

**CHEMISTRY 184: Biological Chemistry Laboratory**  
**Etemadi, Rose, Kool**  
**Spring 2009**

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 2:15-6:00 PM, Herrin Labs T201.

**Lectures:** Lectures will precede labs on certain days as noted on the schedule. On these days, we will meet in the laboratory.

**Website:** The class website can be found at <http://chem184.stanford.edu>. The site contains all handouts including equipment manuals, optional reading, and lectures. We will occasionally use e-mail to let you know about your grades, sequencing results, etc.

**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 6 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 (roughly three people per group). 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 essential. 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 fridge. Please make efficient use of glassware, but don't hesitate in cases where it is necessary to use "fresh" glassware.

**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, as well as the notebook grading policy, can be found on pp. 6-7 of the lab manual.

**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 at a time dictated by the registrar. 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 (75%) and the final exam (25%).

**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:** Meet in the Herrin Labs room T201 at 2:15 PM. On days when we have lectures, meet at the same time, same place. Occasionally, groups working on the same lab will meet for a short separate section discussion. On these days, which are indicated on the schedule below, meet in T201 but do not start your lab work until after the discussion.

| <b>Date</b> | <b>Lab Period</b> | <b>Lecture / Section Discussion</b>   |
|-------------|-------------------|---|
| 3/31/09     | 1                 | <b>Lecture:</b> Introduction (Mozzi and Jack), Lab Notebook (Kool)                                |
| 4/2/09      | 2                 | <b>Section Discussion:</b> ZsYellow group (2-3 PM)  |
| 4/7/09      | 3                 | <b>Section Discussion:</b> Microscopy group   |
| 4/9/09      | 4                 | <b>Section Discussion:</b> Tyrosinase group   |
| 4/14/09     | 5                 | <b>Lecture:</b> Fluorescence and chemistry of the ZsYellow fluorophore (Kool)                     |
| 4/16/09     | 6                 |   |
| 4/21/09     | 1                 | <b>Lecture:</b> Spectrophotometers, spectrofluorometers, and single-molecule fluorescence (Mozzi) |
| 4/23/09     | 2                 | <b>Section Discussion:</b> ZsYellow group   |
| 4/28/09     | 3                 | <b>Section Discussion:</b> Microscopy group   |
| 4/30/09     | 4                 | <b>Section Discussion:</b> Tyrosinase group   |
| 5/5/09      | 5                 | <b>Lecture:</b> Diffusion and microscopy (Altman)   |
| 5/7/09      | 6                 |   |
| 5/12/09     | 1                 | <b>Lecture:</b> Tyrosinase: A family portrait (Jack); Working in a lab (Kool)                     |
| 5/14/09     | 2                 | <b>Section Discussion:</b> ZsYellow group   |
| 5/19/09     | 3                 | <b>Section Discussion:</b> Microscopy group   |
| 5/21/09     | 4                 | <b>Section Discussion:</b> Tyrosinase group   |
| 5/26/09     | 5                 | <b>Lecture:</b> Single-molecule spectroscopy: A case study (Altman)                               |
| 5/28/09     | 6                 |   |
| 6/2/09      |                   | <b>Whole class discussion:</b> Summarizing lab results  |
| 6/?/09      |                   | Final Time and Room TBA   |