CHEMISTRY 184: Biological Chemistry Laboratory
Altman, Elrad, Zare
Spring 2008

This course introduces students to modern techniques in biological chemistry. Labs will include protein purification, characterization of enzyme kinetics, site-directed mutagenesis, heterologous expression of His-tagged proteins, and single-molecule fluorescence microscopy. Always ask if you are unsure of how to use lab equipment, have questions regarding a protocol, or do not understand something.

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Laboratory: Tuesday and Thursday 1:15-5:00 PM, Clark Center W250.

Lectures: Lectures will precede labs on certain days as noted on the schedule. On these days, we will meet in the Clark Center, Room E205.

Website: The class website can be found at http://coursework.stanford.edu. The site contains all handouts including equipment manuals, optional reading, lectures, and electronic results (such as sequencing). Please sign up on coursework as soon as possible.

Collaborative learning: Laboratories are collaborative by nature. We are all responsible for making this class an enjoyable and productive learning experience. Communication is the key to collaborative learning. Communicate with your lab partner(s) to ensure that everyone knows what is being done and why. Communicate your difficulties, observations, results, and conclusions with the rest of the class. And please communicate with us if you have any comments or concerns.

Your lab partner(s) will be your closest collaborators. Spend a couple minutes at the beginning of each lab period planning out your time. Lab partners do not need to do everything together, and on certain days, you may have to work separately in order to finish by 5 PM. On these days it is especially important that you keep each other informed. Each person should be familiar with all pieces of equipment and all collected data, even if they are not directly involved in the data

collection. Also, if a piece of equipment will be used multiple times, each person should have a chance to work with it.

The class will be divided into 6 groups. There are three labs, each of which takes six sessions or about three weeks. Two groups will be performing the same lab during each three week period. Communicate with the other group performing your lab. At the beginning of a new lab cycle, spend a few minutes talking to the groups that just completed the lab you are about to begin. Think of advice you have for the group that is about to begin the lab you have completed.

Cleanliness is next to godliness. Clearly label all your tubes, racks etc. and clean your work area before you leave for the day. Unlabeled storage containers will be tossed, especially in the freezer and cold room. Dirty glassware should be placed in the large plastic containers next to the sink that is closest to W281 (the microscope room).

The teaching lab is adjacent to Dr. Jennifer Cochran's lab, and we share the cold room with them. Please be respectful of them and their space. It is absolutely unacceptable to take any of their lab equipment. Please do not tarnish our relationship with our neighbors.

Preparation for lab: It is crucial that you come prepared for lab, especially if you want to complete the lab in the allotted time. This means reading and thinking about the protocols and background reading for that day before you come in. Do you understand all the procedures? Do you understand the reasoning behind each step? What reagents/equipment will you need? How can you and your partners divide the labor to get through the day's work efficiently? Are there long periods of waiting (e.g. during incubations or spins) during which you can prepare for the next step?

We occasionally ask you to answer questions or perform calculations before you come into class. Answer these in your lab notebook, clearly labeling the work as *pre-lab preparation*.

Laboratory Performance: Lab performance will be graded based on the following criteria:

- Knowledge and implementation of safe laboratory practices
- Preparation for each laboratory period
- Efficient use of laboratory time
- Demonstration of an understanding of the laboratory methods and the goals of the lab.
- Helpfulness to those around you
- Cleanliness

Lab notebook: The required laboratory notebook, Roaring Springs #77649, is available in the *Stanford Bookstore*. It contains 100 pages with carbon copies. Guidelines for maintaining a lab notebook can be found on pp. 6-7.

Assignments and grading: Chemistry 184 is primarily a laboratory course. All of your effort should be invested in preparing for the labs, carrying out the labs, and analyzing your data. The class will also have a final exam on Friday June 6 from 3:30-6:30 PM. The exam will be based entirely on the lab concepts. Practice questions similar to those on the final will be handed out before the exam. Final grades will be based on lab notebooks/lab performance (67%) and the final exam (33%).

Missing labs: Please email one of the instructors and your lab partner(s) as soon you know you will be missing class. Usually, you will be required to come in to office hours for about 30 minutes to discuss the missed material.

Lab schedule: Unless there is a scheduled lecture, meet in the Clark Center W250 at 1:15 PM. On days when we have lectures, meet at the same time in the Clark Center, E205. Occasionally, groups working on the same lab will meet for a short section discussion. On these days, which are indicated on the schedule below, meet in W250 but do not start your lab work until after the discussion.

Date	Lab Period	Lecture / Section Discussion
4/1/08	1	**Lecture:** Introduction (Elrad), Lab Notebook (Kool)
4/3/08	2	**Section Discussion:** ZsYellow group (2-3 PM)
4/8/08	3	**Section Discussion:** Microscopy group
4/10/08	4	**Section Discussion:** Tyrosinase group
4/15/08	5	**Lecture:** Fluorescence and chemistry of the ZsYellow fluorophore (Kool)
4/17/08	6	
4/22/08	1	**Lecture:** Spectrophotometers, spectrofluorometers, and single-molecule fluorescence (Zare)
4/24/08	2	**Section Discussion:** ZsYellow group
4/29/08	3	**Section Discussion:** Microscopy group
5/1/08	4	**Section Discussion:** Tyrosinase group
5/6/08	5	**Lecture:** Diffusion and microscopy (Altman)
5/8/08	6	
5/13/08	1	**Lecture:** Tyrosinase: A family portrait (Elrad); Working in a lab (Kool)
5/15/08	2	**Section Discussion:** ZsYellow group
5/20/08	3	**Section Discussion:** Microscopy group
5/22/08	4	**Section Discussion:** Tyrosinase group
5/27/08	5	**Lecture:** Single-molecule spectroscopy: A case study (Altman)
5/29/08	6	
6/3/08		**Whole class discussion:** Summarizing lab results
6/6/08		Final 3:30 PM – 6:30 PM, Room TBA