Fall 2015

Welcome to Chemistry 3BL at UC Berkeley

Instructor: Ming Chen Hammond, mingch@berkeley.edu

Course Information: Wed 3-4 pm in 100 Lewis, Fri 4-5 pm in 1 Pimentel

Prerequisites: C- or higher in Chem 3A and 3AL
Concurrent enrollment in Chem 3B or a C- in Chem 3B

Lab Exam Date: Thurs Dec 3, 7-8 pm (location TBA)

Lab Lectures
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. In addition, connections will be made between organic chemistry and medicinal chemistry / biochemistry topics. A tentative lecture schedule is provided below. This schedule is subject to change and any updates or reading assignments will be announced on the course website.

Chem 3BL Lecture Schedule Fall 2015

Topics related to experimental lab exercises are typically covered in the preceding week's lecture. In other words, the lectures are in advance of the labs by one week.

Dates	Lecture Topic
8/26, 8/28	Syllabus, NMR Review
9/2, 9/4	NMR in Biology, Exp 16 / Carbocations
9/9, 9/11	Exp 17 / Aromaticity
9/16, 9/18	Intro to Medicinal Chemistry
9/23, 9/25	Exp 18 / Friedel Crafts
9/30, 10/2	Exp 20 / Azo Dyes
10/7, 10/9	Exp 21 / Wittig, Phosphorous NMR
10/14, 10/16	Exp 23 / Aldol, Allylic NMR splittings
10/21, 10/23	Mass Spec in Biology
10/28, 10/30	Exp 27 / Modified Perkin
11/4, 11/6	Exp 22 / Suzuki, cross couplings
11/13	(**No lecture on Wed 11/11**) Biochemistry: Organic chemistry in water
11/18, 11/20	Lab Exam review
11/25, 11/27	**Thanksgiving Break – No lecture**
12/2	(**No lecture on Fri 12/4**) Biochemistry: Organic chemistry in water

Laboratory

Laboratories are 4 hours long. You should plan on being in lab for this period of time. There are 8 graded lab reports and 3 graded worksheets. Each assignment is worth 12 points. Your lowest assignment score will be dropped leading to a total of *120 points* for lab attendance and lab reports / worksheets. **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 Fall 2015

Please note that lab experiment weeks start on Wed and end on the following Tues, EXCEPT for the last week, which is lab check-out (Mon Nov 30 to Fri Dec 4).

Dates (W-Tu)	Experiment
8/26-9/1	A. Lab Check-In and NMR Refresher
9/2-9/8	**No Lab – 3BL Spectroscopy #1 (Academic holiday on 9/7)**
9/9-9/15	B. **#**16 Some Chemistry of α-Pinene Oxide
9/16-9/22	C. #17 A Dehydrogenation/Hydrogenation
9/23-9/29	**No Lab (Chem 3B has an exam on 9/24)**
9/30-10/6	D. #18 The Friedel-Crafts Reaction
10/7-10/13	E. #20 Diphenyl Ethanol and Clay
10/14-10/20	F. #21 The Wittig Reaction
10/21-10/27	G. #23 The Crossed Aldol Condensation
10/28-11/3	**No Lab (Chem 3B has an exam on 10/28)**
11/4-11/10	H. **#**27 The Synthesis of an α,β-Unsaturated Carboxylic Acid Derivative
11/11-11/17	**No Lab – 3BL Spectroscopy #2 (Academic holiday on 11/11)**
11/18-11/24	I. #22 The Suzuki Reaction
11/25-11/27	**Thanksgiving Break – No Lab**
11/30-12/4	J. Lab Check-Out (Lab exam on 12/3, Th section will check-out after)

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

- *Ming Hammond*: Wed 4-5 pm and Fri 3-4 pm in the Chemistry Library (Hildebrand) Room E.
- *Graduate Student Instructors*: All GSI office hours will be held in 106 Latimer Hall. The schedule will be posted on the course website. 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

Ming Hammond: mingch@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 Exam

There will be one written lab exam worth 30 points. **The exam will take place on the last week of classes on Thurs Dec 3 from 7-8 pm**. The exam will focus on material that has been covered in both lab lecture and lab. This exam MUST be taken in order to complete the class. 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 bCourses 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) ^{1}H 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.
5) At least one question regarding the PURPOSE of any given experimental procedure.

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. <u>Your GSI can ask you to leave the lab for the day if you are not wearing such clothing or eyewear.</u>
- 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

Graded points are distributed as follows:

120 points for lab reports (8) and worksheets (3) (lowest score is dropped)
30 points for the lab final exam (see **Lab Exam** section for important details)

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

Grade	Includes	Points
A	A and A-	120-150
B	B+, B, and B-	105-119
C	C+, C, and C-	90-104
D	D	70-89
F	F	0-69