products of reactions and synthesize desired products.

**Notification Of Services For Students With Documented Disabilities** NIU abides by Section 504 of the Rehabilitation Act of 1973 which mandates reasonable accommodations be provided for qualified students with disabilities. If you have a disability and may require some type of instructional and/or examination accommodation, you will need to register with the Center for Access-Ability Resources (CAAR), the designated office on campus to provide services and administer exams with accommodations for students with disabilities. The CAAR office is located on the 4th floor of the University Health Services building (815-753-1303). Accommodations are not retroactive. Please contact me early in the semester so that I can provide or facilitate in providing accommodations you may need. You must for each exam have a form filled out about 10 business days in advance to be sure to have a CAAR test time appointment.