

BIBC 103: Biochemical Techniques Spring 2023

Instructor: Sinem Beyhan, Ph.D. (sbeyhan@ucsd.edu)

Office Hours: Mondays 1:00-2:00 pm over Zoom (Canvas link); also available by appointment

Instructional Assistants: Aishwarya Ravisankar (aravisan@ucsd.edu)
Jacob Durazo (jdurazo@ucsd.edu)

Lectures: M/W/F 9:00-9:50 am in SEQUO 147. You are strongly encouraged to attend lectures. While it is not mandatory, in the lecture we will discuss the background of the labs and strategies for approaching the lab work and assignments. The lectures will be recorded for the video podcast, but attending live gives you the opportunity to ask questions.

Labs: W/F 10:00 am- 1:50 pm in YORK 3306/3406

Course Objectives:

This course will introduce some of the experimental methods used in biochemistry and molecular biology, with an emphasis on those techniques used to study proteins. You will gain a conceptual understanding of, and some hands-on experience in, various protein purification techniques, expression and purification of recombinant proteins from bacterial cells, and methods for analyzing the different properties of proteins. The laboratory work will consist of three big, multi-day projects, as well as some smaller, single-day experiments. All the lab work will emphasize mastery of the skills that are essential to work independently in a biochemistry lab, including hands-on wet-lab and quantitative reasoning skills.

More importantly, this course is designed to give an appreciation of what science is and how it works. Science is not just a bunch of random facts...it is a process! It is easier to understand biology, or any field, when you understand how we know what we know about it. Understanding how information in biology is brought to light is just as important as the information itself. Through the laboratory projects, we will develop the skills necessary to interpret data from experiments in order to answer questions about biological systems and to design experiments to ask new questions. In keeping with this, the importance of good experimental design, including the use of appropriate controls, will be highlighted in all experiments.

Materials Required:

- 1) Biochemical Techniques Lab Manual, 2022/2023 Edition (available from the Bookstore)
- 2) Bound laboratory notebook (**not loose leaf**; do not need carbon copies)
- 3) Safety glasses
- 4) Lab coat

Course Web Site:

Except for the lab manual, all course materials will be accessed through the course webpage on Canvas. Much of the data you generate in your experiments will be accessed through Canvas, in addition to lab report guidelines and practice problem sets for quizzes and exams. Be sure to check Canvas frequently for announcements and updates on assignments.

Course Requirements and Grading: Your final grade for the class will be calculated using the following criteria:

Activity	Value
LDH: Lab Notebook	60 points
LDH: Purification table analysis (due May 7 th)	120 points
Sea Urchin: Lab Notebook	40 points
Sea Urchin: Lab Report (due May 28 th)	200 points
Fly Lab: Lab Notebook	30 points
Fly Lab: EMBA and ADH activity analysis (due June 4 th)	100 points
Bioinformatics: Lab manual questions (Lab 19 part A) (June 1st – in class)	51 points
Bioinformatics: Lab manual questions (Lab 19 part C-D) (June 6th – in class)	39 points
Quiz 1 (April 18)	20 points
Quiz 2 (May 23)	20 points
Exam 1 (May 4)	120 points
Exam 2 (June 8)	200 points
Total	1000 points
Got crystals? 20 points extra	

Point Cutoffs for Grade Assignments:

915-1000	A	780-794	C+
895-914	A-	715-779	C
880-894	B+	695-714	C-
815-879	B	600-694	D
795-814	B-	0-599	F

Lab Quizzes and Exams:

All quizzes and exams will be taken in person during the lab sessions. The purpose of the lab quizzes is to be sure you are mastering the basic concepts behind your experiments as we go through the class. This includes understanding the purpose of the lab projects and how each experiment fits into this, the basic concepts underlying the procedures, and simple mathematical and analytical skills based on what you have actually done in lab. The quiz dates are given in the lab schedule. Quizzes will be given at the beginning of lab, will take 15 – 30 minutes, and will consist of 5 to 7 questions.

The two exams are cumulative and will be problem solving-based. They may include some basic questions on the concepts we have covered, but will emphasize taking the information you have learned and extrapolating to solve problems you have not seen before. Practice questions will be provided on Canvas to help you prepare for the exams.

Lab Attendance Policies:

In-person attendance at each lab session is mandatory. An unexcused absence will result in 10 points being deducted. If you test positive for COVID-19 or feel ill, however, stay home and contact the instructor by email. If you test-positive for COVID-19 and must isolate, we will work with you to keep you in the class. If you know that you need to miss a lab session, discuss this with the instructor (not the IA, they are not authorized to give you permission) to see if it will be possible to make up the lab session or excuse you from the lab with no consequences. Please bring this to the instructor's attention as soon as you know that it will be an issue. Only the instructor (not the IAs) can excuse an absence. Two unexcused absences will result in the student failing the course.

Turning Written Assignments:

Lab report and data write-ups will be submitted electronically on Canvas. Lab reports are due before the end of the day (11:59 pm) on the due date. Ten points will be deducted for each day following the due date that the lab report is late. Students agree that by taking this course all required papers will be subject to review for textual similarity by Turnitin.com for the detection of plagiarism. All submitted papers will be included as source documents in the Turnitin reference database solely for the purpose

of detecting plagiarism of such papers. Use of the Turnitin service is subject to the terms of use agreement posted on the Turnitin site.

Lab Report Grading and Regrade Policy:

Your lab report will be graded by your IA, based on the lab report guidelines. I work closely with all the IAs to ensure that the grading is accurate and equivalent between sections. If you disagree with the grading of your lab report, discuss this with your IA to get clarification on why points were deducted. If you still disagree with the grading you may submit the report to me for a re-grade. This must be done within one week of receiving the graded report. I will re-grade the entire report and give you a new score, and this is the score that will be recorded.

Making Up Quizzes and Exams:

Please note that it is extremely burdensome for the instructor and IAs to have to prepare and proctor make-up exams. Missing a scheduled quiz or exam will only be excused for medical reasons where documentation can be provided.

Monday Lecture Schedule: On Mondays, we have a lecture but there is no lab session. We use this time to review our lab practices, observations and analyses. Problem set answers will also be discussed at this time.

Week	Dates	Discussion Topics
Week 1	April 3	Introduction to BIBC 103
Week 2	April 10	Review of lab practices and calculations
Week 3	April 17	Problem set 1 answers
Week 4	April 24	LDH activity calculations
Week 5	May 1	Problem set 2 answers
Week 6	May 8	Exam 1 answers
Week 7	May 15	Problem set 3 answers
Week 8	May 22	Sea urchin lab report discussion
Week 9	May 29	Memorial Day (No lecture)
Week 10	June 5	Review of all lecture materials

Lab Schedule:

	Dates	Experiment/Activity	Lab Manual Chapter
Wk 1	April 5	Enrollment and safety orientation; Lab skills and equipment exercises	Lab 1 (and pp.1-11)
	April 7	Introduction to SDS-PAGE	Lab 2
Wk 2	April 12	LDH 1: Initial purification of LDH from crude homogenate: centrifugation, ammonium sulfate precipitations; prepare size exclusion column	Lab 3
	April 14	Quiz 1 in Lab LDH 2: Affinity chromatography	Lab 4
Wk 3	April 19	LDH 3: Size exclusion chromatography	Lab 5
	April 21	LDH 4: Activity assays; Bradford protein assays	Lab 6
Wk 4	April 26	LDH 5: SDS-PAGE of LDH purification fractions	Lab 7
	April 28	LDH 6: Native gel electrophoresis of LDH with activity stain; Set up lysozyme crystallization 1	Lab 8 Lab 18
Wk 5	May 3	Sea urchin fertilization, prepare cell lysates	Lab 9A
	May 5	Exam 1 in Lab	
Wk 6	May 10	MAPK Western blot—SDS PAGE and electroblotting	Lab 10
	May 12	MAPK Western blot—Immunodetection	Lab 11
Wk 7	May 17	ELISA for phospholipase C activity; Examine lysozyme crystals 1; set up lysozyme crystallization 2	Lab 12 Lab 18
	May 19	Work up ELISA data; make figures for lab report	Lab 12
Wk 8	May 24	Quiz 2 in Lab Fly Lab 1: Sort flies and prepare assays	Canvas pdf
	May 26	Fly Lab 2: Ethanol Mobility Behavior Assay; alcohol dehydrogenase activity assays; Bradford assays	Canvas pdf

Wk 9	May 31	Fly Lab 3: Statistical analysis of data; determine substrate specificities for fly and yeast ADH; Examine lysozyme crystals 2	Canvas pdf Lab 18
	June 2	Bioinformatics 1	Lab 19 part A
Wk 10	June 7	Bioinformatics 2	Lab 19 pts B-D
	June 9	Exam 2 in Lab	

Academic Integrity

Academic dishonesty undermines the hard work of all students in the class who take responsibility for their learning. Academic dishonesty is incompatible with science and the search for truth. We do not tolerate it. Out of respect and appreciation for your own efforts, nor should you. We encourage you to talk with any of the BICD 100 teaching team if you learn of any incidents of academic dishonesty. Any student violating UCSD's Academic Dishonesty or Student Conduct policies will earn an 'F' in the course and will be reported to their college Dean for administrative processing. Committing acts that violate Student Conduct policies, resulting in course disruption, may be cause for suspension or dismissal from UCSD. Submitting online assignments for someone else will be treated as violations of Student Conduct Policies.

ACCESSIBILITY

<http://disabilities.ucsd.edu> | osd@ucsd.edu | 858-534-4382

Any student with a disability is welcome to contact me early in the quarter to work out accommodations to support their success in this course. Students requesting accommodations for this course due to a disability should work through the Office for Students with Disabilities (OSD). Instructors will receive Authorization for Accommodations Letters from the OSD online portal. Whenever possible, we will use universal designs that are inclusive. If you have feedback on how to make the class more accessible, please get in touch!

INCLUSION

It is our goal to create a learning environment that supports diversity of thought, perspective, experience, and identities. We encourage all of you to participate in discussion and contribute to the field from your perspective. If you have feedback on how to make the class more inclusive, please get in touch!

Office of Equity, Diversity, and Inclusion:

858.822.3542 | diversity@ucsd.edu | <https://diversity.ucsd.edu/>
<https://students.ucsd.edu/student-life/diversity/index.html>

<https://regents.universityofcalifornia.edu/governance/policies/4400.html>

DISCRIMINATION AND HARASSMENT

The University of California, in accordance with applicable federal and state laws and university policies, does not discriminate on the basis of race, color, national origin, religion, sex, gender, gender identity, gender expression, pregnancy (including pregnancy, childbirth, and medical conditions related to pregnancy or childbirth), physical or mental disability, medical condition, genetic information, ancestry, marital status, age, sexual orientation, citizenship, or service in the uniformed services (including membership, application for membership, performance of service, application for service, or obligation for service in the uniformed services). The university also prohibits harassment based on these protected categories, including sexual harassment, as well as sexual assault, domestic violence, dating violence, and stalking. The nondiscrimination policy covers admission, access, and treatment in university programs and activities.

If students have questions about student-related nondiscrimination policies or concerns about possible discrimination or harassment, they should contact the Office for the Prevention of Harassment & Discrimination (OPHD) at (858) 534-8298, <https://ophd.ucsd.edu/> , or <http://ophd.ucsd.edu/report-bias/index.html>

Campus policies provide for a prompt and effective response to student complaints. This response may include alternative resolution procedures or formal investigation. Students will be informed about complaint resolution options. A student who chooses not to report may still contact CARE at the Sexual Assault Resource Center for more information, emotional support, individual and group counseling, and/or assistance with obtaining a medical exam. For off-campus support services, a student may contact the Center for Community Solutions. Other confidential resources on campus include Counseling and Psychological Services, Office of the Ombuds, and Student Health Services.

CARE at the Sexual Assault Resource Center: 858.534.5793 | sarc@ucsd.edu | <https://care.ucsd.edu>

Counseling and Psychological Services (CAPS): 858.534.3755 | <https://caps.ucsd.edu>

Student Resources for Support and Learning

ACADEMIC SUPPORT

Geisel Library	Research tools and eReserves
Content Tutoring with the Teaching + Learning Commons	Drop-in and online tutoring through the Academic Achievement Hub

Supplemental Instruction with the Teaching + Learning Commons	Peer-assisted study sessions through the Academic Achievement Hub to improve success in historically challenging courses
Writing Hub Services in the Teaching + Learning Commons	Improve writing skills and connect with a peer writing mentor
Learning Strategies Tutoring	Address learning challenges with a metacognitive approach
OASIS	Intellectual and personal development support
Student Success Coaching Program	Peer mentor program that provides students with information, resources, and support in meeting their goals
Academic Integrity	Policy on Academic Integrity of Scholarship strategies to excel with integrity
Technical Support	Assistance with accounts, network, and technical is

STUDENT RESOURCES

Basic Needs	Provides access to food, housing, and financial resources
Counseling and Psychological Services (CAPS)	Provides services like confidential counseling and consultations for psychiatric services and mental health programming
Community Centers	As part of the Office of Equity, Diversity, and Inclusion the campus community centers provide programs and resources for students and contribute toward the evolution of a socially just campus
Counseling and Psychological Services	Individual, group, couples, and family psychotherapy services for registered undergraduate and graduate students

Office for Students with Disabilities	Documents students disabilities, provides accessibility resources, and reasonable accommodations
Triton Concern Line	Report students of concern at (858) 246-1111

SUBJECT TO CHANGE POLICY

The information contained in the course syllabus may be – under certain circumstances (e.g., to enhance student learning) – subject to change with reasonable advance notice, as deemed appropriate by the instructor.

TECHNICAL SUPPORT

For help with accounts, network, and technical issues: <https://acms.ucsd.edu/contact/index.html>

For help connecting to electronic library resources such as eReserves and e-journals:

<https://library.ucsd.edu/computing-and-technology/connect-from-off-campus/>