

BI 421 & BI/CH 527/621: Biochemistry I Lab Syllabus – Fall 2024

Laboratory and Discussion Coordinator

Blair Szymczyna, Ph.D. (bszymcz@bu.edu)

Discussion Times: Tuesdays: 12:30 – 1:45 pm (C1) in SCI 109 and 3:30 – 4:45 pm (C2) in COM 101

Office hours and location: Posted on BlackBoard

E-mails: All e-mails to Dr. Szymczyna regarding the course must be sent to biochlab@bu.edu

General questions and communications with TFs and other students should be posted on Slack

Introduction

Students enrolled in Biochemistry I course have wide-ranging interests and aspire to pursue a diverse set of careers in life sciences, chemistry, bioengineering, medicine, and pharmaceutical sciences, both in industrial and academic settings. The biochemistry laboratory is designed to introduce you to modern techniques used in biochemical research and enhance your laboratory skills. This part of the course has the greatest potential for securing jobs and academic opportunities. This is your “practical experience”. The more you can say in an interview about the types of experiments that you performed and the skills you developed in this lab and your understanding of the theoretical underpinnings of the techniques, the more impressed your potential employer or graduate/professional admissions faculty will be. The biochemistry lab is equipped with several modern and sophisticated instruments that are common in biochemistry laboratories. Over the years we have spent well over \$750,000 on the equipment for the Biochemistry laboratory and we hope everyone will appreciate this when using the equipment.

We have up to twelve sections performing the laboratory exercises each week. Please keep in mind that just as you would appreciate a clean work area and functional equipment so that you can do your experiments, the same is true of everyone in the section that follows yours. Each lab section will have about 18 students, and as such both the equipment and the instruction staff are stretched to the maximum. Each section will have two teaching fellows that are responsible for the instruction, preparation, equipment, grading, and safety procedures for their section.

Prerequisites

Students must have earned a grade of “C” or higher in Organic Chemistry II

Questions, Concerns, and Differences in Opinion

All questions regarding the laboratory, notebook and reports should first be addressed to your lab instructors. Only if you cannot get a satisfactory answer or reach an agreement should you contact Blair Szymczyna during office hours or via e-mail. Differences of opinion concerning grades must be addressed within one week of receiving that graded assignment, as outlined during the lab course introduction.

Required Materials

Bound Laboratory Notebook: a basic, lined notebook is sufficient since permanent records will be scanned in and submitted to Gradescope.

Scientific Calculator, capable of handling arithmetic and logarithmic operations (e.g. Texas Instruments TI-30X IIS 2-Line Scientific Calculator).

Additional Required Equipment: Approved safety eye goggles, Full length lab coat, USB-C flash drive

Top Hat (You will receive an e-mail to sign up)

Lab Safety

Dress appropriately for each lab section. The minimum acceptable lab attire is a long lab coat that is always buttoned, long pants, closed-toed shoes, goggles and gloves. Long hair must always be tied back. Unacceptable clothing includes flip-flops, ballerina flats, capris, shorts, tank tops and sleeveless shirts. *In other words, you should have no exposed skin below your neck!* **Students who do not have appropriate attire/PPE will not be allowed into the laboratory.** Applying cosmetics, chewing gum, or consuming any food or drink are not allowed in lab. Teaching fellows will give only one warning regarding lab safety violations. **Repeated violations and failure to comply with lab safety policies will result in a dismissal from lab and a zero for the day.**

Laboratory Schedule

Experimental topic	Lab	Discussion dates	Lab dates	Report due at end of lab day
Welcome to Biochemistry I labs		Sept 3		
Intro and Skills Building	1	Sept 10	Sept 11 – 16	Sept 18 – 23
Preparation of Crude Enzyme Extract	2 week 1	Sept 17	Sept 18 – 23	Sept 25 – 30
No Labs				
Ammonium Sulfate Fractionation & Dialysis	2 week 2	Oct 1	Oct 2 – 7	Oct 9 – 15
Affinity Chromatography	2 week 3	Oct 8	Oct 9 – 15	Oct 16 – 22
Molecular Modeling	3	Pre-recorded ¹	Oct 16 – 21	Oct 23 – 28
Activity Assays and Protein Concentration Determination	2 week 4	Oct 22	Oct 23 – 28	Oct 30 – Nov 4
Kinetic Parameter Determination	4	Oct 29	Oct 30 – Nov 4	Nov 6 – 11
Polyacrylamide Gel Electrophoresis using SDS	5 week 1	Nov 5	Nov 6 – 11	Nov 13 – 18
Gel Filtration; Native M _r Determination	5 week 2	Nov 12	Nov 13 – 18	Nov 20 – 25
Native Gel Electrophoresis	5 week 3	Nov 19	Nov 20 – 25	Nov 29 – Dec 4
Thanksgiving		Nov 14	Nov 15 – 20	
Skills Assessment			Nov 29 – Dec 4	

¹ With a BU Monday replacing the Tuesday schedule, the Discussion lecture will be recorded this week

Attendance and Absences

Assignment to a permanent discussion and lab section is required, and attendance is mandatory. All laboratory exercises will be done with a lab partner, which will be arranged during the first week of labs.

You are expected to be to arrive at the laboratory at least 5 minutes before the start of your lab session to allow for laboratory set-up. The labs start promptly at the scheduled time. If you are **more than 15 minutes late** to your lab section, you may not be allowed to participate in the laboratory. Missing a lab will result in you receiving a grade of zero for the lab summary for that section.

Pre-lab discussions are your risk-free, active learning opportunities where you are expected to participate in weekly intellectual scientific discussions on specific topics. They are also a great venue for community building.

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We will do our best to accommodate students who must be absent from lab or discussions for legitimate reasons (validated medical or serious personal reasons). In such cases, it is essential that you inform your TFs and Dr. Szymczyna about your personal circumstances as soon as possible to allow for us to determine the best support and accommodation we can provide. We will try to arrange for the work to be made up in a different section. With most laboratory sections at capacity, however, this might not be possible. **If possible, coordination of legitimate makeups should be made with your lab partner.**

Permission to do make-up work is contingent upon a *bona fide* proof of hardship, such as a written excuse from a physician (not a nurse or clinical worker), a dated death notice or funeral program, court summons, etc. Feeling under the weather, having three exams that day, or getting kicked out of your room by your roommate the night before do not qualify as legitimate reasons for missing lab.

Lab Course Grading

Laboratory Write-ups: 65%

A complete and organized lab write-up includes: a completed pre-lab, all data obtained for those experiments, a completed notebook including all observations and additional details learned during the experiment, data organized into tables, graphs and figures, and your answers to a series of questions about the experiment. Pre-lab write-ups are generally due one hour before your lab. Post-lab write-ups must be submitted electronically on Gradescope before 11:59 pm on the day that they are due. Students generally have one week from the completion of the lab to turn in the post-lab report. It is your responsibility to maintain a professional laboratory notebook for this class and to properly complete your lab write-ups. **Copying of ANY PART of notebooks from previous or current students is a violation of Academic Conduct and will be dealt with as such. A 10% deduction penalty will be applied for each day your lab write-up is turned in late.**

Top Hat: 10%

The Top Hat audience response system will be predominantly used during lecture and will be used for quizzing and polling. When used for quizzing, you will score 1 point if your answer is correct, and 0.5 of a point if your answer is incorrect but you participated. ***You must be in class to answer in-class Top Hat questions. Answering in-class questions while not in class will result in you losing the points for that day, and potentially obtaining an overall Top Hat grade of zero.*** If used for homework, questions can be answered at any time before the due time, which is generally 1 hour before the next discussion.

Missed Top Hat questions will not be excused nor can be made up. Since technical difficulties are sometimes encountered and you may need to miss class for a good reason, you only need to get 85% of the Top Hat points to receive full credit. The grade is calculated using: $[\text{points earned}/(\text{possible points} * 0.85)]$. Please contact Top Hat support directly if you are having problems with your Top Hat interface.

Comportment: 15%

Students will be evaluated by your teaching fellows throughout the semester in the following five categories: 1) Attendance and punctuality; 2) Preparation and Planning; 3) Quality of experimentation, equipment utilization & care, and skill development; 4) Participation, effort, and teamwork; 5) General cleanliness and safety. A mid-semester performance feedback will be provided to each student.

Skills: 10%

Students skills will be evaluated in two different ways. The most important skill you will learn this semester is mechanical pipettor use. Four successful completions of the pipettor skill task will earn you 5% of your final lab grade. The other 5% will be earned by successfully completing the skills assessment lab after Thanksgiving.

Lab Notebook, and Pre-Lab and Post-Lab Summaries

An important component of your lab evaluation is maintaining a well-organized, clear laboratory notebook. Your lab notebooks will be evaluated on clarity (i.e. can someone else repeat your work), which is crucial in all research labs. Lab notebooks should be completed in non-erasable pen. Instead of traditional lab reports, you will submit a laboratory summary at the end of each experiment. This summary will be an extension of your lab notebook. Copies of the pages relevant to the lab report will be submitted to GradeScope — your experimental purpose, the specific procedure you follow, the notes you write down as you do the lab, and the pages where you include your results (any gels, tables, and graphs of data) and data analysis. Below is a general schematic outlining how each experiment should be recorded in your notebook and the experimental summary that you submit in for credit.

In the summary submitted for grading, there will be SIX sections. Some of the sections must be completed in your lab book. You will also be asked to create a PDF document of these pages, and to submit them to GradeScope. The Purpose, Discussion and Reflection sections may be answered directly in GradeScope.

1. A **title** that clearly and accurately describes the experiment
2. A **purpose**, which describes the objectives of the experiment (Completed in pre-lab on GradeScope)
3. A detailed **description** of your procedure for the experiment.
 - a. Prior to the laboratory, the experimental protocols and procedural flowcharts (if necessary) for the experiments that you will conduct in the laboratory should be written out in your notebook, in your own words. The experimental protocols should also include tables of reagents that will be used in the experiment including, where appropriate, reagent molarities (for solutions), measured quantities (mass or volume), and number of moles. Tables that you will use for collecting data should also be prepared. Also be sure to include blank spaces in your procedure for the observations and measurements that you will make during the experiment. If necessary, any procedural flow chart should be the student's own work and outline the experimental steps, the input and output of each step, and the experimental conditions.

The details for each week's experiment will be provided in Pre-Lab Discussion, and Introductory materials will be posted on BlackBoard. Provided materials are not allowed as a resource during the lab period, but your laboratory notebook is ESSENTIAL. Prepare your notebooks accordingly.
 - b. During the laboratory, you may have to make changes to the procedure you prepared or add additional details that were not anticipated. Make notes during the lab that record what you actually do during the lab, including the order and rates of addition of reagents, the times that events occur, the temperature, and any other conditions. Document as you go along because you will not remember the details later! You will want to be able to reproduce the experiment exactly as it was done before, if it works correctly. If you did not get the expected results, a detailed description will help you identify what went wrong and where changes can be made.
4. The **results** of your experiments. These should be included in your notebook as tables, graphs, pictures, or diagrams of your data that you collected during the lab and analyzed.

5. A **discussion** of your results. Answer the questions posed in Gradescope.

6. **Reflection**: This is a great opportunity to show your instructors what you learned!

Academic Conduct

The Boston University rules and regulations described in the College of Arts and Sciences Academic Conduct Code will be strictly enforced. By attending this class, it is assumed that you have read and will abide by the Code, which can be found at: <http://www.bu.edu/academics/policies/academic-conduct-code/>. In particular, this applies to the writing of pre-lab and post-lab write-ups. **Sharing and discussion of data between lab partners is encouraged, but all submitted materials, including procedures, data tables, graphs, calculations, answers to questions, etc., must be independently created by each student.** Any violation of the Academic Code of Conduct will be referred to the Dean of Academic Affairs.

Copyright Laws and Protection

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