

Organic Synthesis Chem 431/631 (Fall 2015)

Meetings: M,W,F 9:00 - 9:50 AM

Location: La Tourette Hall 201

Instructor: Prof. Timothy J. Hagen

Office: FR 350, Office Hours: M,W 10:00- 10:30 AM and by appointment

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Tentative Lecture Schedule

Week / date	Topics
1,2	Chapter 1: Alkylation of enolates and other carbon nucleophiles
2,3	Chapter 2: Reaction of carbon nucleophiles with carbonyl compounds
9/11/15	Exam 1
4	Chapter 3: Functional group interconversion
5	Chapter 4: Electrophilic additions to carbon-carbon multiple bonds
6	Chapter 5: Reductions
7	Chapter 6: Concerted cycloadditions, rearrangements and thermal eliminations
8	Chapter 7: Organometallic compounds of group I and II metals
10/9/15	Exam 2
9	Chapter 8: Reactions involving transition metals
10	Chapter 9: Carbon – carbon bond forming reactions of compounds of boron, silicon and tin
11	Chapter 10: Reactions involving carbocations, carbenes and radicals as reactive intermediates
12	Chapter 11: Aromatic substitution reactions
13	Chapter 12: Oxidations
14,15	Chapter 13: Multistep synthesis
12/4/15	Exam 3
12/9/15	Literature project presentations

NOTE: *This schedule is subject to change.*

On-Line Course Information and Tools: Blackboard (<https://webcourses.niu.edu>).

Required text Advanced Organic Chemistry Part B: Reactions and Synthesis, 5th edition, F.A. Carey and R.J. Sundberg, Springer, 2007.

Recommended: Modern Organic Synthesis: Lecture Notes. Dale L. Boger.
<http://www.scripps.edu/boger/Lecture%20Notes1.html>

Evaluation: Exams (60%), Homework (15%), Literature Project (25%),

Exams: There will be three exams worth 100 points each. The exams will cover recently presented material. Exam 1 will be given on September 11, exam 2 will be given on October 9, and Exam 3 will be given December 4.

Optional review sessions: Review sessions will be held prior to each exam. This is an opportunity to go over problems and ask questions.

Homework: There will be several problem sets that will be collected. Answers will be reviewed in class.

Literature project: The project with rubric is available on Blackboard.

Chem 431: You will find total synthesis article from the recent literature, summarize with a paper, and brief in class presentation. Each paper/presentation will consist of a brief introduction, summary of the retro-synthetic analysis and strategy, overview of the synthesis and conclusions. One class period will be reserved for the presentations.

Chem 631: Each student will choose a molecule from the original literature (which either has or has not been previously synthesized) and, after instructor approval, design an original total synthesis that will be presented to the class (~15 minutes) via powerpoint. The student should make use of reactions learned in the course or from the current literature. In addition to the presentation, students will turn in a copy of their proposed synthetic route, along with stereochemical rationale and justification for the key steps (JACS communication style paper, 2 pages max).

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

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, homework and literature project. The final grades will be curved and the approximate grading scale is below.

Approximate Grading Scale (Chem 431): Average grade: A (100-87%), A- (86-85), B+ (84-83), B (82-75%), B- (74-70), C+ (69-68), C (67-60%), D (59-50%), 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.

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://niu.edu/clasadvising/dates/index.shtml>

Sunday, August 30 Last day to drop course via self-service in MyNIU.

Friday, September 4 Last day to drop course with approval of major college.

Friday, September 11 Last day to change course from credit to audit or from audit to credit.

Friday, October 16 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:

- Knowledge of new concepts not presented in CH 300 series; learning assessed by student's ability to identify/recall appropriate reaction substrate, reagents, or products on exams
- Comprehension of fundamental organic reactivity and stereochemical outcomes; assessed by application of stereochemical models for predicting reaction outcomes in problem sets and exams
- Synthesis of 6-membered transition states for diverse reactions; assessed by ability to use appropriate models to account for reaction products of new reactions presented on exams
- Knowledge of types of selectivity; assessed by the ability to identify enantio-, diastereo-, regio-, chemoselective reactions on problem sets and exams
- Analysis of chirality; assessed by ability to identify homo-, diastereo-, and enantiotopic atoms on problem sets and exams
- Evaluation of reactions in the chemical literature; assessed by ability to offer critical analysis of current publications as part of problem sets and final literature analysis project
- Synthesis of lecture material with the chemical literature; assessed by the ability to blend examples from the lecture with published reactions.
- Analysis of elegance and beauty in science; assessed by ability to point out particularly satisfying experiments (i.e. those that build chemical complexity, involve desymmetrization, unusual pattern recognition) in the literature analysis project
- Communication of science; assessed by the ability to present final literature project. Example: In addition to the written assignment graduate students will be required to present their argument orally and field questions about the publication.

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.