

Welcome to BIMM 101 – Recombinant DNA Techniques Lab!

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Course	Information	1

Instructor	Dr. Lisa McDonnell, <u>Imcdonnell@ucsd.edu</u> <u>https://biology.ucsd.edu/research/faculty/Imcdonnell.html</u> I will only send communication via my UCSD email address or Canvas. I do my best to reply within 24 hours Mon-Fri.	
Course Description	In BIMM101 we aim to function as an inclusive learning community to develop an understanding of how to conduct experiments in a molecular biology setting. We will spend most of our time using CRISPR editing to address research questions, engage in experimental design, and critical analysis of data, literature, and our own writing.	
Credits	4 credits. Class + lab + course work will take approximately 40 hours per week in the summer (see below). Lab courses are intense! Use time wisely – block off time to prep for each lab, and do wrap-up work after each lab. If lab activities end early, I recommend using the remaining lab time to start preparing/get ahead.	
Class, office hour, and lab times		
Materials	 Lab Manual – this is provided to all students during week 1. You do not need to buy one from the bookstore. Lab Notebook – we will assign you a Google Doc to use (if you prefer a paper book, please talk to your instructor). Tablet or laptop to use in lab if you have one. We use the computer in every lab to enter notes in our digital lab notebooks. If you do not have a laptop, that's OK! We have loaner laptops for use during lab. 	



	 PPE: Knee-length laboratory coat (available at bookstore) and UV-blocking safety glasses or goggles (available at bookstore) *highly recommend glasses instead of goggles for comfort* All labs require proper lab attire in addition to PPE: long pants or skirts and closed-toe/heel shoes are required in lab. Fine-tipped sharpie pen (dark color) for labelling tubes in the lab Please see general lab policies here: https://biology.ucsd.edu/education/undergrad/covid-19.html#Biology-Lab-Policies-and-Fees
Instructional Assistants (IAs)	Ayuna Jombik, <u>ajombik@ucsd.edu</u> Xena Singapan, <u>asingapa@ucsd.edu</u> Josef Urrete, <u>jurrete@ucsd.edu</u> Celeste Yang, <u>yuy030@ucsd.edu</u>

BROAD LEARNING GOALS

- Design experiments to address specific research questions, including choosing appropriate controls and explaining the purpose of controls.
- Apply knowledge of molecular biology concepts and lab techniques to plan experiments, explain and troubleshoot results (troubleshoot refers to hypothesizing reasons for unexpected results, and proposing reasonable follow-up work to explore hypotheses).
- Conduct experiments using various recombinant DNA/molecular biology techniques.
- Draw conclusions based on evidence and reasoning.
- Perform basic lab math skills, statistical analysis, and graphing.
- Use basic bioinformatics databases and applications.
- Find, read, and evaluate primary literature.
- Critically evaluate scientific writing (your own, and that of peers).
- Connect small experimental steps to larger experimental goals.
- Keep an organized and detailed lab notebook that is helpful for tracking progress, detailing results, and troubleshooting.
- Be reflective about progress in the course: monitor if you are achieving the experimental goals, and any personal learning goals that you set for yourself.

Lab and class-specific objectives will be provided in each class.

Teaching Philosophy

My philosophy is rooted in research on how people learn. This course is designed to encourage discussion, problem solving, collaboration, frequent feedback, and the development of self-regulated learning and metacognitive skills (planning, frequent practice, reflection on performance). I strive to create an environment for everyone to learn together. My goal is to promote critical thinking such that you can apply your knowledge outside of class and can share it with others. Interaction and communication are very important and helpful when learning! I encourage you to take advantage of all the course components, and engage with me, the IAs, and one another!



Course Format

Course schedule (also please check Canvas on a regular basis)

This is a hybrid course, consisting of video lectures, in-person office hours an in-person labs. Lectures will review the work we are doing in the lab as well as relevant concepts related to molecular biology and the experimental procedures. For this reason, it is highly recommended that you view the lectures prior to lab and are prepared for lab by having read the relevant lab manual sections. Previous students that complete the classes class and do the pre-class work were more likely to complete labs on time and develop greater mastery of the material.

This course is designed to be an environment for everyone to learn. Active participation by asking and answering questions and participating in discussions (e.g., during office hours, and lab), is encouraged. Being able to communicate understanding *and* confusion is critical to success in any discipline! To encourage collaboration, grades are not assigned on a curve. We will focus on developing an understanding of fundamental concepts as they apply to different examples. Therefore, tests and assignments are *not* memorization-based. Instead, they will include questions that are based on solving problems in new contexts, analyzing and interpreting data to draw conclusions, constructing and critiquing claims. Quizzes are open-note/book.

Laboratory Attendance

Attendance in laboratory is required. Attending the first lab is required to maintain your seat in the course. Additional policies are available online

(https://biology.ucsd.edu/education/undergrad/course/ug-labs/index.html)

We do not want you to attend if you are ill, and understand that unexpected emergencies happen, <u>Only</u> <u>the instructor can approve an absence</u>. Please get in touch with your <u>instructor</u> as soon as possible if you are unable to attend lab because of illness or an emergency (at that time the instructor will determine documentation is required). In excused cases, please see below. An <u>unapproved</u> absence will result in a 2% drop in course grade, and two unapproved absences will result in a failing course grade.

Make-up for missed in-person labs because of an excused absence:

Please note that a make-up as a result of absence is not meant to be a punishment - we are making sure that everyone has the same amount of engagement and learning in the course, even if they can't make it into the lab itself for the hands-on activities. Just complete the following steps:

- 1. Let Dr. McDonnell and your IA know that you can't come to campus today and why.
- 2. Get in touch with your group mates to get any information you missed that you will need to complete your lab notebook entry. The easiest way to do this is to create a zoom with your group, during the actual lab session if you are able. We have computers available, and we usually spend the first and last portion of class discussing the pre-lab or interpreting results.
- 3. Make sure your regular notebook entry for the lab is complete by the due date (extensions may be granted by the instructor depending on the circumstance).
- Add a section to your lab notebook entry for that day, called 'Attendance Make-up.' In this section, you should include the following. Make sure this is complete before the start of the next lab.
 - a. In ~200 words (about 6-7 sentences), explain what we did in lab today and why we did it, as if you were explaining it to a friend or relative who didn't study biology (avoid



scientific jargon and make it accessible). *This is not a repeat of the goals and purpose we typically ask for!*

b. Find one scientific journal article (hint: use google scholar) that relates to what we did in lab today, or uses the technique we used in lab, and write a brief paragraph about it, again as if you were explaining it to a friend or relative who didn't study biology. Include the full article citation. Choose one figure from the paper and put it in your entry. Be prepared to have a 5 minute conversation with me the next time you come to lab about what the paper was about and what can be claimed based on the results in the figure.

Your entire attendance make-up section should not take up more than a page.

Weekly Workflow ~40 hours per week:

I am not emphasizing the time to scare people away from the course, but to be transparent about what is involved in being successful in a lab course. Lab courses involve a lot of work, often much more than lecture courses. Please schedule your time carefully.

 Pre-class/lab preparation ~2-3 hours per lab-day (watching lectures + pre-lab questions/prep) Check the course schedule and weekly modules on Canvas. Watch the video lectures. Read the relevant background and protocols in the lab manual and consult the Lab Tasks posted on Canvas. Complete the before lab work (What is Happening Today Assignments on GradeScope). Take notes in your lab notebook about what you will be doing that day, as well as any questions you have.

2. Attend office hours ~1 hour per lab-day

Although attendance is optional, it is highly recommend you attend to ensure you have a chance to ask any questions you have about the lab/course.

3. Lab ~ 16 hours per week (4 x 3-hour 50 minute sessions scheduled).

During lab you will follow the necessary protocols (Lab Manual) as outlined in the Lab Tasks, take notes that are needed in your lab notebook, and ideally complete your lab notebook entry during lab time. The goal is to finish your lab notebook entry during lab time. You can also use lab time to ask questions and get feedback on your work! Use the time in lab effectively – this will help you to stay on top of work and reduce outside of lab work.

4. Weekly Recap Practice Questions ~ 1 hour per week

Most weeks I will post some recap questions about the material covered that same week. These are optional for practice. To review your thinking and answers please discuss with me or your IA in lab or office hours!

5. Additional study/work time – variable (e.g., ~1-2 hours per lab-day)

After lab you may need to spend some time summarizing what you learned, or finishing your lab notebook entry if you didn't complete it during lab.

This lab class is based on application of knowledge and problem solving. If you are stuck on something please seek help immediately!

Overall Course Expectations



What you can do to support your success in the course:	What I will do to support your success in the course:
Read the syllabus and stay current with course information	Be prepared and bring my enthusiasm for teaching to each session
Keep up with class material, practice questions, homework	Respond to emails within one working day*, answer questions during office hours and provide timely feedback on assignments / submissions.
Contribute to the learning environment with <u>fairness, cooperation, and professionalism</u>	Establish a learning environment with fairness, cooperation and professionalism, and will take action if these principles are violated.
Treat your classmates, instructional assistants and myself <u>honestly and ethically</u>	Treat you honestly and ethically, and will address any concerns you might have
Commit to excel with integrity ¹ . Have the courage to act in ways that are honest, fair, responsible, respectful & trustworthy.	Uphold integrity standards and create an atmosphere that fosters active learning, creativity, critical thinking, and honest collaboration.
Manage your time, so you can stay on track with the course and complete tasks on time	Only assign work that is vital to the course, and will work to meet the standard credit hour allotment for the course.
Communicate with me if you determine that a deadline cannot be met due to extenuating circumstances	Consider requests for adjustments and will make reasonable exceptions available to all students when approved

 Please read UC San Diego's <u>Policy on Integrity of Scholarship</u> and take the <u>integrity pledge</u>!
 I am happy to answer questions that are not already addressed in class, on Canvas, or in the syllabus. Please check these resources first.



Assignments and Grading

Bolding indicates flexibility to accommodate for illness/emergencies (elaborated in section below) Please consult course schedule for due dates.

Assignment	Points	Explanation
Syllabus Quiz	1	Review of the syllabus and course components is an important step in understanding the course organization.
Molecular Biology Review	3	This is a set of questions meant to review some pre-requisite genetics and molecular biology concepts, as well as some questions on experimental design and drawing conclusions. This assignment will be scored 1.5 points for on-time completion, and 1.5 points for correctness. Instructions to submit the assignment will be posted on Canvas. No late submissions accepted for this assignment.
Before-lab Questions	9	Before almost every lab you will be asked to answer a few questions about what is happening in lab the day (purpose, what you expect, protocols, things you are unsure about). The purpose of this is to encourage being prepared for lab, and flag anything you are feeling confused about. Please see course schedule/Canvas for due dates. Some questions will be scored for completion, some for correctness. Each student will have at least two entries scored per week (random which ones are scored, so please complete all). The lowest score is dropped.
Lab Notebook Entries	30	For almost every lab you will be taking notes in your Lab Notebook (assigned Google Doc) Taking notes is helpful for pre-lab preparation, and making sense of the results we get. I encourage you to try and complete these DURING LAB TIME. Entries will be checked on a regular basis. The first will be for feedback only. An additional eight will be scored. The lowest score will be dropped. The remaining scores will be averaged, and the average used to determine the points out of 30 (e.g., if your average is 85%, you will receive 22.95 points). You are welcome and encouraged to ask for feedback about your work during lab time or office hours!
Quizzes #1-3	25	Quizzes #1-3 are during lab time (see schedule) and will largely be about your understanding of the experiments, experimental design, the protocols we use, troubleshooting results, and making sense of results to draw conclusions. All quizzes are open notes (lab manual, lab notebook, lecture slides, etc you can use a computer to <u>access</u> your notes but you may not type on your computer/device during a quiz unless you are using a calculator). If you miss a quiz because of illness or emergency, you can re-do the quiz during the final lab day. You can also re-do any/all quizzes on the final lab day to improve any quiz score (highest is counted). The final quiz scores will be weighted as follows: highest 12/25, mid 8/25, lowest 5/25.
CRISPR Write- Up	27	The goal of the write-up is to make sense of our data as they relate to our research questions. This will involve identifying relevant prior literature, how our study fills existing gaps in the literature, summarizing our methods, presenting the results, and constructing scientific arguments to

		explain the results. Arguments consist of claims, evidence to support, and providing reasoning in the form of a biological/molecular/experimental explanation or hypotheses, relating to other literature, and critiquing the limits of our claims and data. A draft will be submitted for peer-review, and then a final version. Guidelines and rubrics will be provided on Canvas. This portion of the course grade is intended to motivate students to consider the impact of their actions on their own learning and the learning of others in the course. Unprofessional interactions consume
Professionalism	1	time yet have no meaningful benefits to you, your fellow students, and/or the teaching team. Analogously in the workplace, being unprofessional to your colleagues or supervisors will only discount you. When you are discounted, you will not be invited for new opportunities that you may or may not be aware of. Professionalism can be demonstrated through being prepared, individually demonstrating meaningful participation in the course (especially during lab time), maturity and respectful behavior towards others. Please see below in the syllabus for more details on professional conduct.
*Flex points	4	Because different people may excel in different aspects, quizzes will be worth 29% or the CRISPR write-up worth 31%, depending on what benefits each individual student, bringing the total to 100.
Total	100	
Bonus opportunity	1	(e.g., surveys – will be posted on Canvas)

Grading Scale

The following grading scheme will be used. The course is **not** graded on a curve (i.e., 20% of students getting A, 20% B, 20% C, and such). Thus, the ability to do well in this course is not dependent on others doing poorly.

90-100 A	A- 90-93; A 94-97; A+ 98-100
80-89 B	B- 80-82; B 83-86; B+ 87-89
70-79 C	C- 70-72; C 73-76; C+ 77-79
60-69 D	D- 60-62; D 63-66; D+ 67-69
59 or lower, F	

DO NOT USE THE "TOTAL POINTS" IN CANVAS GRADES TO DETERMINE YOUR GRADE. The total column does not account for flexible weighting as outlined above thus it is not an accurate reflection of your grade. Occasionally I will post updates - and you can always estimate your grade using the weighting scheme described above and information below.



Professionalism

Example interactions with meaningful benefits:

- Arriving on-time to lab sessions and being prepared to work in lab
- Actively participating in lab sessions, which includes being prepared to engage in discussions and ask questions.
- Developing deeper insight into course material, concepts, biology, and/or society in general
- Working collaboratively to improve in skill building and future opportunities
- Contributing to an inclusive learning environment
- Learning conceptually and meaningfully why full credit was not awarded for an assignment
- Clarifying course material that facilitates deeper learning
- Clarifying course material that facilitates deeper learning
- Reporting errors or problems in class, on assignments, or for other course material

Example interactions that have no meaningful benefits and thus should be avoided:

- Not showing up or being late to lab session
- Contributing inequitably to teamwork
- Harassing and/or bullying the instructional team or other students, either in person or online
- Asking questions when the information is already available or will eventually be known (this does not include asking clarifying questions about content/concepts)
- Ignoring the directions or requests from the instructional team

Summary of accommodations for illness and emergencies

Review the descriptions of the course work above and how flexible policies are built in to almost every part of the course to accommodate for illness and emergencies resulting in a missed assignment or test. Because there is built-in flexibility (e.g., drop lowest scores, miss up to two pre-lab assignments, quiz redos) there are no make-ups for missed assignments and anything with built-in flexibility may not be submitted late. If you are unable to submit something on time because of illness or emergency, you are still encouraged to do the work and ask for feedback.

If a serious illness or emergency interferes with the CRISPR write-up, please discuss with your instructor (documentation may be requested).

What if I am feeling sick/have an emergency on a quiz day?

Do not attend if you are ill. You can do the quiz once you are back *for* feedback, and then do the quiz redo (last lab) for points.

What if I miss a quiz and the quiz re-do day because of illness or an emergency?

In the case of a missed quiz <u>and</u> a missed final lab day (quiz re-do day), you will be asked to provide documentation to both me and the Dean of Academic Affairs and/or Student Affairs of your college. Upon receipt of documentation, it will be determined if you can receive a grade of "Incomplete" ("I"). Students with an incomplete will have the opportunity to take a quiz re-do at a later date – set by the instructor. You must have a passing grade in the course to be eligible for an Incomplete (in addition to the approved reason and documentation noted above). You must have taken at two of three in-lab quizzes in order to be eligible for an "Incomplete" (in addition to documentation).



Academic integrity

https://students.ucsd.edu/academics/academic-integrity/index.html

Integrity of scholarship is essential for an academic community. The University expects that both students and faculty will honor this principle and in so doing protect the validity of University intellectual work. For students, this means that all academic work will be done by the individual(s) to whom it is assigned, without unauthorized aid of any kind. In this course, we need to establish a set of shared values. Following are values* adopted from the <u>International Center for Academic Integrity</u>, which serve as the foundation for academic integrity.

	As students we will	As the teaching team we will
Honesty	 Honestly demonstrate your knowledge and abilities according to expectations listed in the syllabus or in relation to specific assignments and exams Communicate openly without using deception, including citing appropriate sources 	 Give you honest feedback on your demonstration of knowledge and abilities on assignments and exams Communicate openly and honestly about the expectations and standards of the course through the syllabus and in relation to assignments and exams
Responsibility	 Complete assignments on time and in full preparation for class Show up to class on time and be mentally and physically present Participate fully and contribute to team learning and activities 	 Give you timely feedback on your assignments and exams Show up to class on time and be mentally and physically present Create relevant assessments and class activities
Respect	 Speak openly with one another while respecting diverse viewpoints and perspectives Provide sufficient space for others to voice their ideas 	 Respect your perspectives even while we challenge you to think more deeply and critically Help facilitate respectful exchange of ideas
Fairness	 Contribute fully and equally to collaborative work, so that we are not freeloading off of others on our teams Not seek unfair advantage over fellow students in the course 	 Create fair assignments and exams and grade them in a fair and timely manner Treat all students and collaborative teams equally
Trustworthiness	 Not engage in personal affairs while on class time Be open and transparent about what we are doing in class Not distribute course materials to others in an unauthorized fashion 	 Be available to all students when we say we will be Follow through on our promises Not modify the expectations or standards without communicating with everyone in the course
Courage	 Say or do something when we see actions that undermine any of the above values Accept the consequences of upholding and protecting the above values 	 Say or do something when we see actions that undermine any of the above values Accept the consequences of upholding and protecting the above values

* This class statement of values is adapted with permission from Tricia Bertram Gallant Ph.D.



All course materials are the property of the instructor, the course, and the University of California, San Diego and **may not** be posted online, submitted to private or public repositories, or distributed to unauthorized people outside of the course.

Any work associated with the course is expected to be done by you, the enrolled student, and you alone. Discussing overall concepts is a great way to help in learning, but it is not permitted to discuss question answers or share answers.

I take academic integrity very seriously. Any suspected instances of a breach of academic integrity will be reported to the Academic Integrity Office for review and possibly given a score of 0.

Using AI

Using AI (e.g., chatGPT or similar) can be a very helpful tool for learning! You can ask it questions to help clarify your understanding, or check some calculations you have planned, or get a review of some background information. However, be critical of the responses because, although powerful, it can still provide incorrect responses or ideas that are not evidence-based. With any assignment or writing, it is fine to use such a tool for clarification, or to help brainstorm, but the expectation is that any final work submitted is not AI-generated. Your submitted work must come from your thinking, your understanding, your way of communicating ideas. If you are unsure, please ask! **If** you use AI to help with any part of your writing (background literature, understanding a concept or process, making sense of some information) you are asked to cite the tool as a resource and indicate specifically how you used it.

Regrades

If a grading error has been made, you should submit a re-grade request via GradeScope (or on paper). Students who submit items for re-grading understand that **the instructor may re-grade the entire test/homework and the score may go up** *or* **down**. Regrade requests may not be processed until the end of the quarter, and at that time there will be no regrades for a student with an A or A+.

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 | <u>diversity@ucsd.edu</u> | <u>https://diversity.ucsd.edu/</u> <u>https://students.ucsd.edu/student-life/diversity/index.html</u> https://regents.universityofcalifornia.edu/governance/policies/4400.html



Resources for Support and Learning

Learning and Academic Support		
Ask a Librarian: Library Support Chat or make an appointment with a librarian to focus on your research needs	Writing Hub Services in the Teaching + Learning Commons One-on-one online writing tutoring and workshops	
Course Reserves, Connecting from Off-Campus	on key writing topics	
and Research Support	Supplemental Instruction	
Find supplemental course materials	Peer-assisted study sessions through the Academic Achievement Hub to improve success in historically	
First Gen Student Success Coaching Program Peer mentor program that provides students	challenging courses	
with information, resources, and support in meeting their goals	Tutoring – Content Drop-in and online tutoring through the Academic Achievement Hub	
Office of Academic Support &		
Instructional Services (OASIS)	Tutoring – Learning Strategies	
Intellectual and personal development support	Address learning challenges with a metacognitive approach	
Support for Well-being and Inclusion		
Basic Needs at UCSD	Community and Resource Centers	
Any student who has difficulty accessing	Office of Equity, Diversity, and Inclusion	
sufficient food to eat every day, or who lacks a	As part of the <u>Office of Equity, Diversity, and</u>	
safe and stable place to live is encouraged to	<u>Inclusion</u> the campus community centers provide	
contact: foodpantry@.ucsd.edu	programs and resources for students and	
<u>basicneeds@ucsd.edu</u> (858) 246-2632	contribute toward the evolution of a socially just campus	
Counseling and Psychological Services Confidential counseling and consultations for	(858).8223542 <u>diversity@ucsd.edu</u>	
psychiatric service and mental health	Get Involved	
programming	Student organizations, clubs, service opportunities,	
	and many other ways to connect with others on	
Triton Concern Line	campus	
Report students of concern: (858) 246-1111	,	
	Undocumented Student Services	
Office for Students with Disabilities (OSD)	Programs and services are designed to help	
Supports students with disabilities and	students overcome obstacles that arise from their	
accessibility across campus	immigration status and support them through personal and academic excellence	



Health and Well-Being Statement

Students may experience stressors that impact academics and personal well-being. These can include academic stress and pressure, relationship challenges, mental health, drugs and alcohol, identities, finances, and other factors. If you are experiencing stress and concerns it is courageous to seek help! If your stressors are academic, please contact me and I am happy to discuss solutions. I would also encourage you to reach out to the Dean of Academic Affairs for your college. For additional stressors UCSD offers a variety of resources, some of which you can find here: https://vcsa.ucsd.edu/student-success/student-well-being.html

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. Any changes are announced on Canvas (please be sure to have your notifications settings on to receive updates/emails/announcements).

Letter of Recommendation Policy

If you think you may want me to write you a letter of recommendation (or any other instructor), please consider what a good letter would contain and how your actions in the course demonstrate the qualities you will want highlighted in a letter. When students ask me for a letter of recommendation, I ask them to write to me about how they demonstrated critical thinking, leadership, collaboration, and professionalism. I will be specifically looking for examples of these qualities *that I would have observed* during class, lab, and office hours. Be sure to actively participate in the discussions, talk to me during class and office hours, ask questions, offer your own ideas and interpretations of what we are covering, bring interesting facts/papers that are connected to the material we are studying. If you don't actively show the qualities that are needed to write a good letter, it will be hard for me to write a letter that is meaningful and useful.

Technical Support

For help with accounts, network, and technical issues: <u>https://acms.ucsd.edu/contact/index.html</u> For help connecting to electronic library resources such as eReserves and e-journals: <u>https://library.ucsd.edu/computing-and-technology/connect-from-off-campus/</u>

Campus Policies

- UC San Diego Principles of Community
- <u>UC San Diego Policy on Integrity of Scholarship</u>
- <u>Religious Accommodation</u>
- Nondiscrimination and Harassment
- UC San Diego Student Conduct Code