

Biochemical Techniques (BIBC 103)

Fall Quarter 2023

Course information

Lectures: MWF 1- 1.50pm, WLH2113

Labs: WF 2.30- 6.20pm, YORK 3306/3406

Instructor: Dr Miyyada Boumechache

Email: mboumechache@ucsd.edu

Office: HSS 1145B

Office hours: 10.30- 11.30am

Teaching assistants:

Maheeka Bimal: Email: mbimal@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

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 in October last year. 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 my office **HSS 1145B** every **Monday 10.30-11.30 am**. You can also email me on 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 TAs 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 TA 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 TAs are not authorized to give you permission for absence. You need to email the instructor.**

Schedule

	Dates	Experiment/Activity	Lab Manual Chapter
Wk 0	Sep 29	Enrollment and safety orientation; Lab skills and equipment exercises	Intro D and Lab 1
Wk 1	Oct 4	Introduction to SDS-PAGE	Lab 2
	Oct 6	LDH 1: Initial purification of lactate dehydrogenase (LDH) from crude homogenate; centrifugation, ammonium sulfate precipitations	Project 1 Intro and Lab 3
Wk 2	Oct 11	LDH 2: Affinity chromatography	Lab 4
	Oct 13	LDH 3: Size exclusion chromatography	Lab 5

Wk 3	Oct 18	LDH 4: Activity assays; Bradford protein assays	Lab 6
	Oct 20	LDH 5: SDS-PAGE of LDH purification fractions	Lab 7
Wk 4	Oct 25	LDH 6: Native gel electrophoresis of LDH with activity stain	Lab 8
	Oct 27	Set up lysozyme crystallization 1	Lab 17 parts A – C
Wk 5	Nov 1	Practice Exam	
	Nov 3	Sea urchin fertilization, prepare cell lysates	Project 2 Intro and Lab 10
Wk 6	Nov 8	MAP kinase Western blot—SDS PAGE and electroblotting; Examine lysozyme crystals 1	Lab 11 Lab 17 part D
	Nov 10	Veteran's Day Holiday; no lab	
Wk 7	Nov 15	MAPK Western blot—Immunodetection; Set up lysozyme crystallization 2	Lab 12 Lab 17
	Nov 17	Bioinformatics 1: Investigation of an unknown melanoma gene	Lab 18 part A
Wk 8	Nov 22	Bioinformatics 2: Modeling protein structures	Lab 18 parts B – D
	Nov 24	Thanksgiving Holiday; no lab	
Wk 9	Nov 29	Fly Lab 1: Sort flies and prepare assays; Examine lysozyme crystals 2	Lab 9 parts A – C
	Dec 1	Fly Lab 2: Ethanol Mobility Behavior Assay; alcohol dehydrogenase activity assays; Bradford assays	Lab 9 part D
Wk 10	Dec 6	Fly Lab 3: Statistical analysis of data; determine substrate specificities for fly and yeast ADH;	Lab 9 part E
	Dec 8	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. TAs 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 each week. The quizzes will aim to check your understanding of the material covered in lectures delivered during that week. 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 **Friday by midnight the following week.**

Lab reports

You will be required to submit two lab reports that put together work from the 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 TAs. 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 TA 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.

Final exam

The exam will be taken in person during the last lab session on **8th December 2023.** There will be a practice exam earlier in the quarter on **1st November 2023,** 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.

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](https://ucsd.edu)

Religious Accommodation

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

Discrimination & harassment

[About OPHD \(ucsd.edu\)](https://ucsd.edu)

[Policies & Procedures for Students \(ucsd.edu\)](https://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.