Course Description: This course will focus on synthetic transformations of importance in modern organic synthesis. Reactions and reagents will also be discussed from the perspective of multistep synthesis.

Tentative Lecture Schedule

<table>
<thead>
<tr>
<th>Week / date</th>
<th>Topics</th>
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| 1,2         | Introduction  
Chapter 1: Alkylation of enolates and other carbon nucleophiles |
| 2,3         | Chapter 2: Reaction of carbon nucleophiles with carbonyl compounds |
| 4           | Chapter 3: Functional group interconversion |
| 5           | Chapter 4: Electrophilic additions to carbon-carbon multiple bonds |
| 2/15/18     | Exam 1 |
| 6           | Chapter 5: Reductions |
| 7           | Chapter 6: Concerted cycloadditions, rearrangements and thermal eliminations |
| 8           | Chapter 7: Organometallic compounds of group I and II metals |
| 9           | Spring Break (3/12/18 through 3/16/18) |
| 10          | Chapter 8: Reactions involving transition metals |
| 11          | Chapter 9: Carbon – carbon bond forming reactions of compounds of boron, silicon and tin |
| 3/22/18     | Exam 2 |
| 12          | Chapter 10: Reactions involving carbocations, carbenes and radicals as reactive intermediates |
| 13          | Chapter 11: Aromatic substitution reactions |
| 14          | Chapter 12: Oxidations |
| 15,16       | Chapter 13: Multistep synthesis |
| 5/3/18      | Exam 3 |
| 5/8/18      | Literature project presentations and papers due |

Helpful Hints: There is a tremendous volume of information to be covered in this course and we will proceed at a brisk pace. I suggest that you come to class prepared, having already read the chapter. This will allow you to concentrate on concepts that may be unclear to you. Chemistry is a problem solving oriented subject, and I suggest that you work through problems from the chapters we cover. Finally, come to class!! Important concepts, i.e. thing that may appear on exams, are emphasized in lecture as well as things not covered in the book. This course is challenging; be prepared to dedicate at least 1-2 hours per night (5-10 hrs/wk) on synthetic organic chemistry.
On-Line Course Information and Blackboard Access: You must know your student id login and password. [https://webcourses.niu.edu/webapps/portal/frameset.jsp](https://webcourses.niu.edu/webapps/portal/frameset.jsp)


Grading: The course grade will be assigned based on your point totals from the exams, homework assignments, literature project and class participation.

Exams: There will be three exams worth 100 points each. The exams will focus on material recently presented in class.

NIU policies state that under certain justified circumstances (such as department trip, performing arts activity, ROTC function, or athletic competition) students may take tests at an alternate time; contact me ahead of time to make arrangements. [http://www.niu.edu/stat/courses/pdfs/Accessibility_Statement.pdf](http://www.niu.edu/stat/courses/pdfs/Accessibility_Statement.pdf)

All other situations will be dealt with on a case by case basis and the decision of the professor will be final.

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

Optional review sessions: Review sessions will be held prior to each exam. This is an opportunity to go over problems and ask questions. There will be 3 review sessions on the Tuesday prior to the exam. The time and location of the review will be announced in class.

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 may 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.

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

Homework: There will be several problem sets that will be collected. Answers will be reviewed in class.
Literature project: The class will select name reactions for their project on Tuesday January 23rd from the list of organic name reactions, http://www.organic-chemistry.org/namedreactions/ No duplication of name reactions by students. Changes to your selections may be made with instructor approval.

Chem 431: The assignment is due by May 8, 2018. Select three (3) organic name reactions from the list of name reactions provided. For each name reaction provide in two pages or less a reaction scheme and written description of the synthetic reaction or reagent. Include the mechanism, if known. Cover the scope and limitations of the reaction or reagent in your written discussion. Provide an example of the reaction from the current literature, (4 years old or less, with a citation and link to the article). Include the conditions of the reaction that were used in the paper, also include the work up and purification that were used.

Chem 631: The assignment is due on May 8, 2018. Select five (5) organic name reactions from the list of name reactions provided. For each name reaction provide in two pages or less a reaction scheme and written description of the synthetic reaction or reagent. Include the mechanism, if known. Cover the scope and limitations of the reaction or reagent in your written discussion. Provide an example of the reaction from the current literature, (4 years old or less, with a citation and link to the article). Include the conditions of the reaction that were used in the paper, also include the work up and purification that were used.

Chem 631 students will make a PowerPoint presentation that covers the scope of their name reactions to the class (~15-20 minutes per student). The presentation will cover the same points from the papers.

Sources of Information: The American Chemical Society (ACS) Organic Division has an extensive amount of information available for synthetic organic chemists. https://www.organicdivision.org/links/

I have placed additional information and links on Blackboard.

Evaluation: Exams (60%), Homework (20%), Literature Project (15%), Class participation (5%)

The point total is as follows:

- Exams (3 @ 100 points each) 300 points
- Assignments (10 @ 10 points each) 100 points
- Literature Project 75 points
- Class participation 25 points
- Total Points 500 points

Approximate Grading Scale: A (100-87%), A- (86-85), B+ (84-83), B (82-76%), B- (75-73), C+ (72-70), C (69-60%), D (59-50%), F (49-0%)

Important Dates Consult your academic adviser and the NIU website: http://catalog.niu.edu/content.php?catoid=43&navoid=2037

Example: March 9, Friday: Last day for undergraduates to withdraw from a full-semester course or from the university
**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. Plagiarism is unacceptable. 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](http://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 organic chemistry. Develop an appreciation for the importance of the role of organic chemistry in everyday life. Develop an understand of the historical development of the field of organic chemistry.

**Specific Learning Objectives**

After this course, students should be able to: Articulate and apply advanced concepts in stereocontrol in modern organic reactions. S/he will be able to develop predictive models to explain observed stereochemical outcome of reactions. Assemble synthetic sequences to construct a poly-stereogenic compound through a multi-step reaction protocol. Display detailed mechanistic knowledge of carbon-carbon bond forming reactions (including proper indication of electron flow via the curved arrow formalism and likely rate determining step in a mechanistic sequence). Describe a proper understanding of the role that orbital alignment plays in the stereochemical outcome of a chemical transformation. Articulate understanding of the role that organotransition metal compounds and main-group organo compounds play in constructing carbon-carbon bond stereoselectively.

**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: https://niu.edu/gsrc/

**Accessibility Statement**
Northern Illinois University is committed to providing an accessible educational environment in collaboration with the Disability Resource Center (DRC). Any student requiring an academic accommodation due to a disability should let his or her faculty member know as soon as possible. Students who need academic accommodations based on the impact of a disability will be encouraged to contact the DRC if they have not done so already. The DRC is located on the 4th floor of the Health Services Building, and can be reached at 815-753-1303 (V) or drc@niu.edu.

**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*