Microbiology Laboratory

BIMM 121 Winter 2024

INSTRUCTOR: Cindy Gustafson-Brown, Ph.D. (Dr. Gus)
office location: Humanities and Social Sciences 1145F
office hours: Wed, 2:00-2:50 PM (starting during week 2), location TBA
email: cgb@ucsd.edu

Do NOT email me through Canvas.
When you email, PUT **BICD 136** IN THE SUBJECT LINE.
INCLUDE YOUR:

- First and last name
- PID
- Section number (A01 or A02)

If you cannot attend my office hours, you may contact me for a private appointment in person or by zoom. Please present your questions about course material in person, not by email. I cannot guarantee an answer to your email, unless it is an urgent issue. If you don't hear back from me within 24 hours, feel free to email a reminder.

LABS

Section	Time	location	IA	email
B01	Tu/Th 3-5:50	TATA Hall 2101	Emily Karapetian	emkarape@ucsd.edu
B02	Tu/Th 3-5:50	TATA Hall 2102	Ivy Tam	ltam@ucsd.edu

COURSE STRUCTURE

This course is designed to illustrate processes central to microbiology and familiarize students with skills required for handling and characterizing different microorganisms. Emphasis will be on microbial ecology, microbial genetics, microbial physiology, and microbial evolution. Through inquiry-based experiments, students will be able to appreciate microbes' involvement in health, industry, the environment, and everyday life. Throughout the course, students will learn how to work with live microbes at the bench, as well as scientific reasoning, scientific writing, and analysis microbial genomes via bioinformatics.

TEXTBOOK

BIMM 121 Lab Manual, author Katherine Petrie. Available at the UCSD Bookstore.

REQUIRED EQUIPMENT

For this course you will need to bring:

1. **To lecture**
   a. an iClicker (Your iClicker MUST be registered on Canvas in order for your responses to be assigned to you.)
   b. the lab manual
   c. a calculator
2. **To lab**
   a. a calculator
   b. eye protection
      i. Standard prescription eye glasses are NOT sufficient.
      ii. Safety glasses are preferable. Goggles tend to fog.
      iii. You must be able to look through a microscope while wearing the safety glasses, so they should not bulge outward.
   c. a lab coat, down to your knees – This must stay in the lab throughout the quarter.
   d. long pants (not leggings, not anything tight-fitting, not cropped)
   e. closed-toe shoes (no sandals, flip-flops, or other open footwear)
   f. something to tie back long hair
   g. lab manual (as soon as they are available at the bookstore)
   h. bound lab notebook with carbons – You may use the remaining pages in an old lab notebook if there are enough pages at the back for our experiments.
   i. a laptop computer would be helpful on certain days (There are some Apple computers in the lab, but not enough for every student.)

LAB SAFETY TRAINING

Enrolled and waitlisted students MUST successfully complete the Biology Lab Safety Training and Assessment:

https://biolabclass-safetyquiz.ucsd.edu/introduction

BEFORE YOU START THIS COURSE

BILD 1 is a prerequisite for this course. It is assumed that you already have a basic (BILD 1-level) knowledge of the topics listed below. These foundational concepts are the bread and butter of a biology major. **If these are fuzzy, or fading in your memory, you should review them before class.**

- the metric system
- general categories of microbes and their definitions and characteristics
  eukaryotic organisms, prokaryotic organisms
- basic cell structure
- basic biochemistry (glycolysis, TCA cycle, electron transport chain, photosynthesis)
- central dogma of biology

COURSE WEBSITE

This course is on Canvas and should automatically appear on your Canvas account when you register for the class. We will use Canvas to post information on experiments, homework, quizzes, schedules, readings and practice material, experimental data, report guidelines, etc. This website will also be used to post any announcements that pertain to the class. Please check the site regularly and update yourself on the information provided.

Adjust your Canvas settings to push BIMM 121 announcements to your email!

ATTENDANCE AND ABSENCES

1. All students are expected to attend **lecture** regularly. Starting in week 2, there will be clicker points during lecture which will contribute to your grade. It is assumed that all students will have a couple of absences, for which you do NOT need to get approval. Please do not come to class sick. It is fine to miss a couple days. If you miss more than that, it will start to eat into your clicker points.
2. Your attendance is required at **EVERY lab.** In a lab course, it is expected that you will have hands-on experience. You may only leave lab after you *and your team* have finished the experiments for the day and finished cleaning up.
3. Absences due to **scheduling conflicts** (e.g. other classes, exams, scheduled meetings, etc) will not be excused. If you are likely to have interviews for graduate school, please schedule them on non-lab days.
4. Do not come to class sick. If you are **ill or have an emergency** on a day or when there is a lab, exam or assignment due, email as soon as you are able. It is not sufficient to contact your IA alone as your IA does not have the authority to excuse your absence. All absences without **PRIOR** approval of the instructor (not the IA) will be considered unauthorized, unless an emergency prevents you from notifying us. If an emergency prevents you from contacting us prior to the lab, you must contact Dr. Gus within 24 hours to explain.
5. UCSD's policy on EXPOSURE to Covid is that the student should:
    a. test immediately and again 3-5 days later.
    b. wear a mask for a week following exposure.
    c. isolate if they either develop symptoms or test positive.
6. You can find UCSD's up-to-date policy on Covid here: https://returntolearn.ucsd.edu/return-to-campus/exposure-contact-tracing/index.html
7. **6% penalty** to your course score for the first unauthorized, unexplained absence from the lab. If there is a second such absence, you will receive a failing grade in the course.
8. **Tardiness** in the lab will impact your grade. You will miss important announcements and instructions. If you are late to lab more than once, you will receive a **2%** penalty for each additional infraction.

ASSIGNMENT DEADLINES AND SUBMISSION POLICIES:

1. There is a 10 minute grace period on assignment due dates. The penalty for late assignments is 50%, if turned in by 5 PM the next day. Assignments will not be accepted after that.

2. For assignment submitted online, it is the student's responsibility to verify that the submission has been successful.
3. Be sure you submit the **correct document**. We cannot give you an extension if you submit the wrong document and notify us after the due date.
4. By taking this course, students agree that their assignments will be subject to review for textual similarity by Turnitin for the detection of plagiarism. All submitted assignments will be included as source documents in the Turnitin 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 site.
5. Although you may be discussing data with partners, you must submit your own homework, *written in your own words*. **Copying someone else's homework is cheating**. **Showing your homework to someone else is likewise cheating.** (see below)

HOW WILL THIS CLASS WORK??? WHAT DO I DO???

1. Reading, tutorials and videos (posted on Canvas)

There will be reading in the lab manual that corresponds to each lab. This reading must be completed by the lecture BEFORE to the lab. Also, you will find a module posted on Canvas corresponding to each week. Within that module there may be additional reading, tutorials, and/or videos that are assigned for that week. You are expected to study the relevant material BEFORE the lecture that it corresponds to.

WHY DO WE PROCESS INFORMATION BEFORE THE LECTURES? The assigned material will have to be consumed *at some point*. It will be to YOUR benefit to do so before lecture, rather than after class. Having a preliminary exposure to the material beforehand will result in more productive learning during class. Lectures will make more sense to you, we will make more progress, and you will be able to ask questions about what you don't understand during class.

We assume you are here to learn. Just like athletic training for your body, learning requires **effort**. Did you know that studying results in *physical* brain development? Research shows this! Consider this a weight-lifting class for your brain. No one else can do the exercising for you. If you do it, your "thinking muscles" will grow and so will your success in life. Our goal is your success. We are equipping you to change the world!!!

2. Lectures and clicker questions (6% of the course grade)

Lectures will be podcast.

Lectures will **start** with a 3-question, multiple-choice, clicker quiz on the material that was assigned for reading/viewing prior to that lecture. These clicker questions will be shown on slides framed by an **orange** box. Clicker questions will begin on **Tues, Jan 16**.

As you prepare for class, think about what these questions might be. Learning to *anticipate* questions will supercharge your study skills. **You do not have to get all these questions correct to get full credit.** (See below.)

After the initial three clicker questions, there will be additional, thought-questions sprinkled throughout the lectures. The slides with these questions will be framed by a **green** box. The number of questions will vary from day to day. You will independently click in to vote on an answer, based upon your initial impression. Then, you discuss the question for a couple

minutes with other students, followed by a second opportunity to click in. **These questions will NOT be graded for accuracy, only for participation.**

The clicker questions are a good opportunity for you to notice if you are confused on certain topics or protocols. **Please follow-up on things you are confused about! Ask questions in class or lab, come to office hours!**

Grading of clicker questions (starting on Jan 16)

a. **Orange box (quiz) questions** = **3%** of your grade.
   - Get **67%** of these questions correct to get full credit for the quarter.
   - There is a sliding scale of credit up to this maximum.

b. **Green box questions** = **3%** of your grade.
   - It does not matter whether you get these right or wrong.
   - Participating in **75%** of these questions during **75%** of the lectures gives you full credit.
   - No partial credit.

The iClicker MUST be **registered on Canvas** in order for your responses to be assigned to you. Most students will have a legitimate excuse for a couple of unavoidable absences in lecture during the quarter. This is already factored into the grading scheme for clicker points, and it is why you do NOT have to be there every day to get full credit. DO NOT ASK TO MAKE UP CLICKER POINTS IF YOU ARE ABSENT, EVEN IF YOU ARE ABSENT FOR A GOOD REASON. If you are not in class, you do not get points. And that is OKAY.

Further, most students have a day when they forget their clicker or the batteries die. This policy applies to those situations as well. Solving all these problems for every student during a quarter would be a huge administrative headache. Instead, we just build margin into the system, to allow for missing days and/or questions.

Clicker scores will not be posted on Canvas. The answers to the quiz questions (**orange** box questions) are announced during lecture, which is podcast. If you want to keep track of your performance on quiz questions you should keep a record of your answers in your notes. The slides, including the clicker questions, will be posted after each lecture. You may also keep track of your responses to the **green** box questions and compare them to the total number of questions asked.

You may NOT share a clicker with another student. Further, if you are found to be using another student's clicker, or if another student is using your clicker, you will receive a failing grade in the class, and will be referred to the Office of Academic Integrity for administrative discipline.

3. Lab sessions (twice per week)

We will have a three-hour lab twice per week. You will have the opportunity work with microbes, including practicing basic microbiology laboratory techniques.

4. Lab notebooks (12% of the course grade)

Keeping a thorough and organized lab notebook is an essential skill for any lab researcher. Some labs require hard copies and others use digital versions. In BIMM 121, we will use bound notebooks with carbon copies. You will receive instruction on how to keep a good lab notebook.

5. Professionalism (8% of the course grade)

All students are expected to be good lab citizens. The **professionalism** portion of the 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. This includes in-person and electronic communication. Students will be assessed according to their:

a. attitude
b. cooperation with others
c. respectfulness
d. conscientiousness
e. work ethic
f. integrity
g. scientific approach (*e.g.* experimental design, controls, trouble-shooting)
h. thoughtful questions
i. prompt submission of online data sets from lab

When you get a job, these characteristics will likely be evaluated in your first "job review." Unprofessional interactions consume time, yet have no meaningful benefits to you, your fellow students, or the teaching team. 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. Because a lab class is intended to prepare you for doing research in a real lab, we encourage the development of traits that will make you and those working with you successful.

Further, every technician/researcher who works in a lab is expected to come to the lab prepared, with a thorough understanding the experiments they are about to conduct. This is basic lab competence, and to do otherwise would be negligence. It requires studying in advance, before arriving in the lab. Students are expected to come to lab **PREPARED**. This means you have **studied the protocols** beforehand and arrive with a basic understanding and plan for what you will be doing.

Finally, during the labs we evaluate the development of **techniques** and **skills**, which require students:

a. be on time
b. pay attention during instructions
c. carefully manage lab procedures (*e.g.* aseptic technique, proper waste disposal)
d. adapt to unforeseen procedural changes
e. develop accuracy
f. grow in their ability to work independently
g. be responsive to correction **(be teachable)**
h. be careful with university property
i. keep their workspace tidy
j. conduct themselves safely (*e.g.* consistently wear PPE, exercise caution with an open flame, etc)

You will be expected to get into the habit of methodical, well-planned and organized work by mid-quarter. This will help you with the experiments in the second half of the course.

6. Homework (22% of the course grade)

There will be three or four homework assignments during the quarter. The prompts will be posted on Canvas.

7. Office hours

Students are encouraged to come to **Dr. Gus' office hours**, which will be Wed, 2:00-2:50 PM. Even if you don't have questions prepared in advance, do come! If you are struggling or you don't know where to start, do come! I'm happy to tutor you. Even if you want to talk about other things, like grad school or career options, do come! I also make appointments for private meetings or zoom calls.

There will also sometimes be extra time at the end of lab, when you may talk with Dr. Gus or the IAs about any questions you have. (Don't forget the IAs can also help you be successful in this class!)

8. Film

There is one required film in this course, *Human Nature,* available through library reserves. It will be covered on the second exam (week 10). You will need to use a VPN on your computer if you are accessing library reserves from outside the UCSD protected network. More information is on Canvas, under "Films."

9. Lab practicum (5% of the course grade)

Students will individually demonstrate hands-on skills, showing mastery of T-streaking and phase-contrast microscopy of live bacteria.

10. Math quizzes (5% of the course grade)

Students will receive instruction and practice problems in basic lab math and dilutions. There will be several very short (10 minute) quizzes during labs. Days TBA.

10. Exams (42% of the course grade)

There are two exams. They are in-person and closed-book, closed-notes, with true/false, multiple choice, fill-in-the-blank and free response questions. The second exam is cumulative.

Exams will be graded using the Gradescope program, which will only see you answer if you place it within the designated box or blank. If you answer is not within the box (or blank), it will not be graded. Your handwriting must be legible; we will disregard answers which cannot be deciphered.

Exam 1	20% of your grade	Thur, Feb 8, in lecture (12:30-1:50)
Exam 2	22% of your grade	Thur, Mar 14, in lecture (12:30-1:50)

An **old exam** will be posted on Canvas. **Review sheets** (listing the topics/materials covered) will be posted on Canvas shortly before each exam. The IAs will conduct **review sessions** before each exam.

REGRADE POLICY

will be posted on Canvas

COMPONENTS OF THE COURSE GRADE

Component	weight
iClicker questions in lecture	6%
Homework	22%
Lab notebooks	12%
Professionalism	8%
Lab practicum	5%
Math quizzes	5%
Exam 1 (May 4, in lecture)	20%
Exam 2 (June 1, in lecture)	22%

Note: Just coming to lab does not ensure that you will get a passing grade in the class. You must hand in all assignments and get a passing score on those assignments to get a C- in the class. You will not pass the course if the combined score for your two exams is less than 50%.

GRADE DISTRIBUTION

A = 85% - 100%
B = 75% - 86.9%
C = 65% - 75.9%
D = 56% - 64.9%
F = below 56%

There will be pluses and minuses.

UCSD EMAIL

The UCSD Policy and Procedural Manual states that UCSD email is "a recognized and official means by which University officials (including your IA and instructor) may, at their discretion communicate with students." This means Your UCSD email is an official means of communication! The policy further states, "it is essential that students attend to messages sent to their official UCSD email address."

ACADEMIC INTEGRITY

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. **Academic misconduct** is defined as any prohibited, dishonest means to receive course credit, a higher grade, or avoid a lower grade. Academic misconduct misrepresents your knowledge and abilities, which undermines the instructor's ability to determine how well you're doing in the course.

The Office of Academic Integrity has compiled a useful list of tips here:
https://academicintegrity.ucsd.edu/take-action/covid-19-students.html

In this course, we need to establish a set of shared values. On the next page are values* adopted from the International Center for Academic Integrity, which serve as the foundation for academic integrity.

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

	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

BIMM 121 students are expected to do their own work, as outlined in the UCSD Policy on Academic Integrity. **Because all quizzes, exams, homework, and iClicker participation are required for satisfactory completion of this course, any student caught cheating on a quiz, exam, homework or iClicker participation may be given a failing grade for the course and referred to the Office of Academic Integrity for administrative discipline.** *Please* do not risk your future by cheating.

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.

Academic misconduct includes but is not limited to:

1. **Cheating**, such as using "crib notes" during an exam or copying answers from another student on an assignment.
2. **Plagiarism**, such as using the writings or ideas of another person, either in whole or in part, without proper attribution to the author or the source. Copying anything from any source is plagiarism if the source is not clearly cited. Plagiarism is stealing someone else's ideas and presenting them as your own.
3. **Collusion**, such as engaging in unauthorized collaboration on exams or assignments, completing for another student any part or the whole of an exam or assignment, or procuring, providing or accepting materials that contain questions or answers to an exam or assignment to be given at a subsequent time.

Your homework is to be your own work, *i.e*. **your own ideas** written in **your own words**. While lab partners may discuss data, **you may not view, copy or paraphrase, to any extent, current or past homework written by other students.** This is plagiarism**,** a direct attempt by the student to present the ideas of others as their own, and is no different than cheating on an exam. Although common data sets may be analyzed by the class, the creation and labeling of any figures, graphs, and tables must be done independently.

Further, **you are not to show your written work** to any other student.

If you have questions about the difference between discussing your work with others and unauthorized collaboration, please ask your instructor for clarification.

It is a violation of academic integrity to use another student's iClicker in class, or to allow another student to use your iClicker.

ACCESSIBILITY

http://disabilities.ucsd.edu | osd@ucsd.edu | 858-534-4382 (UCSD campus contact)

https://biology.ucsd.edu/education/undergrad/osd.html | bioosd@ucsd.edu (UCSD Biology)

Instructors are unable to provide accommodations unless they are first authorized by the Office for Students with Disabilities (OSD). Any student with a disability is welcome to contact me AND the Biology OSD liaison **early** in the quarter to work out reasonable accommodations to support their success in this course. Students requesting accommodations must first provide a current Authorization for Accommodation (AFA) letter issued by OSD. Receipt of the AFA by the biology liaison in advance is necessary for appropriate planning for the provision of reasonable accommodations. Arrangements for special exams require the student to coordinate together with the Biology OSD liaison.

For more information, contact the OSD at (858) 534-4382 (voice), **osd@ucsd.edu**, or visit **osd.ucsd.edu**

STUDENT RESOURCES

Click here for a video tour of student services and cultural centers across campus. This is a great place to start, for an excellent overview!

ACADEMIC SUPPORT

Geisel Library	Research tools and eReserves
Content Tutoring with the Teaching + Learning Commons	Drop-in and online tutoring through the Academic Achievement Hub
Supplemental Instruction with the Teaching + Learning Commons	Peer-assisted study sessions through the Academic Achievement Hub to improve success in historically challenging courses
Writing Hub Services in the Teaching + Learning Commons	Improve writing skills and connect with a peer writing mentor
Learning Strategies Tutoring	Address learning challenges with a metacognitive approach
OASIS	Intellectual and personal development support
Student Success Coaching Program	Peer mentor program that provides students with information, resources, and support in meeting their goals

TECHNICAL SUPPORT

UCSD Technical Support	Assistance with accounts, network, and technical issues (not MindTap)
Connect from Off-Campus	Help connecting to electronic library resources such as eReserves and e-journals
Computer labs	Find the locations of computer labs in different areas of campus.
Tech Lending Program	Circulates technology items to currently enrolled UCSD students to ensure that users have the technological means to complete coursework as efficiently as possible. TLP inventory consists mostly of frequently-requested items like device chargers, adapters (e.g., mini-HDMI to HDMI), flash drives, and headsets.
Technology Lending Request Form	Fill out this form for requests.
Tools for Remote Learning	Guidance on technology for students, including **Zoom** and **Canvas**, trouble-shooting and resources for internet access

PERSONAL SUPPORT

Basic Needs	Provides access to food, housing, and financial resources
Basic needs assistance forms	Assistance forms for a variety of services
Financial Aid and Scholarships	Answers to questions about financial aid and scholarships. Virtual counseling is available.
Financial Wellness	Access to emergency loans, appeals to increase financial aid, and financial literacy resources.
Counseling and Psychological Services (CAPS)	Provides confidential counseling, consultations, and workshops for psychiatric services and mental health programming
CAPS Crisis and Emergency Services	CAPS provides crisis and urgent counseling to students as well as emergency services.
Community Centers	As part of the Office of Equity, Diversity, and Inclusion the campus community centers provide programs and resources for students and contribute toward the evolution of a socially just campus
Office for Students with Disabilities	Documents students disabilities, provides accessibility resources, and reasonable accommodations
Student Affairs Case Management Services Get help at (858) 246-1111	Triages and addresses student distress by ensuring that students are connected to appropriate resources. Inclusive, comprehensive support services that empower UCSD students to address all aspects of their health and well-being.
CARE at the Sexual Assault Resource Center	Support for victims of sexual assault 858.534.5793

INCLUSION

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 | diversity@ucsd.edu | https://diversity.ucsd.edu/
https://students.ucsd.edu/student-life/diversity/index.html

DISCRIMINATION AND HARASSMENT

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, or obligation 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/ , or http://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.

LETTERS OF RECOMMENDATION

If you might want a letter of recommendation, consider what a good letter would contain and how your actions in the course demonstrate the qualities you want highlighted in a letter. When students ask me for a letter of recommendation, I ask them to describe how they demonstrated critical thinking, leadership, collaboration, and professionalism. I will be looking for examples of these qualities *that I could have noticed* during lecture, lab and office hours. Actively participate in lecture and lab discussions. Talk to me in office hours: ask questions, offer your own ideas and interpretations, bring interesting facts/papers that are connected to the course material. If you don't actively show the qualities that are needed to earn a good letter, it will be hard for me to write a letter that is meaningful and useful.

SUBJECT TO CHANGE POLICY

The information contained in the course syllabus, other than the grade and absence policies, may be – under certain circumstances (*e.g.* to enhance student learning) – subject to change with reasonable advance notice, as deemed appropriate by the instructor.

LAB SCHEDULE

Text colors: Basics, Working with microbes, Microbes as models, Microbes in the World, Microbes as Food

week	date	lab manual sections and activity
1	Tu, Jan 9	BASICS1 - micropipetting A1 - swab surfaces and plate microbes
	Th, Jan 11	examine plates from A1 A2 – inoculate liquid culture in test tube, using aseptic technique A3 - streak plate of *Pseudomonas fluorescens* SBW25
2	Tu, Jan 16	Examine tubes from A2 & streak plates from A3 BASICS2 – microscopy with prepared slides
	Th, Jan 18	B1 - set up microcosms for biofilm evolution
3	Tu, Jan 23	B2 - observe vials (microcosms) B3 - streak out bacteria from vials (microcosms) B4 – make wet mounts of bacteria from microcosms, observe with phase contrast microscopy B5 - dilute & plate bacteria from vials (microcosms)
	Th, Jan 25	B3 - examine streak plates of bacteria from vials B6 - count colonies on dilution plates from B5 B7 – prepare fixed and stained slides of bacteria from B5 C1 - inoculate liquid cultures with bacteria from B5
4	Tu, Jan 30	C2 – make freezer stock of bacteria C3 - extract genomic DNA from bacteria
	Th, Feb 1	C4 - nanodrop spectroscopy – estimate DNA concentration and quality C5 - qubit fluorescence analysis – quantitate DNA
5	Tu, Feb 6	C6 – preparation of DNA library for Illumina sequencing, part 1
	Th, Feb 8	C7 - preparation of DNA library for Illumina sequencing, part 2 C8 - qubit fluorescence analysis – quantitate DNA, aliquot for tape station (bioanalyzer)
6	Tu, Feb 13	C9 - submit DNA library for Illumina sequencing D1 - calibrate microscope with stage micrometer
	Th, Feb 15	D2 – make wet mounts of tardigrades, algae survey mix, *Bacillus subtilis* and observe with phase contrast microscopy E1 - make yogurt

7	Tu, Feb 20	E2 - compare yogurt – observe wet-mounts, Gram stains F1 - streak heirloom yogurt on MRS plates, streak commercial yogurt on *S. thermophilus* agar plates
	Th, Feb 22	G1 - PCR amplify CRISPR loci from *S. thermophilis*
8	Tu, Feb 27	G2 – run PCR product on agarose gel G3 – submit PCR product for Sanger sequencing
	Th, Feb 29	G4 – analyze CRISPR sequences to find spacers, blast for virus match G5 - determine strain ID of *Streptococcus thermophilus* G6 - search for evidence of HGT (horizontal gene transfer)
9	Tu, Mar 5	C10 - unix tutorial H1 - QIIME (16S amplicon metagenomic analysis) part 1
	Th, Mar 7	H2 - QIIME (16S amplicon metagenomic analysis) part 2
10	Tu, Mar 12	C11 - examine fastq, locate sequence files C12 - sequence alignment, identify mutations with breseq software
	Th, Mar 14	C13 - research mutations

Don't forget the dates of the exams!

Exam 1 Thur, Feb 8, in lecture (12:30-1:50)

Exam 2 Thur, Mar 14, in lecture (12:30-1:50)