

**Chemistry 3B**  
**CHEMICAL STRUCTURE AND REACTIVITY (II)**  
**UC Berkeley – Summer 2014**  
**Dr. Pete Marsden – 323 Latimer – [petermarsden@berkeley.edu](mailto:petermarsden@berkeley.edu)**

**Location and time:** 1 Pimentel: Mon, Tues, Wed, and Thur 2:00 – 3:30 PM

**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 resources tab. Exam and quiz grades will be posted under the Gradebook.

**Email:** [petermarsden@berkeley.edu](mailto: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):**

- Midterm Exam #1 will be held on Thursday, July 10
- Midterm Exam #2 will be held on Thursday, July 31
- The Final Exam will be held on Thursday, August 14

**Recommended Materials:**

- 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 600 points, distributed as follows:

- 5 best of 8 quizzes (15 points each for 75 total points)
- 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 (15-20%); B (35%); C (40%); 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 7<sup>th</sup> 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.

### Quizzes (75 points total):

Every Monday, starting June 23<sup>rd</sup> (Yes, that’s the FIRST DAY OF CLASS), there will be a 10 minute, 15 point quiz administered during the lecture. The quizzes will be pulled directly from the homework assignments for the first half of the course, and will be closely related to the homework problems for the second half of the course. The best 5 quizzes of the total 8 will be included in your final score for the course. 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:*

- Mondays from 9:00-11:00 am in chemistry library room D (Hildebrand Hall)
- Tuesdays from 9:00-11:00 am in chemistry library room D (Hildebrand Hall)
- Open door policy – Feel free to stop by my office in 323 Latimer and ask your questions. If the door is closed, I am not in the office.
- 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).

*Graduate Student Instructors:* 106 Latimer Hall (schedule will be posted on bCourses)

The GSI 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 GSI 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 northwest 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.

<i>Topic</i>	<i>Chapter</i>
<b>Exam 1 Material (10 lectures)</b>	
I. Conjugated pi systems	14
a. Orbital Review	14
b. Resonance and Reactivity	14
c. Allylic Bromination	14
d. Diels Alder	14
e. Electrocyclic Reactions	14
II. Aromatic Systems	15
a. Introduction	15
b. Electrophilic Aromatic Substitution	16
c. Nucleophilic Aromatic Substitution	22
d. Aromatic side chain conversions	22
<b>Exam 2 Material (10 lectures)</b>	
III. Ketones and Aldehydes	17
a. Introduction of synthesis / Review of reactivity	8 and 17
b. Nucleophilic attack under basic conditions	
i. Review – Alkoxides, carbanions and other negatively charged nucleophiles	8
ii. New – Wittig Reaction	17
c. Nucleophilic attack under acidic conditions	
i. Acetals, hemiacetals and hydrates	17
ii. Sugar molecules and chemistry	24
iii. Imines, imminiums and enamines	17 and 21
d. 1,4 additions vs 1,2 additions	18
IV. Enolates	18
a. Aldol	18
b. Robinson	18
<b>Final Exam Material (6 lectures)</b>	
V. Carboxylic Acids and derivatives	19 and 23
VI. Nucleic Acids	26
VII. Amino Acids	26