

Brooklyn College – CUNY
Department of Chemistry
Fall 2015 Syllabus – Professor Davenport
Chemistry 4572 (Section RQ1) – Biochemistry Laboratory I
(2 credits; 4-hours)

Course Goals and Learning Objectives. The goal of this course is to provide the student with both a theoretical and practical understanding of basic biochemical methodologies. Specifically students will perform methods for the isolation, purification and characterization of proteins, lipids and DNA. Students are also introduced to the application of database management for biotechnological applications.

Required Text

Laboratory procedures are posted on Blackboard and can be downloaded ahead of the laboratory meeting.

Instructor Contact Information

NAME	Extension	Room
Prof. Davenport	2825	344NE
LDvnport@brooklyn.cuny.edu		

Office hours:

11:00am – 12:30pm Monday
11:00am – 12:30pm Wednesday
or by appointment (please email first).

Experimental Schedule

Note: The class meets each week.
Thursday (1:10pm – 5:05pm)
Room 451NE Ingersoll Extension

You must bring in to each lab session a written protocol (in your lab notebook) for the day's experiment based on the instructions in the lab manual so that you have a personalized guide for doing the experiment. You will not be given any extra time for lab sessions.

Day One: Spectrophotometry (Absorption Spectra; Spectrophotometric Estimation of pK_a).

Day Two: Protein Determination Using a BCA Assay.

Day Three: Isolation and Spectrophotometric Determination of Total Nucleic Acids.

Day Four: Thermal Melting Profile of DNA.

Days Five and Six: Lipids from Egg Yolk

Day Seven: Protein Chemistry and Enzymology (Isolation of Crude Alkaline Phosphatase from *E.coli*; Alkaline phosphatase activity assay; Binding to DEAE Sephadex A-50).

Day Eight: Ion Exchange Chromatography-Ammonium Sulfate Precipitation

Day Nine: Electrophoresis and Activity Assay of Purified Alkaline Phosphatase

Day Ten: Determination of Molecular Weight of Alkaline Phosphatase by Analytical Gel Filtration.

Day Eleven: Enzyme Kinetics

Day Twelve: Competitive and Noncompetitive Inhibition

Day Thirteen: Exercise in Protein/Gene Database Management

Laboratory Requirements:

Please bring in some detergent, paper towels, and a laboratory notebook (will NOT be handed in or graded). Safety goggles must be worn at all times (see below). Some procedures may soil clothing and some may involve hazardous chemicals. You are expected to understand the preparation of laboratory reagents and solutions and should review UNITS such as percent (w/w, w/v, v/v) and molarity.

Grade Breakdown

The final grade for the course is based on the sum of the scores received for the following lab four lab reports, one quiz (held at the end of the semester) and laboratory performance:

10% spectrophotometric methods
15% DNA/RNA labs
15% lipid labs
40% AP enzyme labs
15% lab quiz
5% lab performance

The lab performance component is designed to encourage students to engage in the practical aspects of the experiment rather than as a spectator, given that most labs are conducted with a lab partner.

Laboratory Reports

Submit an electronic version of your lab reports to: ldvnport@brooklyn.cuny.edu.

Students must hand in their reports within 2 weeks after completion of the experiment. If you need access to word processing and other software, you may use the Chemistry Department's personal computers in the lab on the fourth floor or other campus computers. Please answer any questions posed in the lab handouts, in the Results or Discussion sections of your report.

You will be sharing data with your partner but NOT preparing a joint report. Your report will be returned to you if the writing is not grammatically correct and the format does not follow the guidelines below; you will be penalized in the grading of your second try. If you do plagiarize, you will be given a zero on the report and the instructor may take further action. Plagiarism is easy to catch and is considered Academic Dishonesty (see below). If you don't know what plagiarism means, please consult the CUNY guidelines about plagiarism at:

<http://www.cuny.edu/about/info/policies/academic-integrity.pdf>. In addition, the following link has many examples and is very instructive: <http://web.gc.cuny.edu/provost/pdf/AvoidingPlagiarism.pdf>

Lab reports should be in the format of a research paper as published in the journal *Biochemistry*. The lab report must be typed and must have the following sections:

- **Abstract:** The abstract should concisely state the problem, the experimental approach used, the most important results, and conclusion(s). Only a few sentences are needed.

- **Introduction:** This section should give brief background information about the biochemistry addressed by the experiment. This information should justify why you carried out the experiment. The introduction usually ends with a statement summarizing what you will show the reader as your report progresses.

- **Materials and Methods:** This section should describe the materials used (any dangerous chemicals involved) and the experimental procedures followed. You should refer to the hand-outs instead of rewriting all the details of the procedures, for example, "A series of buffer solutions was prepared from pH 4 to 8 according to the hand out"; or, "Absorbance measurements were made at the desired wavelengths using the Spectronic20 spectrophotometer". Avoid details like "I pipetted 20 μ L of solution A into a test tube and then added 20 mL of solution B into the test tube".

- **Results and Calculations:** The results section should include your experimental results presented in tabulated and/or figure format as appropriate, accompanied by a concise description. You need to show calculations with appropriate equations. All graphs are to be computer generated (using SigmaPlot or Excel) with the axes accurately labeled and legends (or titles) clearly describing the data presented. Calculations (only) can be hand-written (no page limit).

- **Discussion** (approx. two paragraphs): The discussion section should be a short and comprehensive description of your findings or conclusions. This should NOT take the form of comments such as "this was a fun experiment ..." or "I learned how to ...", but should be a discussion of the principles involved in the experiment and any conclusions that you can make based on your data. You should discuss experimental errors or problems, which occurred and should attempt to make a simple conclusion. When you evaluate something that is already known about a chemical species and is in the chemical literature, you must compare your results to literature values, report a % error and cite the source of the known value(s). The handouts may not always specify what and when to do this, so use your judgment.

Reports are evaluated based on 1) the quality of the results (but only to a degree that coincides with how well things go in the lab, which varies from group to group, year to year. For example, if your partner spills all the enzyme during the fourth week of the experiment, you will not be penalized greatly for this kind of mishap and will be given enzyme from other student groups or from the stock room); 2) the quality of the written text (in terms of explanations and interpretation of results); 3) presentation of data. If you are not yet familiar with SigmaPlot or other data handling software (Excel), this is the time to learn; 4) explanation of why certain things did not go according to plan or match literature values, etc; 5) and the insights you demonstrate in your conclusions based on your experimental results.

Pre-lab Outline

(Typewritten or in your notebook but NOT copy/pasted from the hand-outs).

Please prepare a **preliminary report** during the course of the alkaline phosphatase protein purification and characterization experiments, since the overall report will cover **seven weeks** of work and you may require some guidance along the way for the written part. You will NOT be allowed to start the experiment without this. Pre-lab outlines must address the following (one page or less):

1. **Purpose of Experiment.**
2. **Techniques and Apparatuses to be used.**
3. **Type of Data Collected (what will be measured and calculated).**
4. **List of Main Reagents and Dangerous Chemicals (if any).**

Safety

It is a New York State law that safety goggles must be worn at all times by all students in the laboratory and will lose marks if observed not wearing their goggles. Goggles are provided as part of the lab equipment rental fee. Students who consistently refuse to properly wear safety goggles during the lab period will be requested to leave. It is the student's responsibility to bring her/his goggles to each lab session. If the student completes their lab work before the end of the session, students MUST continue to wear their goggles until they have exited the lab.

Eating and drinking are not permitted during lab sessions.

Pregnant students are encouraged to defer taking Chemistry 4572.

Accommodations for Students with Disabilities

In order to receive disability-related academic accommodations, students must first be registered with the Center for Student Disability Services. Students who have a documented disability or suspect they may have a disability are invited to set up an appointment with the Director of the Center for Student Disability Services, Ms. Valerie Stewart-Lovell, at 718-951-5538. If you have already registered with the Center for Student Disability Services, please provide your professor with the course accommodation form and discuss your specific accommodation with him/her.

Academic Integrity

The faculty and administration of Brooklyn College support an environment free from cheating and plagiarism. Each student is responsible for being aware of what constitutes cheating and plagiarism and for avoiding both.

The complete text of the CUNY Academic Integrity Policy and the Brooklyn College procedure for implementing that policy can be found at this site: <http://www.brooklyn.cuny.edu/bc/policies>. If a faculty member suspects a violation of academic integrity and, upon investigation, confirms that violation, or if the student admits the violation, the faculty member MUST report the violation.

All students should read carefully and thoroughly the 2014-2015 Brooklyn College Bulletin (http://www.brooklyn.cuny.edu/web/off_registrar/141024_2014-15_Undergraduate_Bulletin.pdf) for a complete listing of academic regulations of the College.

The State law regarding non-attendance because of religious beliefs shall be followed as given in the Brooklyn College Bulletin, Undergraduate Programs 2014-2015, p. 72 http://www.brooklyn.cuny.edu/web/off_registrar/141024_2014-15_Undergraduate_Bulletin.pdf. If you miss a lab session for religious observances, you must make arrangements with

your instructor and stockroom for a make-up time.

Important Dates

Wednesday, September 2: Last day to add a course

Thursday, September 10: Conversion Day.

Classes follow a Monday schedule.

Monday, November 9: Last day to withdraw from a course with a W (non-penalty) grade.