

# Biochemical Techniques (BIBC 103)

## Spring Quarter 2024

### Course information

**Lectures:** Tue & Thu 8.00- 9.20am, PODEM 1A18

**Labs:** Tues & Thu 9.30- 1.20pm or 2.00- 5.50pm, YORK 3306/3406 (Depending on section)

**Instructor:** Dr Miyyada Boumechache

**Email:** [mboumechache@ucsd.edu](mailto:mboumechache@ucsd.edu)

**Office hours:** Mondays: 11.30-1.00 pm in HSS 8016 (subject to change depending on room availability)

### Teaching assistants:

Maheeka Bimal. Email: [mbimal@ucsd.edu](mailto:mbimal@ucsd.edu)

Prathamesh Hrushikesh Saraf. Email: [psaraf@ucsd.edu](mailto:psaraf@ucsd.edu)

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### Aim of the course

To gain an insight into what constitutes biological research including asking the right question, developing an appropriate approach to answering the question, performing experiments using a variety of molecular and biochemical methods, and undertaking appropriate data analysis and interpretation.

### Learning Objectives

By the end of the course, students should be able to:

1. Explain the theory underlying some key molecular and biochemical techniques used in biological research
2. Design experiments to answer a biology question using appropriate controls
3. Follow protocols and perform laboratory experiments using biochemical techniques commonly used to study proteins
4. Analyze and interpret data and make valid conclusions
5. Apply basic bioinformatics to study genes and proteins
6. Read, understand, evaluate and synthesize information from primary literature
7. Write scientific papers (in the form of lab reports)

### About the instructor

I graduated with a pharmacy degree from the University of Manchester, United Kingdom, and I obtained a PhD in molecular pharmacology from the University of Cambridge, United Kingdom. I was a senior lecturer at Kingston University London for 4 years where I taught a variety of courses including pharmacy, biochemistry, pharmacology, biomedical sciences, and pharmaceutical sciences. I moved to San Diego a year and half ago, and this is my second quarter teaching at UCSD and second

time teaching BIBC 103. My ethos is learning should be accessible to and inclusive of all. I care about each and every student and I will do my best to make the learning journey on this course meaningful, purposeful and fun to all. Please do not hesitate to reach out to me if you have any questions/suggestions/concerns and I will do my best to address those. Outside the classroom you can find me in **HSS 8016** every **Monday 11.30- 1.00pm (office hours)** You can also reach out to me via email: [mboumechache@ucsd.edu](mailto:mboumechache@ucsd.edu). I will aim to respond within 3 business days.

### Materials required

Biochemical Techniques Lab manual, 2023-2024 Edition (Available from the bookstore)

Safety glasses

Lab coat

A notebook- digital

Dress code: closed shoes, full length covering of legs.

### Course Format

#### Lectures

I am a strong advocate of the importance of student participation in teaching sessions. There is substantial evidence from research studies that student interaction with their peers and with the instructor enhances their learning and enables them to acquire/polish skills that would help them succeed during university and beyond. Please come prepared to CONTRIBUTE to the lecture. I will strive to post lecture slides on Canvas at least 24h prior to the lecture, so that you can get a head start!

#### Labs

Attending lab sessions is mandatory. All enrolled and waitlisted students must attend the first lab session. **You will lose your seat in the course if you do not arrive to the first lab session within 30 min of the session start time.** Attendance will be recorded by the IAs in the first 30 min of each lab session. You need to ensure you arrive to your lab sessions on time. Anyone arriving more than 15 min late may be turned away and will not be able to attend the class. If you anticipate being late for mitigating circumstances you need to let myself and your IA know as soon as possible. If you need to miss a class for extenuating reasons, you must email me in advance explaining your reasons. I will discuss with you how to make up for any missed work. Any unauthorized absence will result in 5% being deducted from your course grades. Any two or more unauthorized absences will result in failing the course. **Please note IAs are not authorized to give you permission for absence. You need to email the instructor.**

## Schedule

	Dates	Experiment/Activity	Lab Manual Chapter
<b>Wk 1</b>	April 2	Enrollment and safety orientation; Lab skills and equipment exercises	Lab 1; and pg 1 - 11
	April 4	Introduction to SDS-PAGE	Lab 2
<b>Wk 2</b>	April 9	LDH 1: Initial purification of LDH from crude homogenate: centrifugation, ammonium sulfate precipitations	Lab 3
	April 11	LDH 2: Affinity chromatography	Lab 4
<b>Wk 3</b>	April 16	LDH 3: Activity assays; Bradford protein assays	Lab 6
	April 18	LDH 4: Native gel electrophoresis of LDH with activity stain	Lab 8
<b>Wk 4</b>	April 23	Fluorescent Proteins 1: Make competent cells and transform with plasmids	Lab 14
	April 25	Fluorescent Proteins 2: Purification and analysis of fluorescent proteins	Lab 15
<b>Wk 5</b>	April 30	Fluorescent Proteins 3: SDS-PAGE of proteins	Lab 16
	May 2	Practice Exam in lab; set up lysozyme crystals round 1	Lab 17
<b>Wk 6</b>	May 7	Sea urchin fertilization, prepare cell lysates	Lab 10
	May 9	MAPK Western blot—SDS PAGE and electroblotting	Lab 11
<b>Wk 7</b>	May 14	MAPK Western blot—Immunodetection	Lab 12
	May 16	Examine crystals round 1; prep crystals round 2	Lab 17
<b>Wk 8</b>	May 21	Bioinformatics 1: Investigation of an unknown melanoma gene	Lab 18 part A
	May 23	Bioinformatics 2: Modeling protein structures	Lab 18 parts B - D
<b>Wk 9</b>	May 28	Fly Lab 1: Sort flies and prepare assays	Lab 9 Part C
	May 30	Fly Lab 2: Ethanol Mobility Behavior Assay; alcohol dehydrogenase activity assays; determination of substrate specificity	Lab 9 Part D
<b>Wk 10</b>	June 4	Fly Lab 3: Statistical analysis of data; examine lysozyme crystals round 2	Lab 9
	June 6	Final Exam in lab	-

Please note I have not included lectures in the schedule, as their content will be aligned with the lab experiment (s) for each week. For example, lectures could explain the theory behind SDS PAGE/Western blot, or discuss a research paper where the techniques covered in the lab were used in the study.

## Assessments

There are 5 elements of assessment for the course. These include:

Notebook 10%  
Weekly quizzes 20%  
Lab report 1 25%  
Lab report 2 25%  
Exam 20%

### Notebook

It is vitally important that you carefully document your experiments including details about materials, protocols, raw data and statistical analysis. It is recommended that you keep an electronic notebook in the form of a Google doc. Please refer to the Notebook page on Canvas for further guidance on how to create and keep a lab notebook. IAs will review your notebooks periodically and you will be awarded a grade based on completeness, accuracy, relevance, and organization.

### Weekly quizzes

These will be available on Canvas at the end of the week. The quizzes will aim to check your understanding of the material covered in lectures and labs delivered during the preceding week (sometimes two weeks). The questions will be in the format of multiple-choice questions, true false questions and/or fill in the blank. You will have only ONE attempt at each quiz. The questions will not be locked and you can go back and forth to review your answers before submitting the quiz. The quizzes will be due on **Thursday by midnight the following week**.

### Lab reports

You will be required to submit TWO lab reports that put together work from two major projects that you will be undertaking this quarter, namely, LDH purification and MAP Kinase characterization. Guidelines and due dates for the lab reports will be posted on Canvas in due course. Lab reports must be submitted to Turnitin on Canvas and will be checked for plagiarism. Grading of the lab reports will be undertaken by the IAs. I will moderate grades to ensure consistency of marking and fairness to students. Grades will be released on Canvas. If you disagree with the grading of your report, please discuss this with the IA firsthand. If you are still in disagreement, you need to submit a request for regrading by emailing me no later than a week after you have received your grades. You need to include in your email a brief summary explaining why you think you should be awarded a higher grade.

It is important that the lab reports are your own work and reflect your own efforts. Please have a read of the **BIBC 103 integrity policy** found at the end of this document. You will be required to sign a copy of this policy and submit it with each report.

### Final exam

The exam will be taken in person during the last lab session on **6<sup>th</sup> June**. There will be a practice exam earlier in the quarter on **2<sup>nd</sup> May**, which will not count towards your

grades. The practice exam will be very similar in format to the final exam. The exam will focus primarily on the application of knowledge and skills acquired during the course, and assess your ability to analyze and interpret data. **This is NOT an open book exam.**

### **Late or missing assignments**

A strict deadline policy will be observed for online quizzes and lab reports. The assignments will be locked after the deadline has passed, and you will not be able to access the assignment. If you are unable to meet a deadline for mitigating circumstances, please let me know as soon as possible. I will be reasonably accommodative.

### **Grading information**

97- 100%	A+	73 - 76%	C+
93 - 96%	A	69 – 72%	C
89 – 92%	A-	65 – 68%	C-
85 - 88%	B+	60 – 64%	D
81 – 84%	B	< 60%	F
77 – 80%	B-		

Grades will be released on Canvas in a timely fashion. Requests for regrading will be taken into consideration. These should be emailed to me no later than a week after releasing grades. You should include a brief explanation of why you think additional points should be awarded.

### **Resources**

The lectures will be podcast. Podcasts will be uploaded to the Canvas page.

Interactive platforms such as Mentimeter and Padlet will be used for quizzes and polls. These will require the use of a smart device. Please email me if you do not have access to one as soon as possible.

Other support material will be posted on Canvas as and when needed.

### **Policies**

#### **Student Conduct Code**

[Student Conduct Procedures \(ucsd.edu\)](https://ucsd.edu)

#### **Integrity of Scholarship**

[UCSD Policy on Integrity of Scholarship](#)

[\(Please also see BIBC 103 integrity policy below\)](#)

**Religious Accommodation**

[Policy: Exams \(including midterms, final exams, and religious accommodations for exams \(ucsd.edu\)\)](#)

**Discrimination & harassment**

[About OPHD \(ucsd.edu\)](#)

[Policies & Procedures for Students \(ucsd.edu\)](#)

**Subject to change policy**

The information contained in this course syllabus may be under certain circumstances be subject to change with reasonable advance notice.

## BIBC 103 Integrity Policy Regarding Laboratory Reports

The most important part of laboratory work in any field is the interpretation of experimental results. The skills required to accurately organize, analyze, and present data must be learned, and this is a big part of what this class is designed to teach. If a student does not complete a lab report independently, they do not go through the process of thinking through how to work up their data, and lose the chance to learn these skills. Furthermore, this denies the instructor the ability to accurately assess these skills in the student, and give a grade that represents their independent ability. All lab reports for the class must be independently written, *i.e.*, **your own work in your own words**.

- You may not copy to any extent current or past laboratory reports that were written by other students. This is known as plagiarism, which is a direct attempt by the student to present the work of others as their own, and is no different than cheating on an exam.
- Directly copying material from other sources without putting it in your own words is also plagiarism, even if the source is cited as a reference. All of your writing should be in your own words.
- You may not use AI-based writing tools such as ChatGPT to complete your report. This is equivalent to having another student do your work.

Plagiarism and other forms of academic dishonesty on BIBC 103 lab reports are rigorously sought out and penalized. Students are required to upload an electronic version of each lab report to Turnitin.com, where the report is screened with a plagiarism checker against all reports in the Turnitin database. All incidents of plagiarism will automatically be turned in to the Academic Integrity Coordinator. Following UCSD's Policy on Integrity of Scholarship (<https://academicintegrity.ucsd.edu/process/policy.html>), students found to have committed plagiarism or other academic misconduct will receive both an administrative (decided by the Council of Deans) and academic penalty (decided by the instructor).

All submitted reports are retained in the Turnitin database. Similarity hits by the plagiarism checker will also reveal the name of the student who provided the plagiarized material. As stated above, the reason for writing the lab reports is to allow each student to go through the process of thinking through the organization and presentation of their data. Even if not directly copying material, viewing another student's report to examine the structure or content prevents them from thinking through it on their own. **Therefore, releasing your lab report to another student, even if not for the purpose of directly copying material, is considered an act of academic dishonesty.**

While discussion of data among lab partners is encouraged, each student must complete all text, references, figures, and tables on their own. The labeling of electrophoresis gel and Western blot images must be done independently. The submission of reports by lab partners that contain shared work is not allowed, and will result in points being deducted from both reports. If you have questions about the difference between discussing your work with others and unauthorized collaboration, please ask your instructor or IA for clarification.

**Spring Quarter 2024**

*"I have read the BIBC 103 Integrity Policy and understand how to complete my academic work in this class with the utmost integrity. I agree that I will keep all lab reports that I complete for BIBC 103 as restricted material that was used to assess only my abilities, and that I will not release these lab reports to any other students."*

**Student signature**

**Print Name**

**Date**