

**Physical Organic Chemistry
Chem 432 (Fall 2018)**

Meetings: Tu, Th 9:30 – 10:45 AM

Location: Faraday 144

Instructor: Prof. Timothy J. Hagen

Office: FR 350, Office Hours: M&W 2:00-3:00 pm, and by appointment

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Course Description: This course will focus on mechanism and structure in organic chemistry including structural theory, stereochemistry, and the study of the reactive intermediates of organic chemistry.

Tentative Lecture Schedule

Weeks	Chapters	Subject
1-5	1	Introduction / Chemical Bonding and Molecular Structure
	2	Stereochemistry, Conformation, and Stereoselectivity
	3	Structural Effects on Stability and Reactivity
	4	Nucleophilic Substitution
9/27		Exam 1
	5	Polar Addition and Elimination Reactions
	6	Carbanions and Other Carbon Nucleophiles
	7	Addition, Condensation and Substitution Reactions of Carbonyl Compounds
	8	Aromaticity
11/1		Exam 2
	9	Aromatic Substitution
	10	Concerted Pericyclic Reactions
	11	Free Radical Reactions
	12	Photochemistry
12/6		Literature projects due and class presentations
12/13/18		Exam 3 Thursday, December 13, 10-11:50 a.m. in Faraday 144

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: Advanced Organic Chemistry Part A: Structure and Mechanism, 5th edition, F.A. Carey and R.J. Sundberg, Springer, 2007. ISBN: 9780387683461

Class Format: The course will be composed of lectures, in-class exams, homework assignments and a literature project.

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 and working of problems. 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.

Grading: The course grade will be assigned based on your point totals from the exams, homework and a literature paper. Exams (60%), Homework (20%), Literature Project (15%), Attendance and class participation (5%).

Exams: There will be three in class exams that will focus on material covered in class. Solving the problems for each chapter, with a time limit, is good practice for the exams. 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.

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.

Homework Assignments: Problems from each chapter will be assigned and graded.

Literature Project: You will find an article from the recent literature that deals with Physical Organic Chemistry, summarize with a paper and make a 15 minute in class presentation. Acceptable topics include, but are not limited to: reaction mechanisms; reactive intermediates; novel structures; spectroscopy; conformational analysis; quantum chemical studies; structure-reactivity relationships; solvent, isotope and solid-state effects; long-lived charged species; magnetic, optical and conducting molecules; molecular recognition.

You will need to have the article identified by **November 15th** and approved by the instructor.

Each paper/presentation will consist of a brief introduction, overview and significance of the topic or problem addressed discussion of the methods and data presented in the paper and conclusions drawn by the authors.

The In-class presentation will be required for Chem 632 students and it will be extra credit for Chem 432 students. The presentation should be approximately 15 minutes in length. You may use a white board, overhead projector or electronic source, (PowerPoint, MS Word or PDF), for your presentation.

Attendance and participation: Attendance will be taken each class. Class participation and in class discussion are strongly encouraged.

The point total is as follows:

Exams (3 at 100 pts each)	300 Points
Homework assignments	100 Points
Literature Project	75 points
<u>Class participation</u>	<u>25 points</u>
Total Points	500 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.

Extra Credit: THERE IS NO EXTRA CREDIT AVAILABLE.

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.

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/communitystandards/pdf/SCC.PDF>

Learning Outcomes and Expectations

General Education Course Objectives Improve ability to think critically and logically. Learn how to use the scientific method and theories to understand physical organic chemistry. Develop an appreciation for the importance of the role of physical organic chemistry. Develop an understand of the historical development of the field of physical organic chemistry.

Specific Learning Objectives After this course, students should be able to: Use SciFinder, follow and read current literature. 1) apply qualitative electronic structure theory to predict the geometric structure, reactivity and other properties of organic molecules (including organometallic compounds and conjugated polymers), and to apply qualitative theoretical models to describe pericyclic reactions. 2) predict conformational preference of organic molecules and the stereochemical preference in reactions. 3) critically evaluate and apply different techniques (experimental and computational) for the determination of mechanisms of organic reactions. 4) describe different types of reactive intermediates and describe their importance in different reactions 5) apply fundamental concepts of chemical and biochemical catalysis 6) describe various forms of non-covalent interactions in organic, bioorganic and supramolecular systems, and predict the influence of solvent on reactivity 7) describe important processes of organic molecules in electronically excited states

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.

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