BB 422/622: Biochemistry II Lab Syllabus – Spring 2025

Laboratory and Discussion Coordinator and Sections

Dean Tolan (tolan@bu.edu)
Office hours: Mon 4-5 & Wed 12-1

Jackson Ho (jvho3@bu.edu)
Office hours: *Tue 4:30-5:30 PM*

Yinze Wu (yinzewu@bu.edu)
Office hours: *Thr 3:30-4:30 PM*

Pre-lab discussion sections

C3 Mon 2:30–4:15pm **CAS 326**
C1 1:30–3:15pm **PSY B33**
C2 Fri 2:30–4:15pm **SCI 115**

Laboratory sections (all in SCI 162) (each lab has 2 Teaching Fellows and 1 Lab Coordinator (noted in parentheses))

B5 Thurs 5:30–9:30pm (Tolan)
B7 Fri 3:35–7:35pm (Wu)
B2 Tues 8:00–12:00pm (Ho)
B6 Fri 10:10–2:10pm (Tolan)
B1 Mon 6:00–10:00pm (Wu)
B3 Tues 5:30–9:30pm (Ho)

Introduction

The biochemistry laboratory is designed to introduce you to modern techniques used in biochemical research. This part of the course has the greatest potential for securing biotechnology-related 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 in this lab and your understanding of the theoretical underpinnings of the techniques, the more impressed your potential employer or admissions faculty member will be. Of course, we cannot provide each section of 5-9 groups with all of the most modern and sophisticated equipment available. However, wherever possible, we have provided students with access to at least one of such instruments. As such, over the years we have spent well over $750,000 on the equipment for the Biochemistry laboratory and we hope everyone will appreciate this throughout the semester.

We have seven sections performing the laboratory exercises each week, so 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 10-18 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.

Course Prerequisites

Students must have earned a grade of "C–", or higher, in Biochemistry I (BB 421/621/527).

Questions, Concerns, and Differences in Opinion

All questions regarding the discussion, laboratory, assignments, and notebooks, should be addressed to the Laboratory Coordinator via e-mail, Slack, or office hours. Differences of opinion concerning grades must be addressed **within one week of receiving that graded assignment**. If you believe that there is an error in grading, first please speak with a Teaching Fellow or your Lab Coordinator during office hours, via Slack, or during lab. If you deem that regrading of any assignment or quiz is needed, please submit a regrade request through GradeScope during the period that regrades are open (within ONE week of publishing the grades for that assignment).

Questions regarding completion of the Laboratory Reports can be directed to fellows/instructor by attending any one of the available office hours. There will also be a Slack channel available. This will allow you to correspond and discuss questions you have with other students in the class and with TFs who will be monitoring the Slack conversations.

Required Materials

Textbook:

- "Biochemistry Laboratory Manual, 6th Edition" by Dean R. Tolan, Jose L. Medrano & Wen Yi Low (BU Bookstore)

Lab Materials:

- *Bound Laboratory Notebook:* a basic, lined notebook is sufficient since permanent records will be scanned in and submitted to Gradescope.
- Proper eyewear (safety glasses/goggles), lab coat (full length with cuffs), black or blue pens, scientific calculator, and a USB flash drive.

Lab Safety

Dress appropriately for each lab section. The minimum acceptable lab attire is a long lab coat buttoned at all times, long pants, closed-toed shoes, goggles and gloves. Long hair must be tied back at all times. Unacceptable clothing includes flip-flops, ballerina flats, capris, shorts, tank tops and sleeveless shirts. 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	Manual Chapters	Discussion Dates	Lab Dates	Dates for Lab Reports due*, Project due, and Exams
Quantitative Determination of Sugar in Blood	7	Jan 27 – Jan 31	Jan 30 – Feb 4	
Plasmid DNA Preparation	6A	Feb 3 – 7	Feb 6 –11	
		No Discussion	No Lab (13-18)	(Exam 1)
Transcription/Translation	8AB	Feb 18 – 21 (T;R;F)	Feb 20 – 25	Chapter 7 (50 pts)
SDS-PAGE Analysis of Translated Proteins & Autoradiography	8C	Feb 24 – 28	Feb 27 – Mar 4	(proj 1)
Determination of Sulfhydryl Groups with DTNB	9A	Mar 3 – 7	Mar 6 – 7	(Exam 2)
SPRING BREAK				
Determination of Sulfhydryl Groups with DTNB	9A	–	Mar 17 – 18	
Determination of Sulfhydryl Groups with Fluorescein-5-maleimide	9B	Mar 17 – 21	Mar 20 – 25	Chapters 6/8 (150 pts)
Isolation of Membranes	10A	Mar 24 – 28	Mar 27 – Apr 1	(Exam 3)
Preparation and Characterization of Membrane Lipids	10BC	Mar 31 – Apr 4	Apr 3 – 8	Chapter 9 (150 pts) (proj 2)
Characterization of Membrane Proteins: SDS-PAGE & Immunoblot	10D	Apr 7 – 11	Apr 10 – 15	
Staining Immunoblot of Membrane Proteins	10E	Apr 14 – 18	Apr 17 – 23 (R;F;T;W)	(Exam 4)
Molecular Modeling: Mutagenesis & Energy Minimization	11C	Apr 23 – 25 (W;R;F)	Apr 24 – 29 Chapter 11 worksheet due in class (37 pts)	Chapter 10 (200 pts)
				(proj 3)

***These reports are due by end of the day of your lab**

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 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 late to your lab section and miss the chalk talk (***usually more than 15 minutes late)***, you may not be allowed to participate in the laboratory due to safety issues. Missing a lab will result in you receiving a grade of zero for the lab summary due to safety for that section.

Pre-lab discussion attendance is also **mandatory.** These 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 and learning from each other.

Students who must be absent from lab for legitimate reasons (validated medical or serious personal reasons) will need to make up missed lab work during another lab section **THAT WEEK**. In such cases, it is essential that you inform your Lab Coordinator about your personal circumstances as soon as possible to allow for us to determine the best support and accommodation we can provide. **If possible, coordination of legitimate makeups should be made with your lab partner, and requests must be approved by your Lab Coordinator.**

Permission to do make-up lab 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. If you have a legitimate and written excuse that leads to missing a due date for any lab assignment, you will be give some extra time at the discretion of your lab coordinator. You must contact your lab coordinator as soon as possible.

There is no make-up available for missed quizzes or in-class activity after the discussion date has passed. If you anticipate missing a discussion, contact the Dr. Tolan several days in advance to discuss how the quiz and activity could be made up.

Lab Components of Your Grade (30% of course grade)

Discussion:

Remember, attending the pre-lab discussion section is **mandatory**. These sessions will review the underlying concepts and theory of each week's experimental design and purpose. It will include information about how to organize your time in the laboratory and what kinds of preparation will be required for your pre-laboratory notebook write-ups. Finally, any particular safety issues will be discussed along with last-minute changes in the procedures. Discussion attendance will be taken through the completion of an in-class activity each week. Each week's activity will vary and will require you to work with and learn from one another. To build on writing skills, we will dedicate time in some weeks for writing exercises. This will be followed by a peer review activity, where you will provide specific feedback on what was done well and not well to your peers' work so that they can become better at communicating science. By being proficient at peer reviewing, you will also become better readers, writers, and collaborators. Lastly, to build on problem solving and data analysis skills, we will dedicate time in some weeks for case studies/sample problems. **There are no make-up discussion activities** (see ***Attendance and Absences***).

Discussion quizzes:

Quizzes will be administered at the end of each discussion section. Quizzes will test your understanding and knowledge of the information explained in both the introduction and experimental procedures section of the lab manual. **There are no make-up quizzes** (see ***Attendance and Absences***).

***Pre-Laboratory Notebook Write-up*:**

These include title, goals, flow-chart and/or description of the protocol for each week (see details below). These Pre-lab write-ups are scans of your notebook submitted electronically on Gradescope and due 30 minutes before your laboratory section.

***Post-Laboratory Notebook Write-up*:**

These include the data that was collected each week, so called in-lab data (see details below). It should also include a brief conclusion as to whether the procedure worked and/or observations of events that occurred during the laboratory period. These are scans of your notebook submitted electronically on Gradescope before 11:59 pm on the end of lab day.

***Laboratory Reports*:**

For each chapter, a complete and organized lab write-up includes: all the pre-labs for each week of that chapter, all data obtained for those experiments each week, a completed notebook section **as described and organized in the lab manual,** a discussion/conclusion section, and sample calculations. Students turn in the laboratory reports on Gradescope. It is your responsibility to maintain a professional laboratory notebook for this class and to properly complete your laboratory reports. **A 10% deduction penalty will be applied for each day your lab write-up is turned in late.** As stated above, if you have a legitimate and written excuse that leads to missing a due date for any lab assignment, extra time might be allowed at the discretion of your lab coordinator.

Copying of ANY PART of notebooks from previous or current students is a violation of Academic Conduct and will be dealt with as such.

***Comportment*:**

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.

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 set of experiments. 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/observations 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 submitted summary, you will include the following SIX sections. The first four 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 Discussion and Conclusion sections may be answered directly in Gradescope.

1. A **title** that describes the experiment
2. A **purpose**, which describes the objectives of the experiment in 1-2 sentences.
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 or lists 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. **The Laboratory Manual is 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, pH changes and any other specific conditions. Write this down as you go along—you will not remember it accurately later! If the experiment worked correctly, you will want to be able to reproduce it exactly as it was done before. If you did not get the expected results, a detailed description will help you determine what went wrong and where you can make changes.

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. **Conclusion**: Write a short paragraph summarizing the lab, your results and observations. This is a great opportunity to show your instructors what your learned, and to discuss any unexpected results.

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.

Grading Summary

Component	Times per semester	Points each week	Total Points	Percentage of Lab grade (%)
Discussion attendance	11	9	99	9
Discussion Quiz	11	9	99	9
Pre-Laboratory Notebook Write-up	10	10	100	9
Post-Laboratory Notebook Write-up	10	5	50	4.5
Laboratory Reports	5	Variable (see schedule)	587	53.5
Comportment	11	15	165	15
			1100	100