Chemistry 12A: Introduction to Organic Chemistry (Fall 2018)

Lectures:
Tuesdays and Thursdays, 8:10-9:30 am, 105 Stanley
Tuesdays, 5:10 – 6:00 pm, 105 Stanley (laboratory lecture)

Lecture and Laboratory Instructor:
Prof. Anne Baranger (abaranger@berkeley.edu)
Office Hours: time announced on bcourses, 213 Lewis

Head Graduate Student Instructor:
Jakob Dahl jakobd@berkeley.edu

Graduate Student Instructors:

Danny Thach	d_thach@berkeley.edu	Section 211 (Tu, 12-5, 322 Latimer)
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Alex Wheeler	talexander_wheeler@berkeley.edu	Section 312 (W, 12-5 320 Latimer)
Caroline Rouget-Virbel	caroline_rouget@berkeley.edu	Section 321 (W, 5-10, 322 Latimer)
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Amanda Bischoff	amanda_bischoff@berkeley.edu	Section 411 (Th, 1-6, 322 Latimer)
Andre Sanchez	andre_sanchez_243@berkeley.edu	Section 412 (Th, 1-6, 320 Latimer)

GSI Office Hours are held in 106 Latimer. All GSI office hours are open to all enrolled students – you are not limited to the GSI who teaches your lab section. A schedule is posted on the class bcourses site.

Review Sessions by Jakob: Tuesdays 6-8pm in 100 Lewis. First Session: 8/28

Administration: The administrative coordinator for the course is Anjum Sareshwala (330 Latimer Hall, 642-8163, anjums@berkeley.edu), and questions about prerequisites, add/drops, enrollment, etc. should be directed to her.

Class Web Site: bcourses.berkeley.edu

Materials:
1. *Organic Chemistry* 2nd ed by Joel Karty, Cal Berkeley Package, W.W. Norton. The package includes the study guide, and smartwork problems.

2. *Understanding the Principles of Organic Chemistry: A Laboratory Experience* by Pedersen and Myers – custom edition for this course or the regular edition or online/pdf version is also fine.
3. A laboratory notebook with carbon-copy pages (ISBN: 9780738035871, stocked by the bookstore for Chem 3AL/3BL - check with your GSI for approval if you would like to use a different one)
4. Molecular Model Kit – you can use any molecular model kit you wish: Kits from Duluth on Amazon are a reasonable price and good quality. ***You may bring your model kit to all of the exams.***
5. Smartwork Learning System. This is part of the textbook package. You can also purchase it alone, if you already have a copy of the textbook and study guide. General directions to use Smartwork
    a. Create and login to your account at https://digital.wwnorton.com/karty2 using your school email as a login name
    b. Follow prompts to register
    c. Once registered, then enroll in the class by entering in the 5-digit student set ID **59599**

    Helpnotes on registering: http://wwnorton.knowledgeowl.com/help/smartwork5-students-getting-started

    Very important note! **"For your SmartWork homework scores to transfer to the grade book you MUST enter in your CORRECT student ID number when registering for your SmartWork account. Students who do not enter in a complete and correct ID will not receive credit for homework assignments."**

Grading:

360	Midterm Exams (120 points each)
300	Lecture Final Exam
42	Lecture Problem Sets (Drop one)
40	SmartWork Learning Problems (top 16 scores will contribute to this score)
100	Laboratory Final Exam
200	Laboratory Notebook Reports (drop one)
30	Synthesis of Methyl Diantilis Lab Report
21	Lab Lecture activities (Drop one of 8)
20	Lab Lecture quizzes (Drop one of 3)
33	Lecture in-class problems (Drop one)
5	Worksheet in lab
1155	Total

Assigned Problems for Lecture Component of Course:

Assigned problems come in three forms.

1) Assigned problems from SmartWork System (40 points total). These will be due at 7:00am before each lecture. These problems will be at an easy to moderate level for you to gain a basic mastery of the material. Some of these problems may be based on assigned videos. Your top 16 scores will be used to calculate your total SmartWork score.

2) Weekly problem sets (6 points each). These problems will be at a higher level than the SmartWork problems. Some of the problems will be written by the instructor, and others will be assigned from the book. Additional practice problems from the book and other sources will be recommended. There will be a total of 8 lecture problem sets.

3) Graded in-class activities in lecture (3 points each). Your top 11 scores will be used to calculate this total.

Exams:

Exam 1: Tuesday, September 25, 8:10 – 9:30 am
Exam 2: Thursday October 18, 8:10 – 9:30 am
Exam 3: Tuesday, November 20, 8:10-9:30 am
Laboratory Exam: Tuesday, November 27, 5:10-6:00pm
Final Exam: Wednesday, December 12, 2018 3:00-6:00 pm

For an excused absence at an Exam, as evidenced by a note from a medical professional or another acceptable source, the missed exam will be handled in one of two ways, at my complete discretion, as follows: (1) Your score on the missed Exam will be assigned as the average of your scores on the other two Exams, scaled appropriately to the class averages on those other exams; or (2) You will be required to take a make-up Exam.

Laboratory Reports, Quizzes, and Worksheets:

1. Lab Lecture Activities (3 points each): Lab lectures will include a short activity that will be related to recent or current lab lectures and/or lab experiments. The activity may be at any time during the lecture. There will be no makeup activities, but only your top 7 scores will be included in the grade calculations.
2. Lab Lecture quizzes (10 points each): There will be 3 short (10 min) quizzes during lab lecture. The quiz may be at any time during the lecture. There will be no makeup quizzes, but only your top 2 scores will be included in the grade calculations.
3. Lab Notebook Reports (20 points each): These will be completed in lab each week, including prelab preparation, data/observations, analysis, and conclusions. There are 11 weeks of experiments, the lowest score will be dropped from grade calculations.
4. Synthesis of Methyl Diantilis Lab Report (30 points): There will be a take-home assignment related to the Synthesis of Methyl Diantilis experiment, in addition to the normal lab notebook report. Details will be provided at a later date.
5. Worksheet completed in first laboratory.

Time Conflict

The Department of Chemistry does not allow time conflicts. If you have scheduled a class that conflicts with the lab and/or lecture of this course, we will not accommodate the conflict. You need to make sure that the other course that allowed the time conflict will accommodate all conflicts including exams. You will need to work with the instructor of the course that allowed the time conflict to arrange these accommodations.

Course Grade

The table below shows the correlation between your final grade and the total number of points you earn. The point ranges may be lowered slightly when final grades are assigned. Bonus points will be offered from time to time for completing surveys.

Grade	Range	Percent
A+, A, A-	993-1155	86–100%
B+, B, B-	866–992	75–85%
C+, C, C-	704–865	61–74%
D+, D, D-, F	0–703	0–60%

General Course Policies:

Cheating and Plagiarism: Any cheating in examinations and any other unethical conduct will result in an automatic grade of F, a report to the committee on student conduct, and procedures designed to alert past and future professors about any such incidence. **Don't do it!** *If you have a problem of any sort that impinges on your performance,* see Professor Baranger, rather than resorting to ill-informed and poorly conceived measures.

Lecture Component of 12A

This course provides a comprehensive introduction to the fundamentals of organic chemistry – the chemistry of carbon and its compounds. We will first review electronic structure and bonding. We will then focus on four general topics:

1. Conformation and structure
2. Reaction mechanisms
3. Reactions involving alkenes and alkynes
4. Substitution and elimination reactions

All of these topics are interrelated. An important objective of the course is to provide you with an understanding of organic chemistry to apply to problems you encounter in the future involving organic chemistry.

By the end of the class you should be able to:

1. Predict the 3D dynamic structures of organic molecules.
2. Represent mechanisms of organic reactions with arrows, reaction energy diagrams, and orbitals
3. Identify nucleophiles, electrophiles, and leaving groups in reactions.
4. Predict products, including regio and stereoselectivity, based on knowledge of the mechanisms of reactions.
5. Propose multistep syntheses of organic molecules.
6. Use an understanding of the kinetics and thermodynamics of a reaction, predict how the rates and product compositions are affected by changing the substrate, adding a catalyst, changing the temperature or solvent, etc.

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.

Topic 1	Orbitals, bonding, and structure
Topic 2	Conformational analysis
Topic 3	Stereochemistry
Topic 4	Acid/Base
Topic 5	Substitution and elimination reactions
Topic 6	Electrophilic Addition Reactions of Alkenes and Alkynes
Topic 7	Extended orbital systems

Laboratory Component of 12A

Laboratory Lecture:

These discussions (Tuesdays 5-6 pm) will focus on the theoretical and practical aspects of the lab experiments. Topics will include the principles underlying important purification methods (including crystallization, extraction, sublimation, distillation, and chromatography) and analysis methods (including measurement of physical properties, thin layer chromatography, HPLC, and spectroscopic characterization).

Laboratory:

The laboratory sections will provide an introduction to the techniques of experimental organic chemistry, including methods of compound purification, characterization, and structural determination. Many of the experiments require that you work in groups of two to four students. It is important to compare your data to those of others and determine whether your findings are consistent with what is expected. Group work requires cooperation and sometimes patience. *Please note that no person in a group is to rush the other group member in order to finish early. If it is determined that this is occurring, the graduate student instructor has the prerogative to excuse the person involved, resulting in a score of 0/20 points for that lab report.*

Laboratory Attendance

Attendance in lab each week is mandatory. Requests for exceptions to this policy (as outlined below) should be emailed to Prof. Baranger (abaranger@berkeley.edu) with cc's to your GSI.

- Students who will be away from campus on a laboratory date for a sanctioned University event (e.g., university band, play on a university athletic team - not club) must email us at least one week in advance of the planned absence. Upon email notification, a reasonable attempt will be made to arrange participation in an alternate lab section prior to the travel dates.
- Students who have a personal or family emergency and have to travel home or be in the hospital (a signed and stamped doctors note is necessary) should contact us as soon as possible. All reasonable effort to accommodate the student in another laboratory section will be made. Unfortunately, a special individual laboratory experience cannot be arranged and so in the event that they are unable to make up the laboratory in another section, they will forfeit that laboratory grade (there is one dropped lab score included in the grading scheme to accommodate this circumstance).

Laboratory Schedule

Week	Lab Lecture Date (Tues)	First Lab Date (Wed)	Lab Experiment	Procedure
1		8/22	**No Lab lecture on Tuesday of this week.** Lab Check-in, Safety, and Worksheet	
2	8/28	8/29	**Expt. A**: Thin Layer Chromatography	Pedersen Textbook: Called Experiment 7 in textbook and called Lab 11 in the loose leaf version. It is titled: "Thin Layer Chromatography" **and modifications posted on bCourses**
3	9/4	9/5	**Expt. B**: Separation of Organic Compounds Using Liquid-Liquid Extraction	Handout – posted on bcourses
4	9/11	9/12	**Expt. C**: Column Chromatography (Handout)	Handout – posted on bcourses
5	9/18 Quiz 1	9/19	**Expt. A-C** Finish: Analysis of purity and relative yield from weeks 4 and 5 using TLC and HPLC	Handout – posted on bcourses
6	9/25	9/26	**Expt. D:** Recrystallization and Melting Points: Separation of Salicylic acid and Adipic Acid	Pedersen textbook: p. 230 (called Experiment 5)
7	10/2	10/3	**Expt. E**: Asymmetric catalytic transfer hydrogenation	Handout – posted on bcourses
8	10/9 Quiz 2	10/10	**Expt. F**: Nucleophilic Substitution Reactions	Pedersen textbook; p. 257 (called Experiment 10)
9	10/16	10/17	**Expt. D, E** Finish: Analysis of purity separation of products from Expts D, E by TLC, NMR, and HPLC	Handout – posted on bcourses
10	10/23	10/24	**Expt. G:** Synthesis of Methyl Diantilis	Handout – posted on bcourses
11	10/30	10/31	**Expt. H**: Hydration of Alkenes	Handout – posted on bcourses
12	11/6		**No Lab sections – Veteran's day**	
13	11/13 Quiz 3	11/14	**Expt. I**: Some Chemistry of α-Pinene Oxide	Pedersen textbook: p. 291 (called Experiment 16)
14	11/20	-	Lecture and Tuesday lab only. No lab Wed-Fri (Thanksgiving).	
15	**11/27 Exam**	11/27 (Tu)	**Lab Exam** (during lab lecture time), lab checkout (Tues-Fri).	