

BIOLOGY/CHEMISTRY 310
METHODS IN BIOCHEMISTRY AND CELL BIOLOGY
TERM I, 2004
THURSDAYS 12:30-4:30
PROFESSORS LOPRETE & TEEPE

Course Purpose

To a large extent, the study of the cell and its biochemical functions can be seen as the study of proteins. Every structure and function of a cell requires the presence of at least one protein (and usually many more than merely one) in the role of catalyst, processor of information, or essential structural element.

The goal of this course is to give you practical and theoretical experience with some of the basic methods used in the laboratory study of proteins. In the course of your study you will learn how to detect and quantify proteins, how to measure the basic properties of enzymes, how a protein's amino acid sequence is determined, how to separate proteins for individual analysis, and how to use antibodies (themselves a special class of proteins) in protein identification and localization.

Scheduling and Credit

BIO/CHEM 310 provides laboratory credit for both Biochemistry (CHEM 414) and Cell Biology (BIO-307). If you take only one of these courses, the remaining hour constitutes elective credit.

The class is scheduled to meet for one afternoon each week. That time may be used for lectures, demonstrations of procedures, work on laboratory projects, or a combination of these things. You will also need to schedule additional time in most weeks for independent work.

The total time spent in coursework (formally and informally) will vary from week to week, but the overall effect will be to increase your involvement from the formal 3 hours per week to about twice that. That's why you get two credit hours for the course, rather than just the one that normally goes with a single afternoon lab.

Grading

Your final grade will be determined by the weighted average of your work in the following categories, using a standard "90 – 80 – 70 – 60" scheme for assigning letter grades. Additional "plus" and "minus" designations will reflect your relative position within these ranges.

1. Quizzes (10%)

At the beginning of most class meetings there will be a brief quiz, which will cover practical and theoretical aspects of all work done since the preceding quiz. In addition, each quiz will cover general aspects of the work that you'll be beginning that day, so you should be sure to read assignments in advance.

2. Laboratory Reports (50%)

Each exercise (in some cases one exercise encompasses more than one week's work) will result in a written summary or report. The length, goal, format, and credit will vary from report to report, depending on the nature of the work. These details will be spelled out at the appropriate times during the semester.

Statement on Responsible Citation of Scientific Literature in Lab Reports

In those lab reports where the use of outside sources is recommended or required, use bibliographic conventions comparable to those you see used in the journals you are citing. Except for on-line versions of peer-reviewed primary literature (usually available as a pdf file), proceed with appropriate caution when citing web resources – use them as additions to your reading only, not as the sole authorities that you cite. If you intend to include a web resource in your report, then submit your report as an electronic document (Word document) so that your reader can connect to your resource directly. Check the link in your document yourself before submitting, to be sure that it connects.

3. Written Exams (20% + 20%)

There will be two examinations, each covering approximately half of the course material. Exams require you to demonstrate a good theoretical understanding of the techniques that you've learned, as well as practical knowledge. That is, you'll be expected to understand what to do to carry out a technique, what the results should look like, how to interpret them, and what may be wrong if they don't look like you expect them to.

4. Other Factors

You're required to attend all scheduled class meetings and to contribute actively and equitably to your team's work.

In addition, be mindful of the following obligations:

- a. You'll be working sometimes with delicate and expensive equipment, which you can damage through ignorance or neglect. Never twist a knob or flip a switch unless you're quite certain what it will do.
- b. Many chemicals and some equipment that you'll be using can be dangerous if used improperly. Familiarize yourself with hazards, and consider them to be among the most important things you know about each procedure.
- c. Always be neat and clean in your work. A cluttered lab space is dangerous and leads to error and waste. Keep your work organized, and put things back in their proper places when you're done.

- d. The supplies of chemicals and disposables that are provided for your work are not limitless. If you use more than your share, you may be preventing someone else from doing their work altogether.
- e. You'll be handling and injecting live animals. Treat them with consideration, and perform these procedures in a manner that causes them a minimum of pain and distress.

You're expected to adhere conscientiously to all the rules of good lab citizenship mentioned here, as well as to all other safe and courteous lab practices. Shortcomings in these regards will influence your final grade in the course.

WEEKLY SCHEDULE

Aug. 26	Organizational Meeting
Sept. 2	Immunization of Mice
Sept. 9	Spectrophotometry and Protein Quantification
Sept. 16	Enzyme Assays: Basic Principles (and Booster Shots of Mice)
Sept. 23	Determining an enzyme's pH Optimum
Sept. 30	Enzyme Kinetics (and Collection of Blood from Mice)
Oct. 7	Enzyme-Linked Immunosorption Assays (ELISA)
Oct. 14	FIRST EXAMINATION

FALL BREAK

Oct. 21	SDS Gel Electrophoresis of Proteins
Oct. 28	Transblotting (in preparation for immunoblotting)
Nov. 4	Immunoblotting (Western Blotting) and Preparation of Proteins for MS Sequencing and Fingerprint Analysis
Nov. 11	Genetic Transformation of <i>E. coli</i> with an expression vector
Nov. 18	Isolation of Transgenic GFP from <i>E. coli</i> using Chromatography
Nov. 25	THANKSGIVING BREAK
Dec. 2	NO CLASS MEETING
Dec. 10	FINAL EXAMINATION

Scheduled for Dec. 10 from 9-11 am