

Organic Chemistry 336 (Fall 2019)

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&W 2:00-3:00 pm, and by appointment

Email: thagen@niu.edu

Phone: (815) 753-1463

Tentative Lecture Schedule

Lecture Dates	Chapters	Subject
8/26 - 9/13	1	Syllabus/The Basics - Bonding and Molecular Structure
	2	Functional Groups, Intermolecular Forces, & Infrared (IR) Spectroscopy
9/20		Exam 1
9/16 – 10/4	3	Acids and Bases-Introduction to Organic Reactions and Their Mechanisms
	4	Nomenclature & Conformations of Alkanes & Cycloalkanes
	5	Stereochemistry / Chiral Molecules
10/18		Exam 2
10/6 – 11/7	6	Nucleophilic Reactions <i>Properties and Substitution Reactions of Alkyl Halides</i>
	7	Alkenes and Alkynes I: Properties and Synthesis. Elimination Reactions of Alkyl Halides
	8	Alkenes and Alkynes II: Addition Reactions
11/8		Exam 3
11/1 – 12/4	9	Nuclear Magnetic Resonance and Mass Spectrometry
	10	Radical Reactions
	11	Alcohols & Ethers
12/6		Exam 4
12/11/19		Final exam: Wednesday December 11, Noon-1:50 p.m.

On-Line Course Information: Course material will be on Blackboard. You must know your student id login and password. <https://webcourses.niu.edu/webapps/portal/frameset.jsp>

Textbook: Organic Chemistry by T. W. Graham Solomons, Craig B. Fryhle, Scott A. Snyder 12th Edition **ISBN:** 9781118875766

Optional texts - recommended: Organic Chemistry - Study Guide and Student Solutions Manual - 12th edition by T. W. Graham Solomons, Craig B. Fryhle, Scott A. Snyder **ISBN:** 9781119077329

Recommended: Molecular models kit

Class Format: The course will be composed of lectures, in-class exams and online quiz 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.

Exams and Grades: The course grade will be assigned based on your point totals from the exams and homework assignments. The course grade will be assigned based on your point totals from exams, homework 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 homework assignments will be problems from the textbook. If more than ten homework assignments 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. 11th from 12:00 - 1:50 am. The point total is as follows:

The point total is as follows:

Exams (Best 3 of 4 at 100 pts each)	300 Points
Homework (best ten at 10 pts each)	100 Points
Final exam (Wed, 12/11/19 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>

Common Sense Conduct: No cell phones, ipads 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 student's 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: https://www.niu.edu/conduct/_pdf/niu-scc-final.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.

Homework problems: Problems from each chapter will be assigned and distributed to the class via blackboard. A PDF copy of the problems will be made available on blackboard. Your hand written answers will be collected in class.

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 1st and 2nd row elements.
- identify σ and π 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.

Statement of Accessibility If you need an accommodation for this class, please contact the Disability Resource Center as soon as possible. The DRC coordinates accommodations for students with disabilities. It is located on the 4th floor of the Health Services Building, and can be reached at 815-753-1303 or drc@niu.edu.

Also, please contact me privately as soon as possible so we can discuss your accommodations. Please note that you will not be required to disclose your disability, only your accommodations. The sooner you let me know your needs, the sooner I can assist you in achieving your learning goals in this course.

Preferred Gender Pronoun Statement This course affirms people of all gender expressions and gender identities. If you prefer to be called a different name than what is on the class roster, please let me know. Please also inform me and feel free to correct me and your classmates on your preferred gender pronouns. If you have any questions or concerns, please do not hesitate to speak with me in person, or email me. The Gender and Sexuality Resource Center also has a webpage designed to help support people of all genders as they navigate NIU's system: <http://niu.edu/gsrc/audience/trans.shtml> .

Multilingual Student Statement I am committed to making course content accessible to all students. If English is not your first language and this causes you concern about the course, please speak with me.

Student Sexual Misconduct Policy Title IX prohibits sex discrimination to include sexual misconduct: harassment, domestic and dating violence, sexual assault, and stalking. If you or someone you know has been harassed or assaulted, you can receive confidential support and advocacy at the Counseling & Consultation Service's Advocacy Services, which can be contacted on at 815-753-1206, or in Campus Life Building-room 200. Alleged violations can be reported non-confidentially to the Affirmative Action & Equity Compliance Office in Lowden Hall-room 101, at 815-753-1118, or online at <http://www.niu.edu/sexualmisconduct/help/form.shtml>. Reports to law enforcement can be made to NIU Police & Public Safety at 815-753-1212. For an emergency, call 911. For more information about Sexual Misconduct Prevention & Resources, visit <http://niu.edu/sexualmisconduct/index.shtml>. Note: As an instructor, one of my responsibilities is to help create a safe learning environment on our campus. I also have a mandatory reporting responsibility related to my role as an instructor and a faculty advisor to a student organization. I am required to share information regarding sexual misconduct or information about a crime that may have occurred on NIU's campus with the University. Students may speak to someone confidentially by contacting Counseling & Consultation Service's Advocacy Services at 815-753-1206, or in Campus Life Building-room 200.

*See Northern Illinois University Catalog for all other policies and guideline