

The City University of New York
Brooklyn College
Department of Chemistry
Prof. Mariana Torrente
Fall 2023

CHEMISTRY 4572– BIOCHEMISTRY LABORATORY I (2 credits; 4-hours)

CONTACT INFORMATION

Name: Prof. Mariana Torrente
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Office hours: Thursday 3pm – 4pm or by appointment (in person, 3151 Ingersoll)

COURSE GOALS AND LEARNING OBJECTIVES

This course will provide both a theoretical and practical understanding of basic biochemical methods including the isolation, purification and characterization of proteins, lipids and DNA. Database applications for biotechnological applications will also be discussed.

REQUIRED TEXT

Laboratory procedures and supplementary information are posted on Blackboard and can be downloaded prior to each laboratory meeting.

CLASS MEETING SCHEDULE

The class meets weekly on Thursday (9:00am – 12:50pm) at Room 451NE Ingersoll Extension

GENERAL POLICIES

- **Accommodations for Students with Disabilities**

The Center for Student Disability Services (CSDS) is committed to ensuring students with disabilities enjoy an equal opportunity to participate at Brooklyn College. In order to receive disability-related academic accommodations, students must first be registered with CSDS. Students who have a documented disability or suspect they may have a disability are invited to schedule an interview by calling (718) 951-5538 or emailing Josephine.Patterson@brooklyn.cuny.edu. If you have already registered with CSDS, email Josephine.Patterson@brooklyn.cuny.edu or testingcsds@brooklyn.cuny.edu to ensure accommodation emails are sent to Prof. Torrente.

- **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 policy implementation can be found at www.brooklyn.edu/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. Students should be aware that faculty may use plagiarism detection software.

- **Consideration of Religious Observances**

If you must miss a lab session for religious observances, please make arrangements ASAP with your instructor and stockroom for a make-up ahead of time.

- **Sexual and Gender-based Harassment, Discrimination, and Title IX**

Brooklyn College is committed to fostering a safe, equitable and productive learning environment. Students experiencing any form of prohibited discrimination or harassment on or off campus can find information about the reporting process, their rights, specific details about confidentiality, and reporting obligations of Brooklyn College employees on the [Office of Diversity and Equity Programs website](#).

All reports of sexual misconduct or discrimination should be made to Michelle Vargas, Title IX Coordinator (718.951.5000, ext. 3689), and may also be made to Public Safety (719.951.5511), the New York City Police Department (911 or a local NYPD precinct), or Melissa Chan, Associate Director of Judicial Affairs, Division of Student Affairs (718.951.5352), as appropriate.

The [CUNY Equal Opportunity and Non-discrimination Policy](#) includes additional information regarding reporting discrimination and/or retaliation.

- **Student Bereavement Policy**

Students who experience the death of a loved one must contact the Division of Student Affairs, 2113 Boylan Hall, 718.951.5352, studentaffairs@brooklyn.cuny.edu, if they wish to implement either the Standard Bereavement Procedure or the Leave of Absence Bereavement Procedure. For more information see <http://www.brooklyn.cuny.edu/web/about/initiatives/policies/bereavement.php>

- **Immigrant Student Success Office**

As an educator, I support the rights of undocumented students to an education. If you have any concerns in that regard, feel free to discuss them with me, and I will respect your wishes concerning confidentiality. For resources and support, please visit Brooklyn College's Immigrant Student Support Office located at 17 Roosevelt Hall. You can also contact them via email at ISSO@brooklyn.cuny.edu or via phone at 718-951-5023

- **Important Dates (Fall 2023)**

If you decide to withdraw from this course, it is your responsibility to do so by the Deadline for Student Withdrawals (Monday, December 11th, 2023).

Friday, August 25	First day of Fall 2023 classes
Thursday, August 31	Last day to add a course.
Monday, September 4.	College Closed – No classes scheduled.
Friday, September 15 <i>through</i>	No classes scheduled.
Sunday, September 17	
Monday, September 25	No classes scheduled.
Monday, October 9	College Closed – No classes scheduled.
Tuesday, October 10	Conversion Day – Classes follow a Monday schedule.
Wednesday, November 22	No classes scheduled.
<u>Thursday, November 23 and Friday, November 24</u>	<u>College Closed – No classes scheduled.</u>
Saturday, November 25 and Sunday, November 26	College OPEN – No classes scheduled.
Monday, December 11	Last day to withdraw from a course with a “W” grade.
Tuesday, December 12 and Wednesday, December 13.	Reading Days
Thursday, December 14	Final Exams Begin
Wednesday, December 20	Final Exams End / End of Fall Semester

LABORATORY REQUIREMENTS

General Guidelines

- Please bring detergent, paper towels and a laboratory notebook.
- The laboratory notebook will NOT be handed in or graded and is solely for documenting your observations and acquired/measured data during the lab sessions. Guidelines on keeping a laboratory notebook are provided on Blackboard
- **Safety goggles must be worn at all times.**
 - It is a New York State law that safety goggles be worn at all times by all students in the laboratory. You will lose marks if you are observed not wearing safety goggles, and possibly removed from the laboratory after two warnings.

- Goggles are provided as part of the lab equipment rental fee. **It is the student's responsibility to bring her/his goggles to each lab session.**
- If a student completes their lab work before the end of the session, they **MUST** continue to wear their goggles until they have exited the lab.
- Some procedures may soil clothing and some may involve hazardous chemicals. You are encouraged to wear a lab coat.
- 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.
- **Eating and drinking are NOT permitted during lab sessions.**
- Pregnant students are encouraged to notify the laboratory instructor.

Lab Quizzes

Short, one-question lab quizzes, based on the experiments/concepts covered in each experiment, will take place at the beginning of each class session.

Pre-lab Outline

- Please bring a hand-written protocol (Pre-Lab Outline) to each lab session (in your lab notebook) for the day's experiment based on the instructions in the lab manual.
 - Think of the pre-lab as your personalized guide for performing the experiment.
- You will **NOT** be allowed to perform the experiment without a pre-lab. Your pre-lab outlines to briefly address the following key points:
 - Purpose of Experiment.
 - Techniques and Apparatus to be used.
 - Type of Data Collected (what will be measured and calculated).
 - List of Main Reagents and Dangerous Chemicals (if any).

Laboratory Reports

- You must submit a paper version of your lab report for grading **within 1 week** after completion of the experiment (see syllabus for specific deadlines).
 - If you need access to word processing and other software, you may use the Chemistry Department's laptop in the lab or other campus computers.
- Your report will be returned to you ungraded if the writing is not grammatically correct and the format does not follow the guidelines below.
- Your report will be returned to you ungraded if it goes above the specified page limit.
- For cases of plagiarism, students will be assigned a zero for their report and the instructor may take further action. Plagiarism is easy to detect and is considered Academic Dishonesty (see section above).
- You must prepare lab reports in the format of a research article as published in the American Chemical Society's journal Biochemistry (see samples on Blackboard). **Overall report length must not exceed 4 pages.** The lab report should be typed and it must be organized into the following sections:
 - **Abstract:** The abstract concisely states the problem, the experimental approach used, the most important results, and conclusion(s). Only a few sentences are needed.
 - **Introduction:** This section provides brief background information about the biochemistry addressed by the experiment and will justify why you carried it out. The introduction usually ends with a statement summarizing what you will show and discuss in your report.
 - **Materials and Methods:** This section describes the materials used (any dangerous chemicals involved) and the experimental procedures followed. Refer to the handouts 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 handout"; or, "Absorbance measurements were made at the desired wavelengths using the Spectronic20 spectrophotometer". Avoid details such as: "I pipetted 20 mL 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 includes your experimental results presented in tabulated and/or figure format as appropriate, accompanied by a concise description. You need to show calculations (and errors where possible) with appropriate equations. All graphs can be computer generated (using Excel) with the axes accurately labeled and legends (or titles) clearly describing the data presented. Calculations (only) can be hand-written and are not included in the page limit.
- Discussion (approx. two paragraphs): The discussion section provides a short and comprehensive description of your findings or conclusions. This should NOT take the form that includes comments such as "this was a fun experiment..." or "I learned how to...". Rather, this section provides a discussion of the principles involved in the experiment and any conclusions that you can make based on your data. Discuss experimental errors or problems, which occurred and attempt to make a simple conclusion. When you evaluate your data or a concept that is already known for a chemical species and is available 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. Please answer any questions that may be posed in the lab handouts in the Results or Discussion sections of your report.
- Reports are evaluated based on:
 1. the quality of the results (but only to a degree)
 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 Excel, this is a great opportunity to learn;
 4. explanation of why the experiment did not go according to plan or the results do not match literature values, sources of errors, etc.

Note: you will be sharing data with your partner but NOT preparing a joint report.

Grading Policies

- Assignments must be submitted on the assignment deadline. All missed assignments will receive a grade of zero.
 - If you are unable to submit an assignment due to **a documented extenuating circumstance**, you will be given the opportunity to turn in your assignment late.
 - If you are unable to submit an assignment, you must contact the instructor prior to the assignment deadline.
 - In the event of unpredictable extenuating circumstances, other arrangements may be made after discussion with the instructor and possibly the Dean as warranted.
- At the instructor's discretion, a grade of "0" will be assigned to any quizzes and/or writing assignment where academic dishonesty is displayed.

Laboratory Performance

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

GRADE CALCULATION

The final grade for the course is calculated as follows:

- 10% Spectrophotometric Methods
- 15% DNA/RNA Lab
- 10% Lipid Lab
- 10% Ferrimyoglobin Binding Kinetics Lab
- 35% Alkaline Phosphatase Lab
- 15% Lab Quizzes
- 5% Laboratory Performance

Final grades will be assigned on a curve. There is no final exam.

EXPERIMENTAL SCHEDULE

Date	Lab Session	Experiment	Reading Assignment <i><u>*For all labs: experimental procedures on Blackboard</u></i>
8/31	1	Check-In; Protein Determination Using the BCA Assay; Construction of a Protein Standard Plot.	Papers posted on Blackboard.
9/7	2	Spectrophotometric Estimation of pKa Values.	
9/14	3	Quantitative Spectrophotometric Determination of Total DNA and RNA in Animal Cells.	
9/21	4	Thermal Melting Profile of DNA Helix Unfolding (Demonstration).	SPECTROPHOTOMETRIC LAB REPORT DUE
9/28	5	Isolation and Identification of Lipids from Egg Yolk and Animal Cells Using TLC Analysis.	DNA/RNA LAB REPORT DUE
10/05	6	Ferrimyoglobin Fluoride Titration and Binding Kinetics.	LIPID LAB REPORT DUE
10/12	7	Protein Chemistry and Enzymology – *Isolation of Crude Alkaline Phosphatase from E.coli; *Alkaline Phosphatase Activity Assay; *Purification Using Binding to DEAE Sephadex A-50.	FERRIMYOGLOBIN LAB REPORT DUE Note: Pre- lab outlines are particularly important for the alkaline phosphatase/protein purification and characterization experiments, since the overall report will cover seven weeks of work and the pre-lab will provide you with guidance for preparing the full written (graded) lab report.
10/19	8	Ion Exchange Chromatography- Ammonium Sulfate Precipitation.	
10/26	9	Electrophoresis and Activity Assay of Purified Alkaline Phosphatase.	
11/02	10	Determination of Molecular Weight of Alkaline Phosphatase by Analytical Gel Filtration.	
11/09	11	Enzyme Kinetics (K_M and V_{MAX} Determinations).	
11/16	12	Inhibition: Competitive and Noncompetitive	
11/30	13	Alkaline Phosphatase: Internet Exercise in Protein/Gene Database Management (NCBI and ExPASy).	
12/07	14	Check Out.	ALKALINE PHOSPHATASE LAB REPORT DUE

****NOTE: You will not be given any extra time for lab sessions. ****