Chem 730, Advanced Topics in Organic Chemistry
Taught as: Synthetic Organic Chemistry
Spring Semester 2017

Instructor: Prof. B. Mikael Bergdahl
Contact: Office: GMCS 213G
bbergdahl@mail.sdsu.edu (preferred contact) Phone: (619) 594-5865

Lecture meetings: MW, 5:00-6:15 p.m.; GMCS 306

Office Hours: MW 9:00-11:00 am

Texts:

Francis A. Carey, and Richard J. Sundberg, *Advanced Organic Chemistry*, Part B: Reactions and Synthesis, 5th Ed., Kluwer/Plenum Publ., New York 2007.
ISBN: 978-0-387-68354-6. **Required**

Francis A. Carey, and Richard J. Sundberg, *Advanced Organic Chemistry*, Part A: Structure and Mechanisms, 5th Ed., Kluwer/Plenum Publ., New York 2007.
ISBN: 978-0-387-68346-1. **Highly recommended**

Course objectives: Chemistry 730 is an advanced organic chemistry course, which will emphasize modern chemical methodologies most often used in synthetic organic chemistry. Curved arrow mechanism will be presented and emphasized in order to enforce the knowledge and understanding about organic chemistry. Mechanisms covered in this class will be presented in such a way that it connects with fundamental acid-base chemistry, a crucial tool for understanding favorable reaction pathways in organic reactions. Relevant topics are formation of enolates and enamines taking advantage specific reagents, particularly in electrophilic trapping reactions. The course will also cover nucleophilic opening and reductions of carbonyl groups followed by functional group interconversions. Electrophilic additions to carbon-carbon multiple bonds, cycloadditions, rearrangements, and elimination reactions will be highlighted. The course will exemplify synthetic routes and retrosynthetic analysis toward biologically important compounds.

Prerequisites: BS or equivalent degree in chemistry.

Expected Learning Outcomes: Students completing the course should have obtained these skills:

- To be able to present reasonable mechanisms for the organic reactions presented.
- To be able to generate enolates with appropriate bases and its subsequent reaction with various electrophiles.
- To be able to understand solvent effects in enolate type chemistry.
- To be able to justify the stereochemical outcome in stereoselective trapping of electrophiles at α-carbons from enolates and corresponding enamines.
- To be able to understand olefination reactions from stabilized carbon nucleophiles.
- To be able to understand reactions of carbon nucleophiles with carbonyl groups.
- To be able to understand functional group interconversions by substitutions, including protection and deprotection of various protecting groups.
- To be able to understand electrophilic additions to carbon-carbon multiple bonds.
- To be able to understand reduction of carbon-carbon multiple bonds, carbonyl groups, and other functional groups.
- To be able to write a shortened NIH-style grant proposal in organic chemistry
- To be able to make an oral ~20 min presentation of the specific aims and research strategies from the written NIH-style grant proposal.

Attendance: The lecture course consists of two 1.5-hour lectures per week. Lectures will be focused on the theoretical basis and understanding of important concepts in mechanisms of synthetic organic chemistry. You will not be penalized for not attending lectures directly, but indirectly it most likely will be reflected as lower course grades.

Examinations: Two midterm exams will be given during regular lecture schedule (Feb. 15 and Mar. 22) from 5:00 p.m. - 7:00 p.m. The final exam is on Friday, May 5th, 3:30 PM - 5:30 PM. As no make up exams will be given during the semester, it is important that you plan your schedule accordingly. The two 2 hour midterm exams will each be worth 100 points. The final is also a 2 hour exam cumulative and is worth 200 points. Excused absences, substantiated by an appropriate written confirmation, will result in no penalty. Unexcused absences will result in a "zero" and will account for an "F" grade for such exam. Make-up exams will only be offered in exceptional circumstances, typically requiring advance notice.

NIH-Style Written Proposal and Oral Presentation: The homework assignment for the class will be to prepare a shortened NIH-style proposal to propose the total synthesis of a complex natural product with biological activity. These target molecules will be assigned to you in the beginning of the semester. The written proposal is worth a maximum of 75 points and the oral presentation is worth a maximum of 75 points. These presentations are conducted towards the end of the semester,

Grading Policies: Your grade will be determined at the end of the semester, which will not be based on a curve thus your performance will not be affected by others. There is no pre-determined guideline for the grade distribution and most students are assigned high course grades in the end. However, high grades will require a lot of focus, dedication and understanding of the advanced course material. The following flexible scale is a guideline: 80% for "A", 65% for "B" and 50% for a "C" grade, respectively. The +/- grades will be at the instructor's discretion.

Grading: Your course grade will be based on 550 points maximum. Your grade will be based on your performance on your exams.

In summary;	Midterm 1	100	points
	Midterm 2	100	points
	Written Proposal	75	points
	Oral Presentation	75	points
	Final Exam	200	points
	Total	550	points

Cheating and Plagiarism: Academic dishonesty is not tolerated and will result in you receiving a grade of zero for the specific activity. Furthermore, all actions of dishonesty will be reported to the SDSU Center for Students Rights and Responsibilities for investigation and possible disciplinary action, which can include expulsion from SDSU. For additional information on SDSU policies, please see the following URL: http://csrr.sdsu.edu/cheating-plagiarism.html

Students with Disabilities: If you are a student with a disability and believe you will need accommodations for this class, it is your responsibility to contact Student Disability Services at (619) 594-6473. To avoid any delay in the receipt of your accommodations, you should contact the Student Disability Services as soon as possible. Please note that accommodations are not retroactive, and that accommodations based upon disability cannot be provided until you have presented your instructor with an accommodation letter from Student Disability Services.

To the student and how to succeed in Organic Chemistry (and science in general):

1. *Develop good study habits:*
   a. Attend all lectures.
   b. Take good lecture notes.
   c. Use your lecture notes as a guide to your reading in the textbook. Write your questions down if there is something you don't understand. Ask your instructor if you don't understand a concept.
   d. Make flash cards of definitions, concepts, reactions, structures, and nomenclature that are in the textbook that are emphasized by your instructor in lecture. Writing something is equivalent to reading it ten times.
   e. Do all the homework problems with the aid of the study guide or answer book. The suggested problems (homework) have about the same difficulty as the problems you will be given on the exams.
   f. One of the alternative ways to learn, is to find a study partner or to form a study group and work on problems independently and then together.
   g. Keep up to date and don't fall behind.
   h. Seek course advice from science professors and students.
   i. If necessary, see your instructor or department for a tutor.
   j. Try to see the "big picture"; try to see how the topic of the week fits in with the whole course. If you have a difficulty achieving this, ask your instructor.
   k. Practice applying what you have learned in class to the world around you.
   l. Try to foster your own scientific curiosity – wonder why things are and how they happen.
   m. Put emphasis on understanding concepts rather than memorizing material.
2. *Have a positive attitude*.
3. *Realize that science requires more self discipline than many other majors, but actually offers more rewards*.
4. *Be organized*.
5. *Persevere and be determined to succeed*.

Good Luck in Chem 730!!

Mikael Bergdahl

Lecture and Exam schedule; Chem 531/730, Spring 2017

Monday	*Tuesday*	*Wednesday*	*Thursday*	*Friday*
16-Jan ***MLK-Day***	**17-Jan**	**18-Jan** ***Introduction Chapter 1***	**19-Jan**	**20-Jan**
23-Jan ***Chapter 1***	**24-Jan**	**25-Jan** ***Chapter 1***	**26-Jan**	**27-Jan**
30-Jan ***Chapter 1***	**31-Jan**	**01-Feb** ***Chapter 1***	**02-Feb**	**03-Feb**
06-Feb ***Chapter 2***	**07-Feb**	**08-Feb** ***Chapter 2***	**09-Feb**	**10-Feb**
13-Feb ***Chapter 2***	**14-Feb**	**15-Feb** ***Midterm 1***	**16-Feb**	**17-Feb**
20-Feb ***Chapter 2***	**21-Feb**	**22-Feb** ***Chapter 2***	**23-Feb**	**24-Feb**
27-Feb ***Chapter 3***	**28-Feb**	**01-Mar** ***Chapter 3***	**02-Mar**	**03-Mar**
06-Mar ***Chapter 3***	**07-Mar**	**08-Mar** ***Chapter 3***	**09-Mar**	**10-Mar**
13-Mar ***Chapter 3***	**14-Mar**	**15-Mar** ***Chapter 4***	**16-Mar**	**17-Mar**
20-Mar ***Chapter 4***	**21-Mar**	**22-Mar** ***Midterm 2***	**23-Mar**	**24-Mar**
27-Mar *Spring break begins*	**28-Mar** *Spring break*	**29-Mar** *Spring break*	**30-Mar** *Spring break*	**31-Mar** *Spring break*
03-Apr ***Chapter 4***	**04-Apr**	**05-Apr** ***Chapter 4***	**06-Apr**	**07-Apr**
10-Apr ***Chapter 4***	**11-Apr**	**12-Apr** ***Chapter 5***	**13-Apr**	**14-Apr**
17-Apr ***Chapter 5***	**18-Apr**	**19-Apr** ***Chapter 5***	**20-Apr**	**21-Apr**
24-Apr ***Chapter 5***	**25-Apr**	**26-Apr** ***Chapter 5***	**27-Apr**	**28-Apr**
01-May ***Chem 730 presentations***	**02-May**	**03-May** ***Chem 730 presentations***	**04-May** *Last day of classes*	**05-May** *Finals week begins*
08-May	**09-May** *May 5-11 Finals Week*	**10-May**	**11-May**	**12-May**

Chemistry 531/730 Final: Friday May 5th, 3:30-5:30 PM