Microbiology Laboratory

BIMM 121

Winter 2023

INSTRUCTOR: Cindy Gustafson-Brown (Dr. Gus)

office location: Humanities and Social Sciences 1145F office hours: Tuesdays, 2-3 PM (starting during week 2), location TBA email: cgb@ucsd.edu IF YOU EMAIL, PUT <u>BIMM 121</u> IN THE SUBJECT LINE.

IN YOUR EMAIL, INCLUDE YOUR:

- First and last name
- PID
- Section number
- IA name

Please present your questions about course material <u>in person</u> during office hours, not by email. I cannot guarantee an answer to your email, unless it is an urgent issue.

LECTURE: Tu/Th 12:30-1:50 PM, in-person in Sequoyah 148, Lectures will be podcast.

LABS:TATA Hall 2101 and 2102Weeks 1-7Thurs 3-4 PM (except Feb 2 and Feb 23 exams which will be until 4:30)Weeks 8-10either Tues or Thurs (check class calendar) 3-5:50 PM

INSTRUCTIONAL ASSISTANTS (IAs)

B01Joseph Ohjuo014@ucsd.eduB02Eesha Ranganierangani@ucsd.edu

COURSE STRUCTURE

In this class we will explore microbes in the world around us, with an emphasis on laboratory methods to better understand them. You will learn about classic and contemporary methods in microbiology, bacterial physiology, the roles of microbes in the nitrogen cycle, antibiotics, the use of microbes in food science

Due to the 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 many fewer "wet-lab" activities than usual. All BIMM 121 instructors are following the same general plan.

During weeks 1-7, we will have lectures and one hour per week of a "dry lab." The dry lab activities will provide training in lab math, data analysis, scientific reasoning, scientific writing and bioinformatics. Also, the first two exams will take place in the dry lab session.

During weeks 8-10, we will have lectures and three hours per week of a "wet lab." You will have the opportunity work with microbes, including practicing basic aseptic technique, staining bacteria, and observing microbes under the microscope.

REQUIRED EQUIPMENT

For this lab 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. a calculator
- 2. To dry labs in weeks 1-7
 - a. an iClicker
 - b. a calculator
 - c. a laptop computer would be helpful on certain days (There are some Apple computers in the lab, but not enough for every student.)
- 3. To wet labs in weeks 8-10
 - a. a 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.
 - b. a lab coat (extending to your knees)
 - c. eye protection (You may wear either safety glasses or goggles, although goggles tend to fog; standard prescription eye glasses are NOT sufficient. You must be able to look through a microscope while wearing the safety glasses, so they should not bulge outward.)
 - d. long pants (not leggings, not anything tight-fitting, not cropped)
 - e. closed-toed shoes (no sandals, flip-flops, or other open footwear)
 - f. something to tie back long hair

LAB SAFETY TRAINING

Enrolled and waitlisted students MUST successfully complete the Biology Lab Safety Training and Assessment within the first week of class:

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

ATTENDANCE AND ABSENCES

- 1. Your attendance is required at EVERY lab, both the dry labs and the wet labs. You will be engaging in lab activities for the entire scheduled lab session (1 hour for dry labs and 3 hours for wet labs).
- 2. 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.
- **3.** If you are **ill or have an emergency** on a day or when there is a lab, exam or assignment due, email (instructor and IA) <u>before</u> the start of lab, the due date, or exam. 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.

- 4. UCSD's policy is that "<u>Vaccinated</u> students who have been <u>exposed</u> [to COVID-19] are allowed to attend class and move about campus <u>masked</u>" which includes attending inperson exams. This does not include people who have COVID symptoms or a positive test result. You can find an up-to-date policy and more details here: <u>https://returntolearn.ucsd.edu/return-to-campus/exposure-contact-tracing/index.html</u>
- **5. 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.
- 6. Tardiness in the lab will impact your grade. You will miss a quiz (which starts at 3 PM). You will also miss important announcements and instructions. If you are late more than once, you will receive a 2% penalty for each additional infraction.

ASSIGNMENT DEADLINES AND SUBMISSION POLICIES:

1. HW1 (Dilutions 1), HW4 (Dilutions 2), and the Concept Analysis Paper are to be turned in as a hard copy, <u>on paper</u>, at the **START of lecture on Tuesday**. Hard copies turned in more than 10 minutes after the start of class will be considered late. The penalty for late assignments is 40%, if turned in by 5 PM the next day. Assignments will not be accepted after that. It is <u>your</u> responsibility to make arrangements with your IA, **in advance**, to turn in the late work.

In addition to the hard copy, you are required to submit an electronic copy of the <u>Concept Analysis Paper</u> to Turnitin through the link on Canvas. Failure to submit to Turnitin will result in zero points.

By taking this course, students agree that their papers will be subject to review for textual similarity by Turnitin for the detection of plagiarism. All submitted papers 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.

- 2. All other homeworks will be submitted to Gradescope via Canvas by 11 AM on Tues.
- **3.** 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)

BEFORE YOU START THIS COURSE

BILD 1 is a prerequisite for this course. It is assumed that you already have a basic (BILD 1level) 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.

- 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
- the scientific method (variables, controls, etc)
- using Excel spreadsheets

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

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

You will find a module posted on Canvas corresponding to each week. Within that module you will find 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 <u>before</u> lecture, rather than <u>after</u> 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 <u>physical</u> 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 (8% of the course grade)

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 **Thursday, Jan 12**. We will start recording clicker points on **Tuesday, Jan 17**. As you prepare, 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 chance 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

- a. **Orange box (quiz) questions** = **4%** of your grade.
 - Get **70%** 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** = 4% 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 <u>full</u> 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 some margin into the system, to allow for missing days and/or questions.

Clicker scores will <u>not</u> 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 (once per week)

Weeks 1-7: We will have a one-hour "dry lab" on Thursday. The dry lab activities will provide training in lab math, data analysis, scientific reasoning, scientific writing and bioinformatics. Also, the first two exams will take place in the dry lab session.

Weeks 8-10: We will have a three-hour "wet lab." B01 will meet on Tuesdays and B02 will meet on Thursdays. You will have the opportunity work with microbes, including practicing basic aseptic technique, staining bacteria, and using microscopes.

4. Math quizzes (3% of the course grade)

There will be five short (6-7 minute) math quizzes. These quizzes will take place at 3 PM during the dry labs on Jan 19 and 26, Feb 9 and 16, and finally on either Feb 28 or Mar 2, depending on your section. The lowest quiz score will be dropped.

5. Homework (15% of the course grade)

There will be seven homework assignments during the quarter. Three are due as hard copies at the START of lecture, **12:30 PM on Tuesday**. (See late policy, above.) Other, online submissions, are due at **11 AM Tuesday**. Prompt will be posted on Canvas the prior Thurs.

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

Keeping a thorough and organized lab notebook is an essential skill for any lab researcher. Prior to the wet labs, you will receive instruction on how to keep a good lab notebook. When we have wet labs (weeks 8-10), you will write up your results in your lab notebook. At the end of each lab, you will tear out the carbon copies, staple them neatly, and turn them in to your IA for grading.

7. Office hours

Students are encouraged to come to **Dr. Gus' office hours**, which will be Tuesday, 2-3 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 zoom calls or meetings.

Students are also encouraged to attend the office hours of **the IAs**. They can help you be successful in this class!

8. Professionalism (3% 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. Your attitude, cooperation with others, respectfulness, conscientiousness, work ethic, integrity and scientific approach throughout

the course will contribute to your professionalism score. 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 advance study, before arriving in the lab. During weeks 8-10, when we have wet labs, 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 wet labs we evaluate the development of **techniques** and **skills**, which require students:

- a. pay attention during instructions
- b. be responsive to correction (be teachable)
- c. be careful with university property
- d. conduct themselves safely

9. Concept analysis paper (7% of the course grade)

There will be one paper due at the START of lecture on March 14. The prompt for this paper will be posted on Feb 21. This assignment requires you research a topic in microbiology by finding at least three research papers on the subject and then write a brief analysis. It will be limited to five pages.

10. Exams (60% of the course grade)

There are three exams. They are in-person and closed-book, closed-notes, primarily short answer with a few true/false, multiple choice, and fill-in-the-blank questions.

Because the later topics in this lab build on the earlier ones, ALL of the exams are **comprehensive**.

 a. Exam 1
 18% of your grade
 Feb 2, in dry lab (3:00-4:30)

 b. Exam 2
 20% of your grade
 Feb 23, in dry lab (3:00-4:30)

 c. Exam 3
 22% of your grade
 March 16, in lecture (12:30-1:50)

Your handwriting must be legible; we will disregard answers which cannot be deciphered. The IAs will hold **review sessions** the evening before each exam.

Dr. Gus will post review sheets shortly before each exam.

There are no old exams for this course.

REGRADE POLICY

will be posted on Canvas

COMPONENTS OF THE COURSE GRADE

Component	quantity	weight
iClicker questions in lecture	-	8%
Math quizzes (lowest dropped)	5	3%
Homework	7	15%
Lab notebooks	3	4%
Professionalism	-	3%
Concept analysis paper	1	7%
Exam 1 (Feb 2, in dry lab)	1	18%
Exam 2 (Feb 23, in dry lab)	1	20%
Exam 3 (March 16, in lecture)	1	22%

Note: Just coming to lab does not ensure that you will get a passing grade in the class. You must hand in <u>all</u> 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 three exams is less than 50%.

There will be pluses and minuses.

GRADE DISTRIBUTION

A = 88% - 100%B = 77% - 87.9%C = 66% - 76.9%D = 57% - 65.9%F = below 57%

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

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!

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 <u>creation and labeling</u> 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.

Regarding the Concept Analysis Paper, copying material from another source without putting it between quotation marks is plagiarism, even if the source is cited as a reference. In science writing it is not customary to directly quote others. Rather, you should paraphrase (or summarize) the ideas of your source **in your own words** and then *cite the reference*.

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

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.

In this course, we need to establish a set of shared values. On the next page are values* adopted from the <u>International Center for Academic Integrity</u>, 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

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 <u>first authorized</u> 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), <u>osd@ucsd.edu</u>, or visit <u>osd.ucsd.edu</u>

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

Technical Support	Assistance with accounts, network, and technical issues
Connect from Off-Campus	Help connecting to electronic library resources such as eReserves and e-journals

STUDENT RESOURCES

Basic Needs	Provides access to food, housing, and financial resources
Counseling and Psychological Services (CAPS)	Provides confidential counseling and consultations for psychiatric services and mental health programming
Community Centers	As part of the <u>Office of Equity, Diversity, and</u> <u>Inclusion</u> 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
Triton Concern Line	Report students of concern at (858) 246-1111
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, <u>https://ophd.ucsd.edu/</u>, or <u>http://ophd.ucsd.edu/report-bias/index.html</u>

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.

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.

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.

TENTATIVE CLASS SCHEDULE

yellow = lectures green = dry labs lavender = wet labs

week	date	lecture/lab	session topic	Homework due, or quiz
	Jan 10	lecture 1	Overview of course	
1	Jan 12	lecture 2	Intro to microbes, relative sizes, identifying microbes	
	Jan 12	dry lab activity 3-4 PM	Dilutions, Measurements with micropipettors	
	Jan 17	lecture 3	Dilutions, Culturing microbes, Lab media	HW 1 – Dilutions 1*
2	Jan 19	lecture 4	Culturing microbes, Lab media, Water contamination	
	Jan 19	dry lab activity 3-4 PM	Scientific method & experimental design	Math quiz 1
	Jan 24	lecture 5	Bacterial growth curve, Measuring microbial growth	HW 2 – Exp't design 1
3	Jan 26	lecture 6	Measuring microbial growth	
	Jan 26	dry lab activity 3-4 PM	Data analysis, Excel	Math quiz 2
	Jan 31	lecture 7	Endospores, Motility	HW 3 – Data analysis 1
4	Feb 2	lecture 8	Utilization of macronutrients	
	Feb 2	dry lab activity 3-4:30 PM	EXAM 1 (lectures 1-7)	
	Feb 7	lecture 9	Energy production, O2 requirement	HW 4 – Dilutions 2*
5	Feb 9	lecture 10	Fermentation tests, Kligler iron deeps	
	Feb 9	dry lab activity 3-4 PM	Reading research papers, Scientific writing	Math quiz 3
6	Feb 14	lecture 11	Finish Scientific writing, Extreme conditions	HW 5 – Data analysis 2
	Feb 16	lecture 12	Nitrogen cycle, Special metabolic tests	
	Feb 16	dry lab activity 3-4 PM	Bioinformatics tools	Math quiz 4

	Feb 21	lecture 13	Soft skills, working in a lab, keeping lab notebooks	HW 6 – Exp't design 2
7	Feb 23	lecture 14	CRISPR, Streaking/spreading plates	
	Feb 23	dry lab activity 3-4:30 PM	EXAM 2 (lectures 1-13)	
F	Feb 28	lecture 15	Antibiotics, antibiotic resistance	HW 7 – Plagiarism
0	Feb 28	B01 wet lab 3-5:50 PM	micropipetting, surface sampling, inoculation	Math quiz 5 (B01)
8	Mar 2	lecture 16	Yogurt/cheese production	
	Mar 2	B02 wet lab 3-5:50 PM	micropipetting, surface sampling, inoculation	Math quiz 5 (B02)
9 <mark>M</mark> 9 M M	Mar 7	lecture 17	Microscopy (brightfield, dark field)	none
	Mar 7	B01 wet lab 3-5:50 PM	T-streaks, microscopy with prepared slides	
	Mar 9	lecture 18	Microscopy (phase contrast, wet mounts)	
	Mar 9	B02 wet lab 3-5:50 PM	T-streaks, microscopy with prepared slides	
	Mar 14	lecture 19	Simple and Gram staining	Concept analysis paper*
10	Mar 14	B01 wet lab 3-5:50 PM	microscopy w/ wet-mounts, gram stains of yogurt	
	Mar 16	lecture 20	EXAM 3 (lectures 1-19)	
	Mar 16	B02 wet lab 3-5:50 PM	microscopy w/ wet-mounts, gram stains of yogurt	

*HW1 (Dilutions 1), HW4 (Dilutions 2), and the Concept Analysis Paper are to be turned in as a **hard copy**, <u>on paper</u>, at the START of lecture. All other homeworks will be submitted online, to Gradescope via Canvas, **by 11 AM**.