Biochemistry of the Cell, BC 367
Laboratory
Fall 2009

Laboratory Instructors:

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Schedule:

Dates	Experiment
9/15-9/17	1. **Identification of an Unknown Amino Acid**
9/22-9/24	2. **Comparison of Protein Assays**
9/29-10/1 10/6-10/8 10/20-10/22	3. **Purification and Characterization of the Enzyme Lysozyme**
10/27-10/29 11/3-11/5 11/10-11/12	4. **Kinetic Properties of Acid Phosphatase**
11/17-11/19 12/1-12/3	5. **Forensic Analysis of Canine DNA Samples**
12/8-12/10	Clean up and check out

Important note: Attendance is mandatory at all labs. There are no make-up labs.

Preparation:

- Labs are available on the BC 367 webpage. (http://www.colby.edu/chemistry/CH367)
- You must read each exercise and complete the appropriate sections in your notebook (see below) **before coming to lab.**
- You must prepare an experimental flow chart in your notebook each week **before coming to lab**.
- Some experiments require extensive calculations that must be done **before coming to lab** so that you are prepared to begin work immediately. It is not acceptable to spend the first 15 minutes of lab time reading the hand-out as many exercises will take the full four hours. If you are unprepared, you may be asked to leave lab with a zero for the day.
- Please note that each experiment requires a fairly extensive write-up, which will comprise a significant part of your lab grade.

Laboratory Requirements:

1. Your laboratory **notebook** is due at the beginning of the lab period immediately following the completion of each experiment and will comprise 75% of your lab grade. You should purchase two separate notebooks, so that while one is being graded, you can use the other. See below for notebook instructions. Late books will be penalized ½ letter grade per day or fraction thereof. Write-ups more than 5 days late will not be accepted and will count as a zero.

2. One full-length formal **paper** is required, due on December 14 by noon. This paper is based on the experiment of your choice and will comprise 20% of your lab grade. See below for the format of the paper.

3. The remaining 5% of your lab grade will come from how well you perform in lab. Do you make your partner do all the work? Do you work efficiently? Do you come to lab prepared? These are all factors. Attendance is mandatory. There are no make-up labs.

The Laboratory Notebook: Use a bound notebook. Do not skip or remove any pages.

1. Contents
   a) Use only ink for recording notes. Do not white out or erase any mistakes. You may cross out any erroneous entries, but they must remain legible. Explain any such errors.
   b) Provide a Table of Contents for your notebook at the beginning.
   c) Each experiment must follow the format below (see Lab Report Format).
   d) **Record all your raw data** and observations in your notebook during the lab period. Record your observations immediately (don't trust your memory!). Do not record data on loose paper or into Excel. Label all data clearly, including relevant units. Write what is done- not what should have been done.
   e) Keep your notebook as neat as possible under laboratory conditions. We understand that your notes may be subject to water blots, crossed-out mistakes, acid stains, and the like. Since only the original, unedited notes have significance, these risks must be expected. Make your notebook an honest record of your experiments.
   f) After the experiment is over, write the report as described below.

2. Lab Report Format (Sections in bold are to be done **before** laboratory.)
   a) Title; **date**; and lab partner.
   b) Introduction- This section should be similar to the Introduction of a journal article. Briefly describe the purpose of the investigation and its relationship to other work in the field. That is, provide a clear and detailed statement of the project and why you are studying it. When preparing the introduction, ask yourself, "What are the goals of this experiment?" This statement should be followed by a brief discussion of the methods and theory behind the experiment. Include appropriate chemical or biochemical reactions. For a multiple-week experiment, the Introduction should be comprehensive, including all weeks of an experiment. Do not write multiple introductions for multi-week experiments.
   c) Experimental- The experimental section should take the form of a flowchart of the experimental procedure. Do not simply cut and paste the lab handouts into your notebook- the flowchart is intended to make sure you are familiar with the sequence of

events before coming to lab. You may reference the lab handouts for fine levels of detail and use the handouts in lab itself. Be sure to include any modifications of the written procedure that arise during the laboratory period and any other pertinent information (unknown number, standard protein, forensic samples analyzed, etc.). Include any pre-lab calculations that must be done ahead of time.

d) Data and Post-Lab Calculations- Data should be clearly labeled and recorded directly into your lab notebook. For many experiments, the best presentation of data is in tabular form. A sample calculation must be included for each type of calculation.
e) Results- This section includes the formal presentation of the analysis of your raw data as graphs, summary tables, figures, etc. You do not need to include a narrative description of your results in your notebook, but your figures and tables should be well annotated.
f) Discussion- The discussion is the critical analysis section, the place to interpret and evaluate your data and to speculate on other possibilities. Recap your goals. What are your conclusions? How do your results compare with known values? Was the original objective achieved? Describe potential sources of error and how they impact your conclusions. Describe further work that could be done. We recommend that you prepare your discussion in Word, so that you can edit appropriately and also have an electronic copy for your formal paper at the end of the semester.
g) References- Use standard format for all books, journal articles, and Web sites that you used to write up your experiment.

The Final Lab Paper:

You will write one formal laboratory paper, choosing one of the experiments to write up as if you were submitting it to the journal *Biochemistry*. Please note that the tone of a journal article is very different than a notebook write-up. We recommend that you read several sample *Biochemistry* papers to get a feel for the style of this journal. You are not simply typing up the contents of your notebook for submission. For example, the Results section should be a narrative, not just tables and figures like in the notebook.

Correct formatting is essential for manuscript submissions. You can find Information for Authors on the Web (http://pubs.acs.org/journals/bichaw/index.html) or in the first hard-copy issue of each year. A copy of the *ACS Style Guide* is also available in the laboratory. Your manuscript must be typed, include appropriate data and computer-generated figures with suitable legends, and have references (and all other sections) in the correct format for *Biochemistry*. The text must be concise yet complete (a good paper can be written for this assignment in 8-10 pages; if you are significantly longer than this, then you need to prune). Careful thought, research, and editing will be required. Furthermore, use of the **primary literature** is crucial to set the context of your work- note that the primary literature is that contained within scientific journals; Web sites, textbooks, and the lab handout do not count. You should begin this paper in time to request and receive articles through ILL if necessary.

Your paper will be graded as though it were being reviewed for publication, so the simplest experiment may not be the best choice to present. You will need to "pretend" that you were the first to do this work and find some kind of new angle for your presentation. This paper is due on December 14 by noon. Late papers will be penalized ½ letter grade per day or fraction thereof.