

BIBC 103: Biochemical Techniques – In-Person Laboratory Course

Fall Quarter, 2021

Instructor: Goran Bozinovic, Ph.D.

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Office Hours: by appointment during the lab

Lecture: Tue, Thu 11AM – 12:20 PM – SEQUO 147

Labs: CO1, CO2: Tue, Thu 1 - 4:50 PM, York 3306, 3406

Required Text: Biochemical Techniques Lab Manual (available from the Bookstore)

Lab Section	Instructional Assistant	Email
CO1	Yuhao Wan	yuwan@ucsd.edu
CO2	Armando Vazquez	arv012@ucsd.edu

Support Staff/Lab Safety Officer:

Joe Stagg (York Hall 3406)

Telephone: 534-2195; email: jstagg@ucsd.edu**Course Objectives:**

This in-person course will introduce various laboratory techniques used in biochemistry and molecular biology. These will include methods for purifying proteins, expressing recombinant proteins in bacterial cells, and analyzing biological molecules by electrophoresis, Western blotting, and enzyme activity assays. Laboratory work will consist of three multi-day projects, as well as some smaller, single-day experiments. The importance of good experimental design, including the use of appropriate controls, will be highlighted in all experiments. Also, as this is an introductory lab course. All lab work will emphasize the learning of basic lab skills (including dilutions, good pipetting technique, and basic statistical analysis) and good lab practices (such as good notebook keeping).

MANDATORY LAB SAFETY TRAINING PRIOR TO LAB PARTICIPATION – Enrolled and waitlisted students MUST successfully complete the Biology Lab Safety Training and Assessment before the first lab session: <https://biolabclass-safetyquiz.ucsd.edu/introduction>.

All students, enrolled or waitlisted, for the laboratory courses below are REQUIRED to demonstrate an understanding of general lab safety and UCSD Undergraduate Biology lab rules and policies. Completing the online Lab Safety Training and passing the Lab Safety Assessment fulfills this requirement. Enrolled students who miss the first lab meeting, or do not pass the Lab Safety Assessment, will have their lab space revoked. It is the student's responsibility to drop the course or risk receiving a "W" or non-passing grade in the course.

- The Lab Safety Training and Assessment are available at any time, but the assessment will apply to a specific quarter.
- The assessment must be completed and passed BEFORE the first lab meeting. Plan ahead!
- The self-study training and assessment should take approximately 1-hour to complete.
- The assessment portion is timed. Students will have a maximum of 30-minutes to complete the assessment.
- Students may take the assessment as many times as it takes to pass.
- Students will be certified once the assessment is passed. Certification information will be available to lab instructors for verification prior to the first class meeting.

Certification is valid for one quarter.

IN-PERSON ATTENDANCE:

Lecture: Classroom Etiquette:

Detailed information on being on campus and attending courses in person can be found at <https://returntolearn.ucsd.edu/return-to-campus/campus-plan/index.html>. In short,

- ALWAYS: cover your face with a mask Attend only lectures according to your schedule:
Mask Policy:
 - **Indoor: everyone must mask**
 - Regardless of vaccination status, all students, faculty and staff must wear a mask or face covering at all indoor locations at UC San Diego. Masks may be removed if you are alone in an enclosed office with a closed door; you may also eat or drink in this enclosed setting.
 - **Outdoor: masking highly encouraged**
 - All students, faculty and staff are encouraged, but not required, to wear masks outdoors while on campus. Attendees at outdoor campus events must wear a face mask if required by the event organizer.

Types of masks:

- The campus recommends the use of N-95 and KN-95 masks.
- A face covering/face mask DOES NOT include a scarf, ski mask, balaclava, bandana, gaiter, turtleneck, collar, plastic face shield or single layer of fabric.
- Indoor classrooms: everyone, both students and faculty, must wear masks.
 - * If a student otherwise shows up in your class without a mask, they will be reminded to wear a mask. If student refuses to wear a mask, they will be asked to leave.
- you are ill, DO NOT attend the lecture or the discussion section; notify your IA via email.

Other:

- Recordings of any kind in this class are not permitted to maintain a safe learning environment as we often discuss sensitive issues.
- When attending in person - please ask questions. However, make sure that your comments are directed to the class.
- Turn off your phones and refrain from talking to fellow students during the lecture
- Be considerate to others by not walking in/out of classroom for water/bathroom breaks while the class is in session.
- If you must leave early, please be seated in the aisle seat in the back near the exit

Lab Attendance: Enrolled and waitlisted students MUST attend the first lab session. Additional details: <http://biology.ucsd.edu/go/ug-labs>.

Masks: While in lab, students are required to either wear a disposable mask under a cloth mask (double mask) OR wear a KN95 mask.

ADD/DROP DEADLINES are different for lab courses than lecture courses. Students who drop a Biology lab class after the end of the second class meeting will be assigned a "W". Additional details: <http://biology.ucsd.edu/go/ug-labs>.

Note: If a student arrives at the first lab session having not passed the safety assessment, they may be allowed to complete the lab at the discretion of the instructor if the planned activities and environment do not pose any lab safety hazards. Students are not allowed into the lab for the second lab session unless they have successfully passed the safety assessment. Instructors need to enforce this policy *without exception*. Students have until the end of the second lab to drop a lab course. If not, they will be assigned a "W" for the course. Therefore, if a student arrives to the second lab session having not passed the online safety assessment, you can either have them complete the assessment prior to starting the lab or you should instruct them to drop the course that day.

<http://biology.ucsd.edu/education/undergrad/course/ug-labs.html>

Materials Required in lab everyday:

*) **Masks:** While in lab, students are required to either wear a disposable mask under a cloth mask (double mask) OR wear a KN95 mask.

- 1) Biochemical Techniques Lab Manual (available from the Bookstore)
- 2) Bound laboratory notebook with 100 numbered duplicate pages
- 3) Pen (Lab notes must be in ink)
- 4) Calculator
- 5) Safety glasses
- 6) Lab coat
- 7) Proper Attire (no open toed shoes)

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

Exams – 100. 120	220
Lab Report	120
Bioinformatics – Lab Manual Qs	10
Bioinformatics – PyMOL Protein Structure Project	20
Homework (2) – 20, 30	50
Lab Notebook Checks (2* at 5 pts. each)	10
Pre-Lab Pop Quizzes (3 at 5 pts. each)	15
Total	445

% Point Cutoffs for Grade Assignments: (cutoffs may be lowered at the instructor’s discretion)

>92	A	78-79	C+
90-91	A-	72-77	C
88-89	B+	70-71	C-
82-87	B	60-69	D
80-81	B-	<60	F

Assignments - Due Dates:

<u>HW 1</u>	Tue, Oct 12 (by midnight – via “Assignments” upload)
<u>HW 2</u>	Thu, Oct 28 (by midnight - via “Assignments” upload)
Bioinformatics	Tue, Nov 23 (by midnight - via “Assignments” upload)
<u>Lab Report</u> – MAPK:	Tue, Nov,30 (by midnight via email and TurnItIn - CANVAS)

EXAMS:

Midterm: Tuesday, Oct 26th, 11AM – 1 PM in Lab

Final: Thursday, Dec 2nd, 11AM – 2 PM in Lab

Course Web Site:

Many of the course materials are available only through the course website CANVAS (<https://canvas.ucsd.edu>). All students will need to access this site. Once you are enrolled in the class you will have access to the site using your ACS username and password. Be sure to check the course website frequently for announcements and updates on assignments. Items such as lab report guidelines and image files of gels and other data will be provided through the website. The lecture slides and course-content materials will be organized by week in “MODULES” folder; each IA will also have the Section Folder in CANVAS. Use the Discussion Board to ask questions on material from lecture or lab. The IAs will check the Discussion Board daily to answer questions, but students are encouraged to answer questions also. This is a handy resource for last minute questions that come up during late night studying for an exam.

Lab Manual and Quizzes: It is important to carefully read the pertinent sections of the lab manual when planning out experiments and preparing for quizzes. The experiments will “proceed” more efficiently, and you will learn more if you have read through the procedure and understand why and what you are doing. To emphasize the importance of reading the lab manual before virtual labs, there will be four scheduled quizzes at the beginning of lab.

Turning in Lab Reports:

We will be using the “Turnitin” *via* CANVAS for lab reports. Lab reports must be submitted before midnight of the due date. Lab reports not submitted via CANVAS by the end of the day will be considered one-day late. Ten points will be deducted for each working day that the lab reports are late (hard copy and Turnitin.com). Students agree that by taking this course all required papers will be subject to review for textual similarity by Turnitin for the detection of plagiarism. All submitted papers will be included as source documents in the Turnitin.com 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.com site.

*Detailed lab report guidelines will be posted on CANVAS two weeks after the course starts.

Lecture Exams: There will be TWO lecture exams this quarter: midterm (week 5) and final (week 10). To minimize the time constraint, you will be allowed 2 hrs for the midterm and 3 hrs for the final exam. Each exam is “closed-book” in-person, administered on the scheduled date in the lab.

Taking the Exam:

These exams will be held in person and will be closed-book. The midterms will contain material for that section of the course up to the lecture preceding the exam. The final exam will be cumulative, covering the whole class but focused on the material since the second midterm. Exam scores will be available after grading is complete, and you will be able to pick up your graded exams in your discussion section. Questions concerning exams will be addressed during office hours. We will check photo ID at each exam, so please bring a photo ID. Students who do NOT have photo ID will not be permitted to take the exam.

If you miss an exam, you will be required to provide documentation of an unavoidable emergency (serious illness, etc.), preferably in advance. Please note that as of this writing (9/20/2021), UCSD’s policy is that “Vaccinated students who have been exposed [to COVID-19] are allowed to attend class and move about campus masked”, which includes attending in-person exams. This does not include people who have COVID symptoms or a positive test result. You can find an up-to-date policy and more details here:

<https://returntolearn.ucsd.edu/return-to-campus/exposure-contact-tracing/index.html> If you are concerned that you would endanger others by attending an in-person exam, please email me as soon as possible to discuss your situation (gbozinovic@ucsd.edu). If you have extraordinary circumstances that make it impossible for you to take an exam in person, please email me as soon as possible. Otherwise, you will receive a 0 on a missed exam.

- To minimize the effect of a time constraint, you will have 2 hrs to complete each exam.
- Once you submit an exam, you will not be able to drop the score or negotiate a reduction of its impact on your grade for any reason (e.g., you decide afterwards you weren’t well enough).
- Requests to reconsider any grading must be submitted via email along with your exam to the IA who graded the question within TWO weeks after graded exam are made available.

Extraordinary Circumstances:

- If you have an illness, injury, or personal crisis that you believe will prevent you from performing adequately on an exam, contact the instructor about this problem before the exam to discuss your options. Your excuse MUST include official documentation (doctor's note).

- If you cannot do this and miss an exam for one of these reasons, you must contact the instructor within 24 hours of the exam to discuss your options. Once you have submitted an exam, you will not be able to drop the score or negotiate a reduction in its impact on your grade for any reason (e.g., you decide afterwards you weren't well enough).

If a section quiz is missed due to a similar sort of problem, contact your IA no later than 24 hours after the missed quiz. The decision for re-taking the quiz will be at your IA's discretion but will adhere to the same policies stated above (see extraordinary circumstances).

Note: depending on the conditions of the pandemic, one or all exams may need to be switched to an alternate format such as additional online quizzes or online exams. If I need to make this change, I will announce it during the quarter.

Make-up Exams:

Please note that it is extremely burdensome for the instructor and IAs to prepare make-up exams. Missing a scheduled exam will only be excused for medical reasons if documentation is provided. At the instructor's discretion, a missed exam that is excused will either be dropped from the student's point total for the class or made up by an oral exam scheduled within one week of the original exam.

Academic Integrity

Cheating will not be tolerated. The administrative policy on Academic Dishonesty outlined by UCSD will be followed. Students caught cheating during an exam or quiz will be given a "zero" for that assignment. A report will also be filed with the Academic Integrity Coordinator. Cheating includes (but is not limited to) plagiarism and making use of forbidden materials during the test. Tampering with graded exams will result in a failing grade for that exam.

During laboratory sessions, student cooperation and collaboration is highly encouraged. This includes discussion of experimental data with fellow students during lab hours. After the laboratory session is over, however, you are required to work on your own. ***Each student must submit an independently written and independently thought-out data analysis for each lab report / homework assignment.***

It is NOT acceptable to use any old lab reports to assist you in any way. If you happen to be in possession of old copies of lab reports for this class, it is best that you do not even look at them, since they could unintentionally influence the way that you write your own report. If we discover that you have used an old lab report in any way, you will automatically receive a "zero" for that lab report, and you might be reported to the Academic Integrity Coordinator.

While your lab reports will be returned to you, you are NOT permitted to share them with anyone for any reason. If we find that you have shared your lab report with anyone, you will be reported to the Academic Integrity Coordinator, even if you have already completed the class. You are required to read, understand, and sign the "BIBC103 Integrity Policy" which governs the way the academic work in this class is completed.

SEE THE LAB SCHEDULE ON THE NEXT PAGE

Lab Schedule

	<u>Dates</u>	<u>Experiment/Activity</u>	<u>Lab Manual Chapter</u>
Wk 0	Sep. 23	Enrollment and safety orientation	
Wk 1	Sep. 28	Introduction to equipment, pipetting and dilution skills	Lab 1
	Sep. 30	Introduction to SDS-PAGE	Lab 2
Wk 2	Oct. 5	LDH 1: Initial purification of LDH from crude homogenate: centrifugation, ammonium sulfate precipitations	Lab 3
	Oct. 7	LDH 2: Affinity chromatography	Lab 4
Wk 3	Oct. 12	LDH 3: Size exclusion chromatography Homework 1 Due	Lab 5
	Oct. 14	LDH 4: Activity assays; Bradford protein assays	Lab 6
Wk 4	Oct. 19	LDH 5: SDS-PAGE of LDH purification fractions	Lab 7
	Oct. 21	Sea urchin fertilization, prepare cell lysates	Lab 9A
Wk 5	Oct. 26	Midterm Exam in Lab	
	Oct. 28	MAPK Western blot—SDS PAGE and electroblotting Homework 2 Due	Lab 10
Wk 6	Nov. 2	MAPK Western blot—Immunodetection	Lab 11
	Nov. 4	ELISA for phospholipase C activity	Lab 12
Wk 7	Nov. 9	Bioinformatics 1: Investigation of an unknown melanoma gene	Lab 19 part A
	Nov. 11	Veterans Day Holiday, no lab	--
Wk 8	Nov. 16	Bioinformatics 2: Modeling protein structures	Lab 19 parts B – D
	Nov. 18	FP 3: Fluorescent proteins (FP): Make competent cells and transform with plasmid	Lab 15
Wk 9	Nov. 23	FP 4: Purification and analysis of fluorescent proteins Bioinformatics Answers Due	Lab 16
	Nov. 25	Thanksgiving Holiday, no lab	--
Wk 10	Nov. 30,	FP 5: SDS-PAGE of fluorescent proteins MAPK Lab report Due (by midnight, file upload via CANVAS)	Lab 17
	Dec. 2	Final Exam in Lab: Optional: Resume / Cover letter Extra Credit Due (by midnight as the file upload via CANVAS)	--