Course Syllabus

Welcome to BIMM 101: Recombinant DNA Laboratory! In BIMM101 we aim to function as an inclusive learning community to develop an understanding of experimental design, common molecular biology lab techniques, critical analysis of data and literature, and experimentation. We will do most of our exploration by working through a CRISPR editing experiment.

Teaching Team:

Instructor:	Dr. Jessica Rusert	jrusert@ucsd.ed (mailto:jrusert@ucsd.edu)		
IA for D01	Shitian (Steven) Li	shl439@ucsd.edu (mailto:shl439@ucsd.edu)	York 2310	TuTh: 11:00a-2:50p
IA for D02	Charles Rezanka	crezanka@ucsd.edu (mailto:crezanka@ucsd.edu)	York 2332	TuTh: 11:00a-2:50p
IA for D03	Alexandria Xena Singapan	asingapa@ucsd.edu (mailto:asingapa@ucsd.edu)	York 2310	WF: 9:30a-1:20p
IA for D04	Sejal Patel	supatel@ucsd.edu (mailto:supatel@ucsd.edu)	York 2332	WF: 9:30a-1:20p

Learning goals:

- Apply knowledge of the theory behind molecular techniques, and the applications of the methodologies in biological research, to explain experimental steps and troubleshoot results
- · Apply knowledge of molecular biology concepts relevant to our work to explain and troubleshoot results
- Demonstrate proficiency at basic molecular biology techniques
- · Explain the importance of proper controls in designing experiments and interpreting results
- · Perform basic lab math skills, statistical analysis, and graphing
- · Draw logical conclusions from experimental data and justify conclusions
- Use basic bioinformatics databases and applications
- Learn to find, read, and evaluate primary literature

Learning in this course

This course is designed to be a collaborative environment for everyone to learn together and construct a shared understanding of the material. Active participation both in class and lab is expected. Being able to communicate understanding, and confusion, is critical to success in any discipline, and is very useful for learning that the communicate understanding is critical to success in any discipline, and is very useful for learning that the confusion is critical to success in any discipline, and is very useful for learning that the confusion is critical to success in any discipline, and is very useful for learning that the confusion is critical to success in any discipline, and is very useful for learning that the confusion is critical to success in any discipline, and is very useful for learning that the confusion is critical to success in any discipline, and is very useful for learning that the confusion is critical to success in any discipline, and is very useful for learning that the confusion is critical to success in any discipline, and is very useful for learning that the confusion is critical to success in any discipline, and is very useful for learning that the confusion is critical to success in any discipline in the confusion is critical to success in any discipline in the confusion is critical to success in any discipline in the confusion is critical to success in any discipline in the confusion is critical to success in any discipline in the confusion is critical to success in any discipline in the confusion is critical to success in any discipline in the confusion is critical to success in any discipline in the confusion is critical to success in any discipline in the confusion is critical to success in any discipline in the confusion is critical to success in any discipline in the confusion is critical to success in any discipline in the confusion is critical to success in any discipline in the confusion is critical to success in any discipline in the confusion in the confusion is critical to s

Lecture and lab time will be used to teach the concepts behind the lab work, work on applying knowledge, and troubleshooting your data. Hence, it is expected that you will prepare before coming to class/lab, reviewing basic background information about the lab and/or relevant content.

Instead of memorization, we will focus on developing an understanding of fundamental concepts and as they apply to the experiments. Therefore, tests will include questions that are based on solving problems in new contexts or data interpretation and not necessarily on memorizing facts.

Smith et al., 2009. http://www.sciencemag.org/content/323/5910/122.short 🖶 (http://www.sciencemag.org/content/323/5910/122.short)

Lecture: D00 T/Th 9:30-10:50 - PODEMOS 1A20 (see map (https://canvas.ucsd.edu/courses/48776/pages/map-of-lecture-and-lab-buildings).)

All lectures will be in person. iClickers will be used to help you engage in the material. Participation (not correctness) in iClicker questions will be worth 5% of your grade (see below).

Lectures will be recorded with audio only while viewing the slides I'm discussing. These will be posted in the Media Gallery automatically. If board work is done this will not show up in the podcast. Plan to get notes from your lab partner if you cannot attend. I will embed these into the weekly course pages as time permits. **NOTE:** If there is a tech error in a podcast, such as audio that goes out during a lecture, I will not re-record the material.

Labs: Please see this schedule (https://docs.google.com/spreadsheets/d/146oMDPj_SxQgWtPf1RuRVPIN34scaSufDLKiACDy0Z8/edit?usp=sharing) for our weekly lab activities, lectures, exams, and what will be due each week.

Laboratory Attendance

Attendance in the laboratory is required. Attending the first lab is required to maintain your seat in the course. For anyone not present who is enrolled, your spot will be given to a waitlisted student who is present in the order they are listed for the class. Additional policies are available online (https://biology.ucsd.edu/education/undergrad/course/ug-labs/index.html (<a href="https:

We do not want you to attend if you are ill, and understand that unexpected emergencies happen, <u>Only the instructor can approve an absence</u>. Please get in touch with Dr. Rusert as soon as possible, cc'ing your IA, if you are unable to attend lab because of illness or an emergency (at that time the instructor will determine if 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.

Complete the following steps:

- 1. Let Dr. Rusert 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 in the lab, 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 Dr. Rusert depending on the circumstance).
- 4. 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.
 - 1. 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!*
 - 2. 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.

Asking Questions and Getting Help

Dr. Rusert's Office Hours: Fridays 1:15-2:15pm in Zoom (https://ucsd.zoom.us/j/94407719209 🖶 (https://ucsd.zoom.us/j/94407719209).)

Week of October 9th office hours Wednesday 2:15 (find link in zoom)

Being proactive and asking questions during office hours is something I value and appreciate – please ask whatever questions you may have about course material. I'm also more than happy to chat about other topics (e.g., career goals (or confusions!), hobbies, other projects, research, etc.). Also – please make use of time in the lab to talk to me and the IAs as we can generally help you better when talking with you directly.

IAs will not have office hours as there is generally time during lab to ask questions (considering doing this while incubating something or waiting for gel to set). I strongly suggest staying after you have completed the lab to work on your lab notebook so you can ask questions when needed. Please take advantage of this time to discuss anything in the class, not just what you're working on that day.

Emails directed to me, Dr. Rusert, should focus on personal, tech (but not tech support), or course-related issues ONLY (a course-related issue could be different deadlines listed in the syllabus versus that on the assignment, you cannot access the homework, etc.). I will respond to emails usually within 24 hours, but on weekends you may not hear back from me until Monday.

For ALL OTHER questions (such as concept questions), we will be using Piazza for class discussion. The system is highly catered to getting you help fast and efficiently from classmates, IAs, and myself. I encourage you to answer each other's questions or contribute to a conversation! Rather than emailing content or logistics questions to someone from the teaching team, including your IA, please post your questions on Piazza – which you can even do anonymously – by clicking the Piazza link in the menu to the left. Piazza will be checked at least once a day by the teaching team. For logistics questions, please ensure you have carefully reviewed the syllabus and searched the posts in Piazza before making a new post.

Safety

Safety precautions are crucial in the laboratory setting. Biology lab safety training and assessment

(https://biology.ucsd.edu/education/undergrad/course/ug-labs.html (https://biology.ucsd.edu/education/undergrad/course/ug-labs.html)) must be completed by the beginning of the first lab in week 2. Appropriate laboratory attire and personal protective equipment (PPE) are required, including laboratory coats that cover to the knees, safety glasses (recommended) or googles, long pants or equivalent, and closed-toe and closed-heel shoes.

There is no eating or drinking allowed in lab (for eating and drinking breaks please step outside).

Grading

BIMM101 has multiple grading components:

Syllabus Quiz	0.5
Molecular Biology Review Quiz	1.5
Lab notebooks	21
Weekly Canvas Quizzes	10
Midterm	18
CRISPR 'Lab' report	21
Final Exam	21
Professionalism	3
iClickers	4
Total	100

Syllabus Quiz: A review of the syllabus and course components is an important step in understanding the course organization and what you will be responsible for.

Molecular Biology Review Quiz: This covers background molecular biology and experimental design concepts. It will be scored 50% for effort and completion and 50% for correctness. Instructions to take and submit the quiz are posted on Canvas in the Week 0 (https://canvas.ucsd.edu/courses/48776/pages/week-0) page and the Assignments (https://canvas.ucsd.edu/courses/48776/modules/289272) module. Look to the Week 0 page to also find resources to help you if you're shaky on this material. Understanding these concepts is pertinent to much of the content we cover for the rest of the quarter. Getting a good handle on it now will support your success in this course.

Lab notebooks: Each student will be assigned an individual digital lab/research notebook (Google Doc) that they will use for the quarter. These will be made available through the Canvas Site and via email to you directly. Complete and organized lab notebook entries are a critical part of effective work in a research lab. As such, we expect students to practice good lab notebook entry habits. You will have until 11:59pm the night after each lab to complete each entry. Please consult the lab notebook guidelines (https://canvas.ucsd.edu/courses/48776/pages/lab-notebook-guidelines-and-grading). You can see what we expect in the following example following-example

 $(\underline{https://docs.google.com/document/d/1ynU43QH13kaho1nW2SEViYFVqJJBtlDwgpfpKPu_miA/edit?usp=sharing)}.$

Lab notebook entries will be regularly and randomly checked for both before-lab work and in-lab work. In total, roughly 8 entries will be checked and scored. The two lowest scores will be dropped. If you find yourself unable to complete up to two lab notebook entries for any reason, such as illness

or family emergency, there are no extensions – those missed entries will count as the two low scores to be dropped. This is an accommodation built into the course to support students in a variety of situations fairly and equitably. Remember that not all notebook entries will be graded.

You will submit your notebooks at the end of the quarter for plagiarism and points will be deducted from each graded entry that you show significant plagiarism.

<u>Weekly Quizzes:</u> These will cover material from both lectures and lab that week and are meant to reinforce the concepts and help you practice applying them. They are due Sundays by 11:59pm but can be submitted late for a 20% reduction each day. The lowest 2 scores of 8 will be dropped.

<u>Midterm:</u> The midterm will be on Nov. 9th during lecture time. It is meant to evaluate your understanding of the concepts, protocols, experimental design, analysis, and experiments we cover through Lecture and Lab 10 (midway through week 6). If you miss the midterm for any reason, these points will be moved to your final exam (with the exception of an OSD accommodation). It is very important to follow up during office hours on concepts you are unclear on.

You will be allowed to use ONE page front and back of handwritten notes and your lab manual, including any notes you've written in it, during the midterm and final exam. I encourage you to get familiar with your manual, add sticker tabs to easily find sections or pertinent pages, and add important information as we move through this class.

<u>Final Exam:</u> A cumulative final exam will be given during your last lab period (Dec. 7/8th) for roughly 2.5hrs starting at 11am and 9:30am respectively. For extenuating circumstances that interfere with your ability to take the final (i.e. hospitalization), please contact me to discuss your circumstances and options. Everyone will take the final exam and this will be a component of everyone's grade. However, if your final exam grade is greater than your midterm exam grade, your final exam will count for all of the exam points (39% of your grade) to reward you for improving your understanding.

<u>CRISPR Lab Report</u>: The goal of the write-up is to write a short scientific article to present the results of our CRISPR experiment, including presenting and summarizing results and constructing scientific arguments (what you can conclude, evidence to support, and providing reasoning biological/molecular/experimental explanations or hypotheses). A draft will be submitted for peer review, and then a final version will be submitted. Consult <u>course schedule</u> (b) (https://docs.google.com/spreadsheets/d/146oMDPj_SxQgWtPf1RuRVPIN34scaSufDLKiACDy0Z8/edit?usp=sharing) for due dates. Guidelines/rubrics will be provided later in the course.

<u>iClickers:</u> Participation in lectures helps you engage with the material, identify areas of confusion, and presents opportunities to ask questions in real-time. Participation credit will start during lecture 2, Tuesday, Oct. 3rd. You must answer approximately 75% of questions to get participation credit for each lecture. You can miss up to 2 lectures of the 17 for any reason where I will collect participation. Missing more than 2 lectures (e.g. 1 missed of the 15 you need to attend) will cause you to lose a percent of the points you can earn (e.g. 1/15 = -6.7% of the 4% toward your final grade).

Everyone must create an account with iClicker. (https://mhe.my.site.com/iclicker/s/article/Student-Guide-iClicker-Roster-Grade-Sync-Integration) If you're using a physical remote, you must add a remote ID (https://mhe.my.site.com/iclicker/s/article/How-to-Register-a-Remote-in-the-iClicker-Student-App) to your account. You can either use an iClicker remote (I recommend buying a used one from the bookstore or online) or the iClicker app (free for the first 2 weeks of use). However, if the app gives you problems in our lecture hall (e.g. you cannot connect to the internet) you will have to buy a remote. I will not give participation points at the end of lectures to those having problems as this becomes a terrible use of my time and I have lab immediately after lecture. Please figure out how to use the app or your remote BEFORE class (e.g. setting the frequency on a physical remote (https://blink.ucsd.edu/faculty/instruction/tech-guide/clickers/during-class.html#Presenting-and-Polling)), but also ask me or your neighbors for help during lecture if you're struggling so we get off on the right foot!

<u>Professionalism:</u> This portion of the course grade is intended to motivate students to consider the impact of their actions on their learning and the learning of others in the course. Unprofessional interactions consume 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 to new opportunities that you may or may not be aware of. Professionalism can be demonstrated through individually demonstrating meaningful participation in the course (especially during lab time), maturity, and respectful behavior toward others.

By default, every student is assumed to be professionally mature. Hence, this component is awarded to every student at the beginning of the quarter. During the quarter, based on observations by the teaching team, which includes but is not limited to participating in lab sessions, one-on-one interactions, electronic communication, contributing data to class data sets according to deadlines, and follow-up conversations on grades, your professionalism credit may be deducted.

Example interactions with meaningful benefits:

• 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 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
- · Reporting errors or problems in class, on assignments, or for other course material
- · Arriving on time to lab sessions and being prepared to work in lab

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

- · Not showing up or being late repeatedly to lab session
- · Contributing inequitably to teamwork
- · Harassing and/or bullying or getting overly angry with the instructional team or other students, either in person or online
- Asking questions when the information is already available (such as in the syllabus) or will eventually be known (this does not include asking clarifying
 questions about content/concepts)
- Ignoring the directions or requests from the instructional team (such as contributing to group presentations of class data)
- · Unprofessional behavior in lab (e.g., not respecting the working environment of others, using unprofessional language)

Extra Credit

I have created a non-traditional and, dare I say, *fun* (intriguing, helpful, influential....?) extra credit assignment that is optional, to be completed by Nov. 27th at 11:59pm or anytime before then (you can do it now!). Please see the assignment details here: <u>Happiness Lab Podcast Extra Credit Option</u> (<u>https://canvas.ucsd.edu/courses/48776/assignments/680891</u>)

Student Resources for Support and Learning

Many <u>resources (https://canvas.ucsd.edu/courses/48776/pages/student-resources-for-support-and-learning)</u> on campus are directed at supporting your intellectual development. Do not be shy to make the most of these resources.

Grades

Grades will be based on your percentage in the course shown below. This course is not graded on a curve (i.e. 20% of students getting A, B, C, and such), and the ability to do well in the course is not dependent on others doing poorly.

97+ = A+	94 up to 97 = A	90 up to 93= A-
87 up to 89 = B+	83 up to 86 = B	80 up to 82 = B-
76 up to 79 = C+	72 up to 75 = C	67 up to 71= C-
60 up to 66= D	Below 60 = F	

Technical Support

For help with accounts, network, and technical issues: https://acms.ucsd.edu/contact/index.html (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/ (https://library.ucsd.edu/computing-and-technology/connect-from-off-campus/)

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

The integrity of scholarship is essential for an academic community. The University expects that both faculty and students 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. Anyone caught cheating (including plagiarizing lab reports, cheating on a test, or changing an answer for a re-grade) will be reported to the Academic Integrity Office and points will be taken off plagiarized work.

Inclusion and Accessibility

Any student with a disability is welcome to contact us early in the quarter to work out reasonable accommodations to support your success in this course. Students requesting accommodations for this course due to a disability must provide a current Authorization for Accommodation (AFA) letter issued by the Office for Students with Disabilities (OSD), which is located in University Center 202 behind Center Hall. Students are required to present their AFA letters to faculty and the OSD Liaison in the Division of Biological Sciences in advance so that accommodations may be arranged.

For further information

Contact the OSD:

858-534-4382 (http://disabilities.ucsd.edu) http://disabilities.ucsd.edu (http://disabilities.ucsd.edu) osd@ucsd.edu (mailto:osd@ucsd.edu)

Office of Equity, Diversity, and Inclusion:

858.822.3542 | diversity@ucsd.edu (mailto:diversity@ucsd.edu) | https://diversity.ucsd.edu/ (https://diversity.ucsd.edu/)

https://students.ucsd.edu/student-life/diversity/index.html (https://students.ucsd.edu/student-life/diversity/index.html)

Discrimination and Harrassment

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 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/ (https://ophd.ucsd.edu/), or http://ophd.ucsd.edu/report-bias/index.html (https://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 (mailto:sarc@ucsd.edu) | https://care.ucsd.edu (https://care.ucsd.edu)
Counseling and Psychological Services (CAPS): 858.534.3755 | https://caps.ucsd.edu (https://caps.ucsd.edu)

Course Summary:

Date	Details	Due
00.14.0000	Week 0 Quiz - Dilutions (https://canvas.ucsd.edu/courses/48776/assignments/687316)	due by 11:59pm
Sun Oct 1, 2023	Week 1 Survey: Getting to Know You - #FinAid (https://canvas.ucsd.edu/courses/48776/assignments/684052)	due by 11:59pm
Mon Oct 2, 2023	Mol Bio Review (https://canvas.ucsd.edu/courses/48776/assignments/680894)	due by 11:59pm
Wed Oct 4, 2023	Syllabus and Studying Techniques Quiz (https://canvas.ucsd.edu/courses/48776/assignments/693584)	due by 11:59pm
Sun Oct 8, 2023	Week 1 Quiz - CRISPR intro, ADE2 gene, AGE intro, replicates	due by 11:59pm

Date	Details (https://canvas.ucsd.edu/courses/48776/assignments/687313)	Due
Wed Oct 11, 2023	2:15 Dr. Rusert's Office hours this week only (https://canvas.ucsd.edu/calendar? event_id=950346&include_contexts=course_48776)	2pm to 3pm
Fri Oct 13, 2023	Week 2 Quiz - gRNA and HDR design; Exp. design, plasmids (https://canvas.ucsd.edu/courses/48776/assignments/687319)	due by 11:59pm
Fri Oct 20, 2023	Dr. Rusert's Office Hours 1:15pm (https://canvas.ucsd.edu/calendar? event_id=950337&include_contexts=course_48776)	1pm to 2pm
Fri Oct 27, 2023	Dr. Rusert's Office Hours 1:15pm (https://canvas.ucsd.edu/calendar? event_id=950338&include_contexts=course_48776)	1pm to 2pm
Fri Nov 3, 2023	Dr. Rusert's Office Hours 1:15pm (https://canvas.ucsd.edu/calendar? event_id=950339&include_contexts=course_48776)	1pm to 2pm
Thu Nov 9, 2023	Midterm (https://canvas.ucsd.edu/courses/48776/assignments/680890)	due by 10:50am
Fri Nov 10, 2023	Dr. Rusert's Office Hours 1:15pm (https://canvas.ucsd.edu/calendar? event_id=950340&include_contexts=course_48776)	1pm to 2pm
Fri Nov 17, 2023	Dr. Rusert's Office Hours 1:15pm (https://canvas.ucsd.edu/calendar? event_id=950341&include_contexts=course_48776)	1pm to 2pm
Fri Nov 24, 2023	Dr. Rusert's Office Hours 1:15pm (https://canvas.ucsd.edu/calendar? event_id=950342&include_contexts=course_48776)	1pm to 2pm
Fri Dec 1, 2023	Dr. Rusert's Office Hours 1:15pm (https://canvas.ucsd.edu/calendar? event_id=950343&include_contexts=course_48776)	1pm to 2pm
Sun Dec 3, 2023	Happiness Lab Podcast Extra Credit Option (https://canvas.ucsd.edu/courses/48776/assignments/680891)	due by 11:59pm
	Lab notebook grading #1 (https://canvas.ucsd.edu/courses/48776/assignments/706756)	due by 11:59pm
Fri Day 45, 2002	Lab notebook grading #2 (https://canvas.ucsd.edu/courses/48776/assignments/706759)	due by 11:59pm
Fri Dec 15, 2023	Lab notebook grading #3 (https://canvas.ucsd.edu/courses/48776/assignments/706758)	due by 11:59pm
	Lab notebook grading #4 (https://canvas.ucsd.edu/courses/48776/assignments/706757)	due by 11:59pm
	Professionalism (https://canvas.ucsd.edu/courses/48776/assignments/680895)	