Chemistry 3B
CHEMICAL STRUCTURE AND REACTIVITY (II)
UC Berkeley – Summer 2017
Dr. Pete Marsden – 323 Latimer – petermarsden@berkeley.edu

Location and time: 1 Pimentel M-Th 2:00-3:30PM.

General Information:

Chemistry 3B is the second semester of a two-semester survey of organic chemistry. The learning goals of this course are to familiarize the students with aromatic systems, carbonyl chemistry and various biologically relevant molecules. We will focus on their mechanisms of formation as well as reaction coordinate energy diagrams.

Course Website: http://bcourses.berkeley.edu

The course website will be used for announcements throughout the semester, as well as for periodically posting selected resources. You are responsible for checking the site on a regular basis. All Homework will be posted under the Files tab. Exam and quiz grades will be posted under the Gradebook.

Email: petermarsden@berkeley.edu

All e-mail concerning Chemistry 3B should have "Chem3B" in the title. Use e-mail for asking simple questions about the course or if you would like to make an appointment to see me. Do not expect detailed answers to chemical questions since organic chemistry is a very visual science and generally requires structures to explain concepts. These questions are more appropriate for office hours.

Exams (150 pt per midterm, 225 pt final, Total 525 pts):

- Exam #1 will be held on Thursday, July 6 (2-4 pm)
- Exam #2 will be held on Thursday, July 27 (2-4 pm)
- The Final Exam will be held on Thursday, August 10 (1:30 pm – 4:30 pm)

Recommended Materials (NOT REQUIRED!!!!):

- K. P. C. Vollhardt, N. E. Schore; "Organic Chemistry, 7th Edition," Freeman, New York.
- N. E. Schore, Study Guide, Freeman, New York.
- HGS Maruzen Molecular Structure Models

Grading: The course will be graded on the basis of **650 points**, distributed as follows:

- 8 quizzes (20 points each for 125 total points (there are 35 free points built in))
- Each midterm exam is worth 150 points (total of 300 points).
- The final exam will be worth 225 points.

Course Grade

Final letter grades in this course will be based on the total points in the course. Distribution of letter grades will be approximately:
A (25-30%); B (30-35%); C (25-30%); D, F (5-10%)

Homework:

Homework sets will be posted regularly on the course website. The homework will not be graded, but is extremely important for understanding the material. Each set will contain suggested book problems from the 7th edition of the Vollhardt text as well as problems that I have written. Due to the fast pace of this course, it will be easy to get behind. To ensure that this does not happen, I suggest you use the text problems as a "warm-up". If you feel comfortable with the material, skip them entirely. If you are struggling, be sure to go through them so that you will have a set of problem solving skills to apply to the more difficult problems on my homework sets.

When attempting my homework sets, be sure to go through your notes at the same time. Many of the strategies outlined during lecture are directly applicable to the completion of the homework questions.

Quizzes (125 points total):

Every Wednesday, there will be a 10 minute, 20 point quiz administered during the lecture. The quizzes will be closely related to the homework problems and lecture material. It is possible to receive over 100 percent of the quiz points (160/125). Because of this, there will be no make-up quizzes.

Lecture attendance:

Organic chemistry is a concentrated and fast-moving subject. It is not inherently more difficult than other science courses, but you will probably find it different from anything you have studied previously because there is a great deal of new conceptual material to assimilate. An important aspect of the subject is that it is very **cumulative,** with each new topic building upon and using concepts developed in the previous one. Because of this close interrelationship of topics, this is not a course in which it is possible to learn some topics but ignore others, especially in the first semester. It is also very difficult to wait until a few days before the midterm and final examinations to begin learning the course material. Therefore, the single factor that gives students the most trouble is **falling behind.** To avoid this problem, I strongly recommend that you come to lecture regularly, and above all **work problems as soon as they are assigned.**

Lecture attendance is particularly important, since all exams in this course will be based on the material covered in lecture. The textbook should be used as a supplement to the lectures. There may be many topics covered in lectures that are not in the text and you will be responsible for knowing this material.

Office Hours:

Dr. Pete Marsden:

- Monday, 9:00-11:00 AM Chem Library. Tuesday 9-11AM in Bixby North.
- Open door policy – Feel free to stop by my office in 323 Latimer and ask your questions. If the door is closed, I am either not in the office or I am busy.
- Email – You can set up meetings with me via email. Be sure to have "Chem 3B" in the subject of the email (petermarsden@berkeley.edu).

Teaching Assistants: Bixby Commons (schedule will be posted on bCourses)

The TA office hours are spread out throughout the week, and are available on a walk-in basis to all enrolled students in both Chem 3B and Chem 3BL (lab). You may visit any TA during scheduled office hours. This is a very valuable resource and you are highly encouraged to bring questions here on a regular basis. Access to the room can be found on the southwest face of Latimer Hall.

Course Outline: The following topics will be discussed in the order shown below (subject to change). The number of lectures per topic will vary. Topics not found in the text will be inserted when appropriate.

Unit 1 Material

Lecture	Day	Date	Topic(s)
1	Mon	19-Jun	Allyl Systems and Conjugated pi systems part 1
2	Tue	20-Jun	Conjugated Pi systems part 2
3	Wed	21-Jun	*Quiz 1* and Conj. Pi systems pt 3 and Diels Alder pt. 1
4	Thurs	22-Jun	Diels Alder pt. 2
5	Mon	26-Jun	Electrocyclizations and Aromaticity intro
6	Tue	27-Jun	Electrophilic Aromatic Substitutions pt. 1
7	Wed	28-Jun	*Quiz 2* and EAS directing groups and SnAr intro
8	Thurs	39-Jun	SnAr and review
	Mon	3-Jul	HOLIDAY!
	Tues	4-Jul	HOLIDAY!
9	Wed	6-Jul	*Quiz 3* and Review
	Thurs	7-Jul	***Exam 1***

Unit 2 Material

Lecture	Day	Date	Topic(s)
10	Mon	10-Jul	Ketones and Aldehydes as electrophiles
11	Tues	11-Jul	Hemi acetals and acetals
12	Wed	12-Jul	*Quiz 4* and Sugars pt. 1
13	Thurs	13-Jul	Sugars pt. 2
14	Mon	17-Jul	Amine Nucleophiles
15	Tues	18-Jul	Enolates introduction
16	Wed	19-Jul	*Quiz 5* and Enolates alkylation, halogenation, aldol
17	Thurs	20-Jul	Beta dicarbonyls and aldol condensations
18	Mon	24-Jul	Carbonyl vs beta carbon electrophiles
19	Tues	25-Jul	Cuprates and Robinson Annulation
20	Wed	26-Jul	*Quiz 6* and Review
	Thurs	27-Jul	***Exam 2***

Unit 3 Material

Lecture	Day	Date	Topic(s)
21	Mon	31-Jul	Carboxylic Acids Introduction
22	Tues	1-Aug	Carboxylic Acid Derivatives
23	Wed	2-Aug	*Quiz 7* and Lithiates attacking derivatives and Reductions of derivatives
24	Thurs	3-Aug	Fatty Acid Synthesis and Amino Acid Intro
25	Mon	7-Aug	Amino Acid Peptide Coupling and Sequencing pt. 1
26	Tues	8-Aug	Peptide Sequencing pt. 2
27	Wed	9-Aug	*Quiz 8* and Edman Degradation and Review
	Thurs	10-Aug	***Final Exam***

Topic *Chapter*

Unit 1 Material

I. Conjugated pi systems *14*
   a. Orbital Review *14.1 (especially figure 14-2), 14.5 (especially figure 14-7)*
   b. Resonance and Reactivity *14.1, 14.5, 14.6, 14.7*
   c. Allylic Bromination *14.2*
   d. Diels Alder *14.5,14.8*
   e. Electrocyclic Reactions *14.9*

II. Aromatic Systems *15*
   a. Introduction *15.1-15.3, 15.5,15.6,15.7,25.1,25.3, 25.5 (figure 25-2)*
   b. Electrophilic Aromatic Substitution *15.8-15.13, 16.1-16.3*
   c. Nucleophilic Aromatic Substitution *22.4,22.10*
   d. Aromatic side chain conversions *22.5, come to lecture*
   e. Nucleic Acid Bases *26.9*

Unit 2 Material

III. Ketones and Aldehydes *17*
   a. Introduction of synthesis and reactivity *17.1,17.2,17.4(table 17-2),17.5*
   b. Nucleophilic attack under basic conditions
      i. Review – Alkoxides, carbanions and other negatively charged nucleophiles *8.7,8.8,pg 751,17.11*
      ii. New – Wittig Reaction *17.12*
   c. Nucleophilic attack under acidic conditions
      i. Acetals, hemiacetals and hydrates *17.5(table 17-4),17.6,17.7, 17.8(up to pg 758)*
      ii. Sugar molecules and chemistry *24.1-24.3,24.6,24.8,24.11,26.9*
      iii. Imines, imminiums and enamines *17.9,17.10,21.6*
   d. 1,4 additions vs 1,2 additions *18.8-18.10*

IV. Enolates *18*
   a. Aldol *18.1-18.5, 23.3*
   b. Robinson *18.11*

Unit 3 Material

V. Carboxylic Acids and derivatives *19.4,19.6-19.11, 20.1-20.4,20.8,23.1,26.6*
VI. Nucleic Acids *26.9*
VII. Amino Acids 26.1,*26.4,26.5*