

Chemistry 3A
CHEMICAL STRUCTURE AND REACTIVITY (Organic Chemistry 1)
UC Berkeley – Fall 2018
Dr. Pete Marsden – 323 Latimer – petermarsden@berkeley.edu

Location and time: 1 Pimentel: Tu and Th 8:00 - 9:30 AM
1 Pimentel: Tu and Th 2:00 – 3:30 PM (webcast)

General Information:

Chemistry 3A is the first semester of a two-semester survey of organic chemistry. The main learning goals for this course are 1) to understand and apply Coulomb's Law with respect to chemical reactions, 2) to qualitatively apply the concept of resonance to reactivity, and 3) to use the concepts of molecular orbital theory to understand and even predict the way certain reactions occur with respect to their three dimensional outcomes (stereochemistry) and multiple products (regiochemistry).

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.

Email: petermarsden@berkeley.edu

All e-mail concerning Chemistry 3A should have "Chem3A" 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.

Recommended Materials (NOT required, even a little bit):

- David Klein; "Organic Chemistry : As a Second Language. First Semester Topics. 4th edition," Wiley and Sons Publishing.
- Any molecular modeling kit

Grading: The course will be graded on the basis of **675 points**, distributed as follows:

- 10 best of 14 quizzes (15 points each for 150 total points)
- Each midterm exam is worth 150 points (total of 300 points).
- The final exam will be worth 225 points.

Exams (150 pt per exam, 225 pt final, total 525 pts):

- Exam #1 will be held on Tuesday, October 2 from 7:00 – 9:00 PM.
- Exam #2 will be held on Tuesday, November 6 from 7:00 – 9:00 PM.
- The Final Exam will be held on Monday, December 10 from 3:00 – 6:00 PM.

Quizzes (150 points total):

Every Tuesday, there will be a 10 minute, 15 point quiz administered during the lecture. The quizzes will be closely related to the homework problems and **lecture material**. You must attend the lecture section you are signed up for according to CalCentral.

Course Grade

Final letter grades in this course will be based on the total points in the course. Grade cutoffs will be approximately:

A+/A/A-	: 100% - 85%
B+/B/B-	: 84% - 70%
C+/C/C-	: 69% - 40%
F	: <39%

These are only approximate cutoffs. I might raise or lower them, depending on the actual distribution of scores throughout the semester. Traditionally, the percentage of students receiving each type of grade are as follows:

A (30-35%); B (30-35%); C (25-30%); D, F (5-10%)

I create two separate histograms for the course, assign letters based on each histogram, and give students the higher of the two letter grades. One histogram is based on a pure points scale (as stated in the "grading" section above", and the other gives more weight to the final exam (weighted to 325 pts) and less weight to each of the exams (each weighted down to 100 points).

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. 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.

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 an exam 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.

Lecture Homework/Handout/Review page

Each lecture, there will be a one-page document that will serve as a “Cliff’s Notes” style handout. After each lecture, you should be able to go through that one page and answer all of the questions. It is intended to be similar to Chem 1A discussion handouts, only they are not collected. These are designed as study aides, but are by no means necessary to complete. They will definitely help you retain the information from lecture and solidify the concepts in a small amount of time (please read as minimum needed to pass quizzes).

Office Hours:

Dr. Pete Marsden:

- Monday 1-3 pm in Hildebrand 100F starting after Labor Day.
- Thursday 4-6 pm in 425 Latimer starting first week of class.
- Email – You can set up meetings with me via email. Be sure to have “Chem 3A” in the subject of the email (petermarsden@berkeley.edu).

Head GSI: Shelby McCowen

- Weekly review session Wednesday evenings in 100 Lewis from 7-9PM
- Her office hours can be found with the other GSI office hours on the Google schedule posted on bCourses.

Graduate Student Instructors: Bixby Commons (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 3A and Chem 3AL (lab)**. You may visit any GSI during scheduled office hours. This is a very valuable resource and you are highly encouraged to bring questions regarding topics covered in lecture, lab lecture, lab, homework assignments, practice exams, etc. 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).

Unit 1 Material

Lecture	Day	Date	Topic(s)
1	Thurs	23-Aug	Review, Bond-Line Notation, Formal Charges
2	Tue	28-Aug	<u>Quiz 1</u> and Resonance introduction
3	Thurs	30-Aug	Resonance and acid-base chemistry
4	Tue	4-Sep	<u>Quiz 2</u> and Resonance and Nucleophiles and Electrophiles
5	Thurs	6-Sep	Intro to Molecular Orbitals and Hybrid Orbitals
6	Tue	11-Sep	<u>Quiz 3</u> and 3D images of molecular orbitals
7	Thurs	13-Sep	Hydrocarbons and nomenclature
8	Tue	18-Sep	<u>Quiz 4</u> and Conformational analysis
9	Thurs	20-Sep	Ring strain and Chair cyclohexane
10	Tues	25-Sep	<u>Quiz 5</u> and Substituent effects on chair flips

Unit 2 Material

Lecture	Day	Date	Topic(s)
11	Thurs	27-Sep	Radical Chemistry Introduction, BDEs, Reaction Coordinate Diagrams
12	Tues	2-Oct	<u>Quiz 6</u> and Radical Chemistry Mechanisms
	Tues	2-Oct	<u>Exam 1 (7-9 pm)</u>
13	Thurs	4-Oct	Reactivity and Stereochemistry introduction
14	Tues	9-Oct	<u>Quiz 7</u> and Stereochemistry
15	Thurs	11-Oct	R&S Nomenclature
16	Tues	16-Oct	<u>Quiz 8</u> and Predicting Products with Stereochemistry
17	Thurs	18-Oct	Introduction to Substitution Chemistry, focus on Sn2
18	Tues	23-Oct	<u>Quiz 9</u> and Sn1 chemistry
19	Thurs	25-Oct	Sn1 and Sn2 comparison, mechanism practice
20	Tues	30-Oct	<u>Quiz 10</u> and Carbocation rearrangements

Unit 3 Material

Lecture	Day	Date	Topic(s)
21	Thurs	1-Nov	Elimination Chemistry (E1 and E2)
22	Tues	6-Nov	<u>Quiz 11</u> and Kinetic Analysis of E2
	Tues	6-Nov	<u>Exam 2 (7-9 pm)</u>
23	Thurs	8-Nov	Alkene stability, naming, and stepwise reactivity (rxn with acids)
24	Tues	13-Nov	<u>Quiz 12</u> and Alkenes reacting as nucleophiles, and concerted mechanisms
25	Thurs	15-Nov	Alkene reaction review and introduction to synthesis
26	Tues	20-Nov	<u>Quiz 13</u> and Epoxides, carbanions and carbonyls
	Thurs	22-Nov	<u>HOLIDAY FOR TURKEY!</u>
27	Tues	27-Nov	<u>Quiz 14</u> and carbonyl reactivity
28	Thurs	29-Nov	Alkyne reactivity and Review
	Mon	10-Dec	<u>Final Exam (3-6 pm)</u>