



BIMM 121: MICROBIOLOGY LABORATORY

FALL
'23

LECTURE: DIB 122 (BY THE TROLLEY STATION), TUES + THURS, 9:30A - 10:50A,
LAB: TATA HALL 2101 + 2102, 11:00-1:50

WELCOME!

Welcome to microbiology laboratory. Here we'll be using techniques in microbial physiology, microbial genomics, microbial evolution, and microbial ecology to explore the role of microbes in the world, microbes as models for understanding health, and microbes in food production. Inquiry-based experiments will cover the fundamentals of both working with live microscopic organisms at the bench and bioinformatically analyzing their genomes on the computer.



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

OFFICE HOURS (BY APPOINTMENT): TBA

SEE CANVAS FOR OFFICE HOURS SIGN-UP INFORMATION

IAS: EMILY KARAPETIAN, AO1, emkarape@ucsd.edu (TATA 2101)

FU-HSUAN, AO2 fuko@ucsd.edu (TATA 2102)

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 that same day. Occasionally, we will also work on some dry-lab problem solving or analysis tasks during lecture. During lecture, there will be

Lab sessions: Wet lab sessions will be held from 11A-1:50P on Tuesdays and Thursdays in TATA 2101 & 2102. We'll be sure to let you out of lecture with enough time to get up the hill before lab starts at 11. (Or, if lecture goes all the way until 10:50, we'll shift the start time of lab by a few minutes to make sure everyone has enough time).

If instructors get COVID: 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 always be recorded so you can refer to them later!)

IN-PERSON ATTENDANCE AND ACCOMMODATIONS:

In order to get the most out of this lab, you need to attend both the lab sessions and lecture sessions (which often contain crucial information needed to complete the lab activities). **Attendance is required as part of your grade.** So, if you have a routine conflict between lecture or lab and another class or obligation, this course might not be for you. 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, so be sure to review the details below.

LECTURE ATTENDANCE:

Lecture attendance will be monitored with clickers. Each lecture will be worth two points, and to earn those points, you'll need to get two clicker questions correct during that lecture (typically there are 5-6 opportunities to answer clicker questions per lecture, so this usually isn't too hard). To earn full lecture attendance (clicker) credit, we are requiring 28 clicker points (2 points x 14 lectures). This means you can fully miss up to 3 lectures without penalty. Since everyone will likely be scrambling to get their clickers in week 0, we won't count clickers for the first lecture on 9/28. If you need to miss more than 3 lectures, please see the accommodations section below.

LAB ATTENDANCE:

Lab attendance will be monitored and recorded by the IAs. Each lab session will be worth one point. There are 18 in-person labs throughout the quarter, and to earn full lab attendance credit, we are requiring 15 points. This means you can miss up to 3 labs without penalty. If you need to miss more than 3 labs, please see the accommodations section below. **IMPORTANT: If you miss lab, you are still 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.

ACCOMMODATIONS:

If you miss lecture or lab, there is no need to reach out or request approval, as long as you haven't missed more than three lectures or three labs. If you HAVE gone over 3 missed lectures **or** 3 missed labs, please reach out to Dr. Petrie to discuss your options for potentially getting that day's participation excused – generally, any chronic concerns will require official accommodation from OSD, and any acute or unexpected issues will require validation from your college's dean of student affairs. 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 cold symptoms, tested positive for covid, have been exposed, or have been advised to quarantine, please stay home! When in doubt - don't come out!

EXTENSIONS: If you experience extenuating circumstances (illness, family emergencies etc.) that would prevent you from submitting work (lab notebook, quizzes, or lab report) on time, please reach out to Dr. Petrie to request an extension. Everyone has **2 no-questions-asked 2-day extensions** they can use in this class, you just have to reach out and let me know you plan to use one, using the **extension request google form** available on canvas.

ASSESSMENTS AND BASIS FOR FINAL GRADE:

Assessment	Weight
quizzes	30%
lab notebook	20%

HOW WILL YOU BE
GRADED?

lab reports	30%
lecture attendance (clickers)	8%
lab attendance	8%
plagiarism assignment	4%

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 7 quizzes throughout the quarter. Generally, quizzes will be held every week, though we skip weeks that overlap with lab-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 in week 2, on 10/8). 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 (20% of grade). You must complete your weekly lab notebook entries by 5PM on Friday at the end of each week. **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). For detailed lab notebook guidelines, see canvas.

Lab reports (30% of grade) There will be three lab reports. Late lab reports without an approved extension 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.

Lecture attendance (8% of grade) See 'in-person attendance and accommodations' above for a detailed description of the attendance policy.

Lab attendance (8% of grade) See 'in-person attendance and accommodations' above for a detailed description of the attendance policy.

Plagiarism assignment (4% of grade) This assignment is due early in the quarter, but it's an easy way to earn a solid 4% - you'll have the opportunity to revise it, and it provides key training for your lab reports.

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.

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.

WHAT DO YOU NEED FOR THIS CLASS? (CHECKLIST)

- ☐ **In-person PPE:** Starting in week 0, you will need the following. They should be available at the bookstore (<https://www.ucsandiegobookstore.com/medical-lab/apparel-accessories/biology-lab-supplies>), but unfortunately, they were unable to do course-specific PPE orders this year, so supplies may be limited. It is totally fine to purchase these from outside sources if you need to.
 - ☐ **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. It cannot be a disposable (paper) lab coat, as we use Bunsen burners in this lab, and fire + paper do not play nice together.
 - ☐ **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 physical iClicker remote:** Starting in week 1, you will need a physical iClicker remote. This is how we will be taking attendance in lecture. If you do not already have one, they are \$58.75 new and \$44.25 used at the bookstore. The bookstore also has an option to rent one for a single quarter for \$26.73. The mobile iClicker app will not be permitted; the campus wifi is not reliable enough for it to work.
- ☐ **The Fall 2023 BIMM 121 Lab Manual:** This is available from the bookstore for \$15.25. Make sure you are purchasing the Fall 2023 version – older versions will not work. The manual may not be available in time for lab 1; so we'll provided the instructions for lab 1 only as pdf on canvas. You may want to print this and bring it with you to the first lab, though this is not required, as the lab benches have computers.
- ☐ **A digital lab notebook:** This is not something you need to purchase, or even set up yourself. If you haven't already, in the next few days you should receive an email invitation to a google doc that will serve as your lab notebook for the quarter. This document is shared between you, your IA, and the instructor, and we'll be checking it regularly to be sure you are keeping it up-to-date in accordance with the lab notebook guidelines (see canvas) and deadlines (Friday 5PM). You do not need a fancy, carbon copy lab notebook, though you may wish to bring a small legal pad or something similar to lab, in case you have any notes or observations you want to jot down during lab itself.

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, October 6th, last notebook due Friday, December 8th.

Tuesday, October 10th, 9:30 AM: quiz 1 due (quiz opens 5PM Sunday)

Tuesday, October 10th, 9:30 AM: **Plagiarism Assignment**, initial submission due

Tuesday, October 17th, 9:30 AM: quiz 2 due (quiz opens 5PM Sunday)

Tuesday, October 17th, 9:30 AM: **Plagiarism Assignment**, revised submission due

Tuesday, October 24th, 9:30 AM: **Lab Report 1 (biofilm phenotypes) due** (no quiz)

Tuesday, October 31st, 9:30 AM: quiz 3 due (quiz opens 5PM Sunday)

Tuesday, November 7th, 9:30 AM: quiz 4 due (quiz opens 5PM Sunday)

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

Tuesday, November 21st, 9:30 AM: quiz 6 due (quiz opens 5PM Sunday)

Thursday, November 30th, 9:30 AM: **Lab Report 2 (CRISPR) due** (no quiz Tuesday 11/28)

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

Tuesday December 12th, 9:30 AM: **Lab Report 3 (biofilm phenotypes) due**

COURSE SCHEDULE (TENTATIVE): Please see lab manual table of contents for detailed list of experiments in each lab. Note that lab projects are broken into three broad modules, which are color coded to help you keep track (sometimes we have to jump around, as some experiments take a long time to process, and we can't just wait doing nothing in the meantime).

Week	Module	Date	Lecture (DIB 122)	Lab (TATA 2102/2102)
0	microbes in the world	9/28 (H)	course overview, cultures, inoculation, sterile technique	Lab 1
1	microbes in the world / microbes as models	10/3 (T)	examining cultures, colony morphology, t-streaks, microscopy	Lab 2
		10/5 (H)	biofilm introduction, serial dilution 1	Lab 3

2	microbes as models	10/10 (T)	serial dilution 2, wet mounts, phase contrast notes	Lab 4
		10/12 (H)	heat fixation	Lab 5
3	microbes as models	10/17 (T)	DNA extraction, cryoprotection	Lab 6
		10/19 (H)	DNA quantification	Lab 7
4	microbes as models	10/24 (T)	Illumina sequencing, library prep	Lab 8
		10/26 (H)	tape station	Lab 9
5	microbes...as models / in the world / as food	10/31 (T)	calculate molar concentration (in class activity), pixel to um ratio, protists, phase contrast reminders	Lab 10
		11/2 (H)	fermentation, cell appearance and arrangement, gram staining	Lab 11
6	microbes as food	11/7 (T)	history of CRISPR discovery	Lab 12
		11/9 (H)	<i>Veteran's day no lecture today</i>	<i>no lab today</i>
7	microbes as food	11/14 (T)	what we know about CRISPRs of lactic acid bacteria (genetic organization), PCR	Lab 13
		11/16 (H)	gel electrophoresis, using CRISPR-Cas finder and BLAST	Lab 14
8	microbes as food	11/21 (T)	<i>no lecture today – extra work time for lab 15</i>	Lab 15 (remote & asynchronous)
		11/23 (H)	<i>Thanksgiving - no lecture today</i>	<i>no lab today</i>
9	microbes as food / microbes as models	11/28 (T)	CRISPR review, Illumina quality scores, coverage, UNIX basics	Lab 16
		11/30 (H)	common SBW25 mutations (WspF, Fuz), interpreting mutations	Lab 17
10	microbes in the world	12/5(T)	physiology vs 16S identification, amplicon metagenomics, QIIME basics (biome matrix)	Lab 18
		12/7 (H)	more QIIME (diversity metrics)	Lab 19