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 jobs and/or 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 graduate/professional admissions faculty will be. Of course, we cannot provide each section of 8-9 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 when using the equipment.

We have six sections doing 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 about 16-18 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, assignments, notebooks, and quizzes should be addressed to your teaching fellows. If you cannot reach one of them, try the other one. Only if you cannot get satisfactory answers or agreement should you contact the Laboratory and Discussion Coordinators via email.

Required Materials

Textbook:

Tolan, Biochemistry Lab Text, 2nd Edition (BU Bookstore)

Lab Materials:

Safety eye goggles
A bound research notebook
Black or blue pens
Scientific calculator
**Lab Safety**

Dress appropriately for each lab section. The minimum acceptable lab attire is closed-toed shoes, long pants, a t-shirt, safety goggles, and long hair tied back at all times. Unacceptable clothing includes flip-flops, ballerina flats, capris, shorts, tank tops and sleeveless shirts. Food, drink, and consumables of any kind are not allowed in lab. Your teaching fellows will warn you of any 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**

<table>
<thead>
<tr>
<th>Experimental topic</th>
<th>Chapter</th>
<th>Discussion dates</th>
<th>Lab dates</th>
<th>Notebook write-up due at end of lab</th>
</tr>
</thead>
<tbody>
<tr>
<td>Photometric Methods for Protein Determination</td>
<td>1</td>
<td>Sept 8-9</td>
<td>Sept 9-15</td>
<td></td>
</tr>
<tr>
<td>Buffers and Tittrations</td>
<td>2</td>
<td>Sept 15-16</td>
<td>Sept 16-22</td>
<td>Chapter 1</td>
</tr>
<tr>
<td>Preparation of Crude Enzyme Extract</td>
<td>3A-C</td>
<td>Sept 22-23</td>
<td>Sept 23-29</td>
<td>Chapter 1</td>
</tr>
<tr>
<td>Ammonium Sulfate Fractionation &amp; Dialysis</td>
<td>3D-E</td>
<td>Sept 29-30</td>
<td>Oct 7-10, 14</td>
<td></td>
</tr>
<tr>
<td>Affinity Chromatography &amp; Concentration of Purified LDH by Ultrafiltration</td>
<td>3F-G</td>
<td>Oct 6-7</td>
<td>Oct 14</td>
<td></td>
</tr>
<tr>
<td>Using the Molecular Modeling Program “O”</td>
<td>11A-B</td>
<td>Oct 14&lt;sup&gt;①&lt;/sup&gt;</td>
<td>Oct 15-21</td>
<td></td>
</tr>
<tr>
<td>Functional Characteristics of LDH</td>
<td>4</td>
<td>Oct 20-21</td>
<td>Oct 22-28</td>
<td>Chapter 3 &amp; 11</td>
</tr>
<tr>
<td>Gel Filtration; Native Mr, Determination</td>
<td>5A</td>
<td>Oct 27-28</td>
<td>Oct 29 – Nov 4</td>
<td>Chapter 4</td>
</tr>
<tr>
<td>Polyacrylamide Gel Electrophoresis using SDS; Subunit Mr, Determination</td>
<td>5B</td>
<td>Nov 3-4</td>
<td>Nov 5-11</td>
<td></td>
</tr>
<tr>
<td>Native Zone Electrophoresis; “Zymograms”</td>
<td>5C</td>
<td>Nov 10-11</td>
<td>Nov 12-18</td>
<td></td>
</tr>
<tr>
<td>Preparation of Plasmid DNA &amp; Estimation of DNA Concentration</td>
<td>6A-B</td>
<td>Nov 17-18</td>
<td>Nov 19-24, Dec 2&lt;sup&gt;②&lt;/sup&gt;</td>
<td>Chapter 5</td>
</tr>
<tr>
<td>Restriction Mapping</td>
<td>6C</td>
<td>Dec 1-2</td>
<td>Dec 3-9</td>
<td></td>
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</tbody>
</table>

<sup>①</sup>Oct 14 is a substitute Monday schedule due to the Oct 13 Columbus Day holiday.
<sup>②</sup>Labs will be held in CAS 330 for that week. Some lab time will be available to complete Chapter 3C.
<sup>③</sup>Due to the Oct 14 substitute Monday schedule, Tuesday discussion sections for that week will be held at a different time and location.
<sup>④</sup>For Tuesday section, Chapter 6A-B lab will be held after Thanksgiving Recess, but Chapter 5 remains DUE on Nov. 25.
<sup>⑤</sup>Chapter 6 lab write-ups will be submitted on Thursday, December 11 at noon in front of SCI 162 for all sections.

**Pre-laboratory Write-up**

For each lab week, you are required to come to each lab with a completed pre-lab write-up. This pre-lab write-up includes: title of entry, date of entry, an introduction (stating objectives and purpose for the week), experimental procedures in your own words (**do not copy word-for-word from the procedures section of the lab manual**), and any necessary tables for collecting data. **Photocopying from the lab manual is not allowed.** Failure to complete a proper pre-lab write-up before the beginning of lab will result in a loss of points.
towards the final lab write-up. Utilize the notebook section from the lab manual each week to figure out what data you require to complete each lab write-up. Lab manuals are not allowed during 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. Lab partners, discussion and laboratory sections will be arranged during the first week of discussion and lab sections.

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. **You must inform your TF as soon as possible about your absence to make arrangements for the make-up lab work.**

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.

There is no make-up available for missed quizzes after the discussion date has passed. If you anticipate missing a discussion quiz, contact the discussion coordinators at least seven days before the discussion date to arrange taking a different quiz in advance.

**Grading**

**Laboratory Write-ups:** 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, a completed notebook section as described and organized in the lab manual, a discussion/conclusion section, and sample calculations. Entries in pencil, loose notebook pages, and multiple pages stacked and stapled/taped/attached/folded together will not be graded. It is your responsibility to maintain a professional laboratory notebook for this class. **Copying of ANY PART of notebooks from previous or current students is a violation of Academic Conduct and will be dealt with as such.**

**Discussion Quizzes:** Quizzes will be given 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**).

**Comportment:** Attendance, punctuality, cleanliness, preparation, effort, laboratory skills, quality of experimentation, ability to work in a group, and adherence to safety regulations will all be factored into this evaluation at the end of the semester. A mid-term comportment grade will be available to students during the middle of the semester to serve as a progress report, which will not count towards your final grade.

**Lab Exam:** The lab exam is scheduled to take place in discussion during the last week of classes (Dec 8 & 9). Specifics regarding the lab exam will be made available during later discussion sections.

**Academic Conduct**

The Boston University rules and regulations described in the College of Arts and Sciences Academic Conduct Code will be strictly enforced (copies are available in CAS 105). In particular, this applies to the writing of 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 originally be from you.**

Any violation of the Academic Code of Conduct will be referred to the Dean of Academic Affairs and will result in a zero on the assignment. A second violation will result in failure of the course and another referral to the Dean.