

Welcome to Chemistry 3BL at UC Berkeley

Instructor: Pete Marsden, petermarsden@berkeley.edu, 323 Latimer

Course Information: Monday, Wednesday Lecture, 12-1 PM in 1 Pimentel

Pre/Corequisites: C- or higher in Chem 3A and 3AL.
Concurrent enrollment in Chem 3B or a C- in Chem 3B.

Lab Exam Date: Wednesday August 13 during lab lecture (12-1 PM)

Lectures

The lectures will NOT serve as a “walk-through” of the actual experiment, but rather will focus on the theory and practical aspects of what you will be discovering in the lab. Some of the topics covered will not be directly related to the lab experiments, but will be relevant to the organic chemistry laboratory and laboratory science in general. A tentative lecture schedule is provided below, along with required reading assignments from the laboratory textbook relevant to the topics which will be covered. This schedule is subject to change and any updates or additional reading assignments will be announced on the course website.

Chem 3BL Lecture Schedule Summer 2014

| Dates | Lecture Topic |
|------------|--|
| 6/23 | NMR Review #1 / α pinene oxide intro |
| 6/25 | α -Pinene Oxide wrap up and Exp 17 intro (aromaticity) |
| 6/30 | Experiment 17 wrap up and Exp 18 intro (Friedel Crafts) |
| 7/2 | Exp 18 – more intro |
| 7/7 | Exp 18 wrap up and Exp 20 intro |
| 7/9 | Exp 20 intro and ICLR intro |
| 7/14 | Exp 20 wrap up and Exp 21 introduction |
| 7/16 | Exp 21 more introduction / phosphorous NMR |
| 7/21 | Exp 23 introduction / allylic NMR splittings |
| 7/23 | Exp 24 introduction |
| 7/28 | Nano-putians |
| 7/30 | Exp 27 intro (mechanisms) |
| 8/4 | Exp 22 intro (Suzuki, cross couplings, aromatic substitution review) |
| 8/6 | Exp 22 wrap up and more aromatic substitution review / ICLR review |
| 8/11 | Lab Exam review |
| 8/13 | Lab Exam |

Laboratory

Laboratories are 4 hours long. You should plan on being in lab for this period of time. There are 9 graded experiments and one graded worksheet. Each assignment is worth 12 points. Your lowest lab score will be dropped leading to a total of 108 points for lab attendance and lab reports. **See the section in this handout on lab report grades to determine what is necessary for the successful completion of a lab report.** It is your responsibility to read this information. As you will see, there are important consequences associated with not attending lab and/or not turning in completed laboratory reports.

NMR spectroscopy is a very important tool in determining the structures of products isolated from reactions. Thus, we will make considerable use of NMR spectroscopy in this course. Additionally, almost all experiments make use of thin layer chromatography (TLC) as an analytical tool for both monitoring reaction progress and qualitatively assessing the purity of products.

A tentative lab schedule is provided below. It is subject to change and any updates will be announced on the course website.

Chem 3BL Lab Schedule Summer 2014

| Dates | Experiment |
|----------------|---|
| 6/23-6/24 | A. Lab Check-In and NMR worksheet |
| 6/25-6/26 | B. #16 Some Chemistry of α -Pinene Oxide |
| 6/30-7/1 | C. #17 A Dehydrogenation/Hydrogenation |
| 7/2-7/3 | No Lab – Just for fun. |
| 7/7-7/8 | D. #18 The Friedel-Crafts Reaction |
| 7/9-7/10 | No Lab – Lecture exam |
| 7/14-7/15 | E. #20 The Reaction of 1,1-Diphenylethanol on Clay with Microwave Heat |
| 7/16-7/17 | F. ICLR #1 |
| 7/21-7/22 | G. #21 The Wittig Reaction |
| 7/23-7/24 | H. #23 The Crossed Aldol Condensation |
| 7/28-7/29 | I. #24 Identifying the Structure of an Aldehyde by Qualitative Analysis |
| 7/30-7/31 | No lab – Lecture Exam |
| 8/4-8/5 | J. #27 The Synthesis of an α,β -Unsaturated Carboxylic Acid Derivative |
| 8/6-8/7 | K. #22 The Suzuki Reaction |
| 8/11-8/12 | L. ICLR #2 and Lab Check-Out |
| 8/13-8/14 | No lab – Lecture Final Exam |

Course Website

The course website is <http://bcourses.berkeley.edu>. If you are enrolled in the course, you will have access to this site. Announcements, spectra and other items will be posted on this website. It is recommended that you check this site daily to see if there are any relevant announcements that you might have missed in class.

Office Hours

- *Pete Marsden*: Times to be determined, but held in my office 323 Latimer. You may come to my office hours for lecture material as well as for lab material. Lab questions will be answered first, followed by lecture questions.
- *Graduate Student Instructors*: All GSI office hours will be held in 106 Latimer Hall. The schedule will be posted on the course website and on the door of the office hours room. You may attend the office hours held by any GSI, not only the ones held by the GSI for your lab section. These office hours are for both 3B and 3BL.

Email

Pete Marsden: petermarsden@berkeley.edu. All emails concerning Chemistry 3BL should have "Chem 3BL" in the subject line.

Required Texts

- Understanding the Principles of Organic Chemistry. A Laboratory Course. 1st Edition. Steven F. Pedersen and Arlyn M. Myers. ISBN 978-1-1114-2816-7
- Organic Chemistry Laboratory Notebook. Steven F. Pedersen and Jesse H. Pedersen. Hayden-McNeil ISBN 978-0-7380-3587-1

Ethics

It is assumed that all work you do for this laboratory class is original. This includes the prelab, in-lab observations and data and spectral analyses. You should not attempt to bring any data or notes that are not specifically allowed to the in-lab lab report periods or lab exam.

All of this falls under a behavioral category I refer to as Ethical Common Sense. Unethical behavior in this class will result in an F in the course and you will be reported to the Office of Student Conduct.

Lab Report Questions

You are NOT responsible for handing in the answers to the lab report questions posed at the end of each experiment. You can, however, turn in answers to these questions at the same time you hand in the spectral analyses for a given experiment and they will be reviewed and corrected by your teaching assistant. Please note that this is strictly voluntary and NO record of whether or not you turned in these questions will be kept. The only time this offer of correcting your answers to these questions is valid is on the date that the spectral analyses for the given experiment is due. Teaching assistants will not supply the answers to these questions by e-mail or any other electronic format, but you may discuss these questions during office hours.

In-Class Lab Reports

Twice during the semester there will be an in-class lab report. This entails writing a discussion, answering questions and assigning spectral data from one of the experiments associated with that particular cycle. During that lab period you will be offered the choice of writing a lab report on one of two experiments. The two experiments will be announced during the assigned lab period. The lab report will consist of writing a discussion that is similar to, but not necessarily exactly the same as the discussion “bullets” found at the end of each experiment. You will also be asked to answer lab report questions similar to, but not necessarily exactly the same as the questions found at the end of each experiment. You will also assign spectral data that is similar to, but not necessarily exactly the same as the spectral data you turned in for each lab. Finally you will need to include a short conclusion.

During these lab periods you will be allowed to use your lab textbook and your graded observations and spectra. ATTENDANCE AT THESE PARTICULAR LAB PERIODS IS MANDATORY. NEITHER ONE OF THESE LAB PERIODS CAN BE USED AS YOUR “DROPPED” SCORE.

Lab Exam

There will be one written lab exam worth 30 points. **The exam will take place during the last week of lab lectures during the 50 minute lecture period.** The exam will focus on material that has been covered in both lecture and lab. This exam MUST be taken AND a score of ≥ 10 points must be obtained in order to complete the class. That is, if you score less than 10 points on the exam, you will receive an incomplete in the class regardless of how many total points you have accumulated. The incomplete will need to be satisfied within two semesters by taking the lab exam offered in Chemistry 3BL in either Summer of 2013 or Fall of 2013. A score of ≥ 10 points will warrant completion of the course.

Note: If you already have three zero's in the course at the time of the lab exam, you do not need to take the lab exam as you have already failed the course.

Pre-Labs (Augmented Prelabs)

There will be a document posted to bSpace each week outlining ADDITIONAL information to add to your prelab for any given experiment. A representative amount of information required each week is shown below:

- 1) a reagent table and reaction equation, including the amount of each reagent used (ie. milligrams, milliliters, mmoles, etc.) as well as a calculation for the theoretical yield of the reaction.
- 2) A numbered list of steps outlining the procedure of the experiment.
- 3) ^1H and ^{13}C NMR predictions for the product of the reaction. If the product is unknown, a prediction of the starting materials will be required.
- 4) A reasonable attempt at an arrow-pushing mechanism for the reaction. If the product is not known, a prediction of a possible product with an accompanying mechanism.

Pre-lab Handouts

There will also be a 1 page pre-lab question sheet worth 1 point that must be completed BEFORE LAB STARTS.

Lab Attendance and Lab Scores

In order to receive points for any given lab, the following conditions must be met:

- You must attend lab.
- Prior to attending any given laboratory period you must have completed all of the reading assignments and attended the lecture preceding that experiment or lab period.
- You must prepare a prelab following the instructions posted for each experiment.
- You must arrive to lab on time, which means no later than Berkeley time (10 minutes after the hour). In general, the first 10-15 minutes of every laboratory period are dedicated to a safety discussion, which is an important part of the experiment. Therefore, if you show up late you will not be allowed to participate in lab for that day.
- You must wear protective clothing and eyewear during the laboratory period. Your GSI can ask you to leave the lab for the day if you are not wearing such clothing or eyewear.
- You must record detailed observations about the experiment. Do not just make a checklist of what you are supposed to do and then check off the procedures as you carry them out without making observations as to what actually happened. All observations must be written in your lab notebook during, not after, the laboratory period.
- You must record all expected data during, not after, the laboratory period. This includes melting points, TLC plates, yields, etc.
- Before leaving lab, you must meet with your TA who will ask you to confirm that certain data is present in your notebook. Upon confirmation, the TA will initial the notebook. At this point, you are to provide them with the perforated pages of your notebook that were used in lab that day.

Your prelab and in-lab observations/data are worth a total of 10 points for each experiment.

- You must make a reasonable attempt to assign ALL of the spectra that are posted online after each experiment. **If one or more of these spectra are not assigned, you will receive a 0 for the entire lab.**
- You must turn in the assigned spectra at the beginning of the lab period it is due. These will be collected as your TA checks prelabs. Late spectral data will not be accepted.

The spectral analyses are worth a total of 2 points for each experiment.

If you do not complete all of the above conditions for any given lab, you will receive a 0 for that experiment. The consequences of a 0 are as follows:

- If you receive two zeros during the semester, you not only will lose a total of 12 points, but your course grade will also be dropped by one third of a grade. For example, if you earn enough points to get a B+ in the class, you will receive a B.
- If you receive three zeros you will receive a failing grade in the course.

Grades

The point total for this course is 165. This means that it is possible to receive more than 100% of the points. These are broken down as follows:

- 105 points for lab assignments (including one dropped score)
- 30 points for the two in-class lab reports
- 30 points for the lab exam

Grades at the end of the semester will be assigned as follows:

| Grade | Includes | Points |
|--------------|-----------------|---------------|
| A | A and A- | 132-165 |
| B | B+, B, and B- | 115-131 |
| C | C+, C, and C- | 88-114 |
| D | D | 77-87 |
| F | F | 0-76 |