UCSD BIMM 121: MICROBIOLOGY LABORATORY

WINTER '23

LECTURE: WARREN LECTURE HALL 2113, TUESDAYS + THURSDAYS, 9:30A - 10:50A,
LAB: TATA HALL 2101 + 2102, SEE SCHEDULE FOR SPECIFIC DATES + TIMES*

*ALL TIMES ARE WITHIN THE SCHEDULED LAB TIME (T/H 11AM - 1:50PM) FOR THIS CLASS

WELCOME!

In this class we will explore microbes in the world around us, their interactions with each other, and their use as laboratory models to better understand biology. **Due to a need to plan this lab far in advance (in November), we unfortunately had to commit to a version of the lab that did not rely on IAs. We are glad IAs are back, and they will help support your learning, but unfortunately this quarter we will have much fewer 'wet-lab' activities than usual.** In weeks 8-10, you will have the opportunity to learn hands-on wet lab techniques for working with microbes, including the fundamentals of basic sterile technique and observing microbes under the microscope. In our 'dry-lab' and lecture sessions before then, you will learn about classic and contemporary methods in microbiology, including the bioinformatic analysis of microbial genomes, and you will analyze real data on current open questions in microbial biology.

Please keep in mind that all instructors of this course are required to follow the same class structure with the same number of in-class contact hours, and that this version of the course is new to them too. Please be patient and understanding with each other as we navigate our way through the course. **We're in this together, so if you have any issues or concerns, please let me know right away.**

INSTRUCTOR: **DR. KATHERINE PETRIE**, *kpetrie@ucsd.edu*

OFFICE HOURS (BY APPOINTMENT): TUESDAYS, 2:30-3:30 PM
SEE CANVAS FOR OFFICE HOURS SIGN-UP INFORMATION

IAS: **EMILY YANG, AO1**, *yoy004@ucsd.edu* **(TATA 2101)**

TODD CHOU, AO2 *toddchou@ucsd.edu* **(TATA 2102)**

IN-PERSON ATTENDANCE AND COVID:

In order to get the most out of this lab, you really need to attend both lab sessions and lecture sessions (which often contain crucial information needed to complete the lab activities), so we are incentivizing your attendance by making it part of your grade (6% of your overall grade). However, because of covid and other unexpected life emergencies, we do not want you to feel pressured to attend every session in order to earn a good grade.

Attendance at every individual class meeting (every lecture and every wet- or dry- lab session) will be worth one point, for a total of 29 points across the quarter. However, to earn full attendance credit, we are only requiring 23 attendance points, so you can miss several sessions with no questions asked. You will still be responsible for completing your lab notebook and other assignments on time, so you'll have to be sure to keep in touch with your group mates to get any missed data or information.

If you experience extenuating circumstances (illness, family emergencies etc) that would prevent you from submitting this work on time, please reach out to Dr. Petrie to request an extension. However, if you just miss lecture or lab, but can still complete your work on time, there is no need to reach out (unless you've already missed 6 course meetings, in which case please reach out to Dr. Petrie to discuss your options). Unless the situation is an emergency, you must contact me ahead of time.

Please prioritize the health of yourself and others: if you have any symptoms, tested positive, have been exposed, or have been advised to quarantine, please stay home! When in doubt - don't come out!

If instructors need to isolate, we will set up synchronous zoom class sessions, and take attendance via zoom chat. Otherwise, course sessions will not be broadcast live (but lectures will be recorded so you can refer to them later!)

COURSE STRUCTURE:

Lectures: Lectures will be held on Tuesdays & Thursdays from 9:30 - 10:50A. During lecture we will go over important concepts and background information needed to accomplish your lab tasks. Occasionally, we will also work on our dry-lab activity in lecture, as some of them require extra time.

Lab sessions: Every week, we will have some kind of lab session where you work with a group and discuss what you are working on.

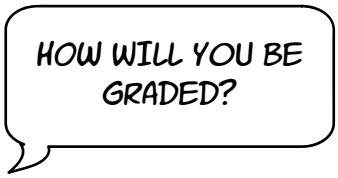
In weeks 1-7, these will be once per week 'dry-lab' sessions ,with activities that focus on data analysis. **Dry lab sessions will run on Thursdays from 11:30A - 12:30P in TATA 2101 and 2102 (doors will open at 11:15A).**

In week 8-10, these will be 'wet-lab' sessions, where you'll get to try out various hands-on microbiology techniques. **Wet lab sessions will be held from 11A-1:50P in TATA 2101 & 2102. You will attend on Tuesday OR Thursday, depending on which section you are in.** We'll be sure to let you out of lecture with enough time to get up the hill before lab starts at 11.

In both types of sessions, you will work in small groups to complete each day's lab tasks and document your accomplishments in a weekly lab notebook (worth 25% of your overall grade).

ASSESSMENTS AND BASIS FOR FINAL GRADE:

Assessment	Weight
quizzes	30%
lab notebook	25%
mini reports	27%
packback	10%
attendance	6%
plagiarism assignment	2%



GRADING SCALE - NO BELL CURVE (YOU WON'T BE COMPETING)

letter	F	D	C-	C	C+	B-	B	B+	A-	A	A+
percent	<60	60-70	70-73	73-77	77-80	80-83	83-87	87-90	90-93	93-97	97-100
gpa pts	0	1.0	1.7	2.0	2.3	2.7	3.0	3.3	3.7	4.0	4.0

ASSESSMENTS IN BRIEF:

Quizzes (30% of grade): There will be 6 quizzes throughout the quarter. Generally, quizzes will be held every week, though we skip weeks that overlap with mini-report deadlines. Canvas quizzes will be available from 5 PM Sunday until 9:30 AM Tuesday, and can be taken any time within that window (first quiz opens 1/15). Once you open a quiz, you must complete it within 30 minutes. Quizzes are open-note, but you must work on your own - any consultation with humans or help-services or machine learning robots will be considered violations of academic integrity. **Your lowest scoring quiz will be dropped.**

Lab Notebook (25% of grade). You must complete a lab notebook entry each week. See 'earning your daily lab points' on the previous page for more information about your attendance grade. **Your lowest scoring notebook grade will be dropped.** Lab notebooks received after 5PM on Fridays will automatically lose 4 points (50%), unless you have extenuating circumstances and Dr. Petrie approves an extension (if you're not sure, just email me).

Mini lab reports (27% of grade) There will be three mini lab reports. (They are considered 'mini' reports since we focus on data analysis, so you won't have as much methodology to write up). As long as you request it ahead of the due date, there are 2, 1-day extensions available to use on your lab reports, no questions asked. Additional late reports may be subject to a 10% penalty, and cannot be accepted more than 5 days late. But please reach out to me if you have any extenuating circumstances.

Packback (10% of grade) This ai-moderated discussion forum is driven by your curiosity and will help you make connections between what we learn in class and the real world. Every week, you are required to **make 2 posts, at least 1 of which must be a response to someone else's post**. To earn credit, your posts must meet certain guidelines. Packback will assign a curiosity score to each post

based on its depth, credibility, and presentation. Consistently high curiosity scores are an opportunity for extra credit. **You can miss 1 packback week**, no questions asked.

Attendance (6% of grade) See 'in-person attendance and covid' above for a description of the attendance policy.

Plagiarism assignment (2% of grade) This assignment is due early in the quarter, but it's an easy way to earn a solid 2% - you'll have the opportunity to revise it, and it provides key training for your mini-reports.

WHAT DO YOU NEED FOR THIS CLASS? (CHECKLIST)

- ☐ **A computer:** Many of our dry lab activities require a computer or tablet. Most of these dry labs will occur in TATA 2201/2102, which are equipped with iMacs you can share with your lab partner. Occasionally, we will carry out dry lab activities during lecture, and for these times (check the schedule), it will be helpful for you or your partner to bring a laptop or tablet; though we will have a limited number of very simple tablets available to borrow.

- ☐ **Internet access:** all course documents will be posted on canvas, so you'll need the internet to get them. Additionally, much of our bioinformatics work will rely on online resources and databases.

- ☐ **Packback access code:** we'll be using this AI-moderated forum to dive deeper into the topics we cover in class. Your account will be automatically charged (~$30) for Packback access unless you opt out of inclusive access within a certain time period.

- ☐ **In-person PPE:** For **weeks 8-10**, you will need the following items, available at the bookstore.

    - ☐ **Knee-length lab coat:** this cannot be a lab-coat you currently use in another setting; for safety reasons, it must remain in the BIMM 121 TATA hall lab all three weeks.

    - ☐ **Safety glasses:** ANSI Z78.1-rated safety glasses (standard prescription eye ware is not sufficient, but chemical splash goggles are NOT required, and they may fog easily and tend to get uncomfortable).

    - ☐ **A paper notebook:** your official lab notebook is a google doc, but you should bring a paper notebook of some kind (any type is fine) to in-person labs to jot down information, as you might not always have access to a computer.

INCLUSIVITY: Everyone comes to this course with different backgrounds, knowledge, and perspectives. We want to create a classroom culture that respects and revels in this human diversity. If you have concerns related to inclusivity or feel your identities are not being honored, please let us know! For more information on campus & community resources, check our canvas page.

INCOMPLETES: If health or family emergencies will make you miss too many assessments, see Dr. Petrie to discuss the possibility of an "Incomplete." Per UCSD Policy, your grade must be in good standing (you have to have a passing grade in the course so far) to be eligible.

IMPORTANT DEADLINES: I will make every effort to announce these deadlines in class and post reminders in multiple places, but please make note of them in your personal calendar now.

Every Friday, 5:00 PM: lab notebooks due (must be fully updated by this time - we will look at google doc timestamps). First notebook due, Friday, January 13th, last notebook due Friday, March 17th.

Every Friday, 5:00 PM: packback discussion board posting deadline (you can post earlier!). First packback due Friday, January 13th, last packback due Friday, March 10th.

Tuesday, January 17th, 9:30 AM: quiz 1 due (quiz opens 5PM Sunday)
Tuesday, January 17th, 9:30 AM: **Plagiarism Assignment**, initial submission due

Tuesday, January 24th, 9:30 AM: quiz 2 due (quiz opens 5PM Sunday)
Tuesday, January 24th, 9:30 AM: **Plagiarism Assignment**, revised submission due

Tuesday, January 31st, 9:30 AM: **Mini Report 1 (biofilm morphotypes) due (no quiz)**

Tuesday, February 7th, 9:30 AM: quiz 3 due (quiz opens 5PM Sunday)

Thursday, February 16th, 9:30 AM: Mini Report 2 (biofilm genotypes) due (no quiz Tuesday 2/14)

Tuesday, February 21st, 9:30 AM: quiz 4 due (quiz opens 5PM Sunday)

Tuesday, February 28th, 9:30 AM: Mini Report 3 (CRISPR) due (no quiz)

Tuesday, March 7th, 9:30 AM: quiz 5 due (quiz opens 5PM Sunday)

Tuesday, March 14th, 9:30 AM: quiz 6 due (quiz opens 5PM Sunday)

COURSE SCHEDULE (TENTATIVE):

Week	Date	Lecture (WLH 2113)	Dry lab or Wet lab (TATA 2102/2102)
1	1/10 (T)	course overview, scope of microbiology lab applications	*no lab today*
	1/12 (H)	biofilms & microbes as models	11:30A-12:30P: basic dilutions

2	1/17 (T)	serial dilution 1	*no lab today*
	1/19 (H)	serial dilution 2	11:30A-12:30P: count morphotypes & calculate frequencies
3	1/24 (T)	genomic mechanisms of biofilm formation in SBW25	*no lab today*
	1/26 (H)	strains, species, bacterial genome organization and annotation	11:30A-12:30P: compare SBW25 & ATCC 13525 reference genomes
4	1/31 (T)	illumine sequencing	*no lab today*
	2/2 (H)	unix basics	11:30-12:30P: run breseq on ATCC 13525 data
5	2/7 (T)	research mutations ***as activity, bring laptop or tablet***	*no lab today*
	2/9 (H)	fermentation, PCR, gels, excel basic stats review	11:30-12:30P: CRISPR 1 (loci size, crispr cas finder, look up phage)
6	2/14 (T)	what we know about CRISPR in *S. thermophilus,* interactions with microbiome	*no lab today*
	2/16 (H)	CRISPR 2 (id strain, HGT search) ***as activity, bring laptop or tablet***	11:30-12:30P: CRISPR 2 extra time
7	2/21 (T)	metagenomics (16Sidentification, biome matrices)	*no lab today*
	2/23 (H)	diversity metrics, possibly start QIITA ***as activity, bring laptop or tablet***	11:30-12:30P: QIITA extra time
8	2/28 (T)	cultures, inoculation, isolation, sterile technique	11:00A-1:50P: micropipetting, surface sampling, inoculation (A01)
	3/2 (H)	examining cultures, colony morphology	11:00A-1:50P: micropipetting, surface sampling, inoculation (A02)
9	3/7 (T)	t-streaks, microscopy	11:00A-1:50P: t-streaks, microscopy w. prepared slides (A01)
	3/9 (H)	physiology-based identification, protists	11:00A-1:50P: t-streaks, microscopy w. prepared slides (A02)
10	3/14 (T)	wet mounts, cell appearance and arrangement, gram staining	11:00A-1:50P: wet-mounts (algae & tardigrades), gram stains of yogurt (A01)

	3/16 (H)	*no lecture today*	11:00A-1:50P: wet-mounts (algae & tardigrades), gram stains of yogurt (A02)