

WE WON'T LET COVID STOP US! EVEN THOUGH WE CAN'T CARRY OUT EXPERIMENTS AT THE BENCH, YOU WILL STILL LEARN FUNDAMENTAL AND REAL SKILLS REQUIRED FOR WORK IN MICROBIOLOGY. TOGETHER, WE WILL EXPLORE THE ROLES OF MICROBES AS MODELS, MICROBES AS FOOD, AND MICROBES IN THE WORLD. YOU WILL LEARN HOW TO USE SCIENTIFIC LITERATURE, HOW TO DESIGN EXPERIMENTS, AND HOW TO ANALYZE DATA, INCLUDING BIOINFORMATIC ANALYSIS OF MICROBIAL GENOMES.

LECTURE, T+H 9:30-10:50

LAB, T+H, 11-1:50

INSTRUCTOR **DR. KATHERINE PETRIE**

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OFFICE HOURS: H 3-5 PM

sign up at: <https://calendly.com/kpetrie>

IAS

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HOW IS THE  
COURSE SET  
UP?

## COURSE STRUCTURE:

**LECTURES:** DURING LECTURE WE WILL GO OVER IMPORTANT CONCEPTS AND BACKGROUND INFORMATION NEEDED TO ACCOMPLISH YOUR LAB TASKS. LECTURES WILL BE LIVE ON ZOOM AND THEY WILL BE RECORDED. YOU ARE ENCOURAGED TO ATTEND THE LIVE LECTURE, BUT LECTURE ATTENDANCE IS NOT MANDATORY (YOU WILL NEED TO WATCH THE RECORDINGS TO DO WELL).

**LABS:** LIVE LAB SESSIONS WILL BE HELD ON ZOOM DURING THE REGULARLY SCHEDULED TIME. YOU WILL WORK IN SMALL GROUPS TO COMPLETE EACH DAY'S LAB TASKS. LAB ATTENDANCE IS REQUIRED AND WILL CONTRIBUTE TO YOUR GRADE. YOU MUST ATTEND THE LAB SECTION YOU ARE OFFICIALLY ENROLLED IN. YOU WILL DOCUMENT EACH LAB'S ACCOMPLISHMENTS IN A DAILY LAB NOTEBOOK, AND THERE WILL BE 3 LAB WRITE-UPS DUE THROUGHOUT THE QUARTER.

## MATERIALS NEEDED TO SUCCEED:

**A COMPUTER:** IN THIS CLASS, YOU WILL NEED A COMPUTER OR A LAPTOP TO INTERACT WITH CLOUD COMPUTING RESOURCES ONLINE. OPERATING SYSTEM (MAC/LINUX/UNIX/PC) DOESN'T MATTER, BUT MOBILE DEVICES (IPADS, SMARTPHONES, ETC.) WILL NOT BE SUFFICIENT FOR THE BIOINFORMATICS WORK WE DO STARTING IN WEEK 5. IF YOU DO NOT HAVE ACCESS TO A COMPUTER AT HOME, PLEASE SEE 'CAMPUS AND COMMUNITY RESOURCES' ON OUR CANVAS PAGE TO REQUEST A LOANER.

**INTERNET ACCESS:** ALL COURSE DOCUMENTS WILL BE POSTED ON CANVAS, SO YOU'LL NEED THE INTERNET TO GET THEM. ADDITIONALLY, ALL BIOINFORMATICS WORK WILL BE DONE IN A CLOUD COMPUTING ENVIRONMENT, SO YOU'LL HAVE TO BE CONNECTED TO DO YOUR WORK FOR THE CLASS.

**ZOOM ACCESS AND A MIC:** FOR LIVE CLASS MEETINGS.

**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 (\$25) FOR PACKBACK ACCESS. IF YOU DROP THE CLASS, YOU MUST OPT OUT BY 1/16 TO AVOID BEING BILLED.

**ASSESSMENTS AND BASIS FOR FINAL GRADE:**

HOW WILL YOU BE GRADED?

ASSESSMENT	WEIGHT
QUIZZES	35 %
LAB WRITE-UPS (TOTAL)	35 %
LAB NOTEBOOK	15 %
PACKBACK	13 %
REFLECTION ASSIGNMENTS (SURVEYS)	2 %

**GRADING SCALE**

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

FOR ASSIGNMENT GUIDELINES + RUBRICS, STAY TUNED TO TRITON ED!

NO BELL CURVE: YOU WON'T BE COMPETING AGAINST EACH OTHER!

**ASSESSMENTS IN BRIEF:****QUIZZES (35% OF GRADE):**

WEEKLY QUIZZES WILL COVER MATERIAL FROM THE PREVIOUS WEEK'S LECTURES AND LABS. QUIZZES WILL BE AVAILABLE FROM 5 PM SUNDAY UNTIL 5 PM MONDAY, AND CAN BE TAKEN ANY TIME WITHIN THAT WINDOW. ONCE YOU OPEN A QUIZ, YOU MUST COMPLETE IT WITHIN 1 HOUR. QUIZZES ARE OPEN-NOTE, BUT YOU MUST WORK ON YOUR OWN - ANY CONSULTATION WITH HUMANS OR HELP-SERVICES WILL BE CONSIDERED VIOLATIONS OF ACADEMIC INTEGRITY. YOUR LOWEST SCORING QUIZ WILL BE DROPPED. THE FIRST QUIZ WILL BE AVAILABLE OCTOBER 11TH.

**LAB-WRITE UPS (35% OF GRADE)**

THERE WILL BE THREE LAB WRITE-UPS. YOUR LOWEST SCORING LAB WRITE UP WILL BE DROPPED.

**LAB NOTEBOOK (15% OF GRADE)**

YOU MUST COMPLETE A LAB NOTEBOOK ENTRY FOR EVERY LAB SESSION. THESE WILL BE WORTH 10 POINTS EACH, AND 2 OF THOSE POINTS COME FROM ATTENDANCE. LAB NOTEBOOKS WILL BE CHECKED ONCE A WEEK, AT A TIME OF THE IA'S CHOOSING, SO KEEP YOUR NOTEBOOKS UP TO DATE. YOUR 2 LOWEST SCORING LAB NOTEBOOKS WILL BE DROPPED.

**PACKBACK (13% OF GRADE)**

THIS AI-MODERATED DISCUSSION FORUM IS A KEY LEARNING TOOL FOR THE CLASS. IT 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 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 2 PACKBACK WEEKS.

**REFLECTION ASSIGNMENTS (2% OF GRADE)**

THESE BRIEF, REFLECTIVE SURVEYS WILL BE SCORED FOR COMPLETION - THEY'RE EASY POINTS!

## WHY SYNCHRONOUS LAB SESSIONS?

THESE ARE DARK AND DIFFICULT TIMES, AND NONE OF US WISHED FOR THIS TO BE HAPPENING. BUT IT IS UP TO US TO DECIDE WHAT TO DO WITH THE TIME WE ARE GIVEN. IT IS MY GOAL TO ENABLE YOU ALL TO LEARN AND GROW THIS QUARTER. WE ALL MAY BE IN UNIQUE LIVING SITUATIONS OR FACING NEW OR DIFFICULT RESPONSIBILITIES AND WORRIES. BECAUSE OF THIS, I AM TRYING TO MAKE THIS CLASS AS FLEXIBLE AS POSSIBLE, WHILE STILL ENSURING WE MAKE PROGRESS TOWARDS OUR LEARNING GOALS. WE ARE HAVING LIVE LAB SESSIONS TO HELP YOU LEARN AS EFFECTIVELY AS WE POSSIBLY CAN, AND TO CREATE A SENSE OF ACADEMIC COMMUNITY DURING THIS TIME OF SOCIAL DISTANCING.

IF CIRCUMSTANCES RELATED TO COVID (I.E. LIVING IN A DIFFERENT TIMEZONE) MAKE IT CONSISTENTLY DIFFICULT FOR YOU TO ATTEND LAB SESSIONS, ACCOMMODATIONS MAY BE MADE AVAILABLE ON A CASE-BY-CASE BASIS. PLEASE CONTACT DR. PETRIE TO DISCUSS.

### IF YOU NEED TO MISS LAB ONCE OR TWICE...

IF YOU CAN'T MAKE IT TO LAB FOR AN UNEXPECTED REASON, YOU MUST LET DR. PETRIE KNOW. YOU WILL STILL BE RESPONSIBLE FOR WHAT YOU MISSED. IF YOUR REASON IS APPROVED, (EMERGENCY, ILLNESS, COVID-RELATED ISSUE, GRAD SCHOOL INTERVIEW, ETC), YOU WILL BE GIVEN AN ALTERNATIVE WAY TO GET YOUR 2 ATTENDANCE POINTS FOR YOUR NOTEBOOK THAT DAY. ENROLLMENT IN ANOTHER COURSE IS NOT CONSIDERED A VALID EXCUSE.

IF HEALTH OR FAMILY EMERGENCIES MAKE YOU MISS TOO MUCH, SEE DR. PETRIE TO DISCUSS THE POSSIBILITY OF AN "INCOMPLETE". PER UCSD POLICY, YOUR GRADE MUST BE IN GOOD STANDING 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 CANVAS.

### WHAT ABOUT LATE ASSIGNMENTS?

EVERYONE GETS 2, 1-DAY EXTENSIONS THAT CAN BE USED ON LAB WRITE-UPS OR LAB NOTEBOOKS. ADDITIONAL LATE ASSIGNMENTS 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.

## WE'RE WORKING TO IMPROVE YOUR EDUCATIONAL EXPERIENCE:

DID YOU KNOW THAT YOU CAN BE PART OF A RESEARCH STUDY IN THIS CLASS?



NO! NOT LIKE THAT! INSTEAD, DURING THIS CLASS, I'LL BE WORKING TO FIGURE OUT THE MOST EFFECTIVE TEACHING METHODS FOR YOUR LEARNING. THIS MEANS YOU MIGHT DO SURVEYS AND PROVIDE FEEDBACK. FOR MORE INFORMATION, PLEASE READ THE INFORMATION AT THE END OF THIS SYLLABUS

## COURSE SCHEDULE (TENTATIVE):

## WEEK 1:

1/5 LECTURE: COURSE SET-UP, INTRO TO MICROBES + BIOFILMS  
LAB: INTRODUCTIONS + DILUTIONS

1/7 LECTURE: SBW25 BIOFILM EVOLUTION, PROPOSAL GOALS  
LAB: DISCUSS PAPER, WRITE BIOFILM PROPOSAL

MICROBES AS  
MODELS

## WEEK 2:

1/12 LECTURE: HOW TO ID MICROBES 1, ASEPTIC TECHNIQUE  
LAB: PROPOSAL EVALUATION

1/14 LECTURE: MEASURING CULTURE DENSITY  
LAB: CRITIQUE ASEPTIC TECHNIQUE VIDEO

## WEEK 3:

1/19 LECTURE: MICROCOSM RESULTS, CALCULATE FREQUENCY  
LAB: SERIAL DILUTION ACTIVITY

1/21 LECTURE: HOW TO ID MICROBES 2  
LAB: COUNT COLONIES, INTERPRET DATA

## WEEK 4:

1/26 LECTURE: MICROBIOMES, SANGER SEQUENCING, PCR  
LAB: PAPER DISCUSSION

1/28 LECTURE: METAGENOMIC 16S SEQUENCING  
LAB: MICROBES@HOME PROPOSAL

MICROBES IN  
THE WORLDMICROBES AS MODELS  
WRITE-UP DUE MON 2/1

## WEEK 5:

2/2 LECTURE: MICROBES IN FOOD, FERMENTATION  
LAB: HOME SAMPLING, CLOUD COMPUTING

2/4 LECTURE: CRISPRS IN YOGURT 1  
LAB: PAPER DISCUSSION, CRISPR ARRAY SIZE COMPARISON

MICROBES AS  
FOOD

## WEEK 6:

2/9 LECTURE: CRISPRS IN YOGURT 2  
LAB: CRISPR-CAS FINDER + BLAST

2/11 LECTURE: CRISPRS IN YOGURT 3  
LAB: HGT EVIDENCE SEARCH (BACTERIA TO BACTERIA)

MICROBES AS  
FOOD



**COURSE SCHEDULE (TENTATIVE):****WEEK 7:**

2/16 LECTURE: OTHER TYPES OF HORIZONTAL GENE TRANSFER  
LAB: HGT EVIDENCE SEARCH (PHAGE GENES TO BACTERIA)

2/18 LECTURE: INTRODUCTION TO COMMAND LINE  
LAB: UNIX TUTORIAL + INSPECT SEQUENCE FILES

BIOINFORMATICS  
INTRODUCTION

MICROBES AS FOOD  
WRITE-UP DUE MON 2/22

**WEEK 8:**

2/23 LECTURE: RESEQUENCING (WHOLE GENOME ILLUMINA)  
LAB: FASTQC + FILTER DATA

2/25 LECTURE: COMMON MUTATIONS IN SBW25  
LAB: BRESEQ, DISCUSS RESULTS

MICROBES AS  
MODELS

**WEEK 9:**

3/2 LECTURE: INTRO TO AMPLICON METAGENOMIC ANALYSIS  
LAB: QIIME 1

3/4 LECTURE: DIVERSITY METRICS + PCA  
LAB: QIIME 2

MICROBES IN  
THE WORLD

BIOINFORMATICS  
WRITE-UP DUE MON 3/8

**WEEK 10:**

3/9 LECTURE: WRAP-UP LECTURE  
LAB: QIIME 3

3/11 LECTURE: OPTIONAL OFFICE HOURS  
LAB: MICROBES@HOME PRESENTATIONS

**ACADEMIC INTEGRITY:**

AN INCLUSIVE ENVIRONMENT IS ONE WHERE EVERYONE HAS AN EQUAL OPPORTUNITY TO SUCCEED. ACADEMIC DISHONESTY (INCLUDING, BUT NOT LIMITED TO: CHEATING, PLAGIARIZING, USING CHEGG OR COURSE HERO) FRACTURES THE PLAYING FIELD, BY GIVING SOME STUDENTS AN UNFAIR ADVANTAGE. ALL MATERIAL WILL BE MONITORED VIA TURN-IT-IN, AND STUDENTS FOUND TO HAVE COMMITTED ACADEMIC DISHONESTY WILL BE REFERRED TO THE UCSD ACADEMIC INTEGRITY OFFICE AND MAY RECEIVE A FAILING GRADE FOR THE COURSE.

University of California, San Diego  
Consent to Act as a Research Subject

Investigating the Impact of Pedagogical Choices on University Student Learning and Engagement

***Who is conducting the study, why you have been asked to participate, how you were selected, and what is the approximate number of participants in the study?***

Gabriele Wienhausen, Director of the Teaching and Learning Commons, together with her education research colleagues is conducting a research study to find out more about how pedagogical choices affect student learning and experience in the classroom. You have been asked to participate in this study because you are a student in a class that is being studied or used as a control. There will be approximately 500,000 participants in this study.

***Why is this study being done?***

The purpose of this study is to create knowledge that has the potential to improve the learning and educational experience of students at UC San Diego and beyond.

***What will happen to you in this study and which procedures are standard of care and which are experimental?***

If you agree to be in this study, the following will happen:

- Your data from this class including grades, homework and exam submissions, and survey responses will be included in the analysis to determine the effectiveness of the pedagogical techniques used in this course compared to other similar courses.

***How much time will each study procedure take, what is your total time commitment, and how long will the study last?***

Your participation involves only agreeing to let us use your data in our analysis. It will require no time on your part above the time you put into this course without agreeing to the study.

***What risks are associated with this study?***

Participation in this study may involve some added risks or discomforts. These include the following:

1. A potential for the loss of confidentiality. We will not share your personally identifying data with people outside our research team. Data will only be kept in anonymized form for research purposes. Course data will not be used for this research study until after final grades have been posted and will be rendered confidential by removing any identifiers before analysis. Your instructor will not know whether or not you are participating in this study until after final grades have been posted. Data from students who opt out of the study will be removed prior to data analysis. Research records will be kept confidential to the extent allowed by law. Research records may be reviewed by the UCSD Institutional Review Board.

Since this is an investigational study, there may be some unknown risks that are currently unforeseeable. You will be informed of any significant new findings.

***What are the alternatives to participating in this study?***

The alternatives to participation in this study are not to participate. If you choose to opt-out of participating in this research study, we will exclude your data from analysis. Whether you participate will have no impact on your experience or grade in the associated class as the professor will not know who is or is not participating in the study until after final grades are assigned.

***What benefits can be reasonably expected?***

There is no direct benefit to you for participating in the study. The investigator, however, may learn more about how to improve student learning, and society may benefit from this knowledge.

***Can you choose to not participate or withdraw from the study without penalty or loss of benefits?***

Participation in research is entirely voluntary. You may refuse to participate or withdraw or refuse to answer specific questions in an interview or on a questionnaire at any time without penalty or loss of benefits to which you are entitled. If you decide that you no longer wish to continue in this study before the end of the quarter, simply respond to the online opt-out form here: <https://goo.gl/forms/JSBRjEmkES6W6xYc2>. If you decide to opt out after the quarter has ended, you must contact Laurel Nelson ([laureln@ucsd.edu](mailto:laureln@ucsd.edu)) and give the quarter and the course from which you would like your data withdrawn.

You will be told if any important new information is found during the course of this study that may affect your wanting to continue.

***Can you be withdrawn from the study without your consent?***

The PI may remove you from the study without your consent if the PI feels it is in your best interest or the best interest of the study. You may also be withdrawn from the study if you do not follow the instructions given you by the study personnel.

***Will you be compensated for participating in this study?***

You will not be compensated for participating in this study.

***Are there any costs associated with participating in this study?***

There will be no cost to you for participating in this study.

***Who can you call if you have questions?***

Gabriele Wienhausen and/or her colleague has explained this study to you and answered your questions. If you have other questions or research-related problems, you may reach Gabriele Wienhausen at [gwienhausen@ucsd.edu](mailto:gwienhausen@ucsd.edu) or (858) 534-3958.

You may call the Human Research Protections Program Office at 858-246-HRPP (858-246-4777) to inquire about your rights as a research subject or to report research-related problems.

***Your Consent***

If you consent to participate in this study, no action is needed. If you DO NOT consent to participate in this study, or you choose to opt-out at any time during the quarter, please submit this form online at [https://docs.google.com/forms/d/e/1FAIpQLScs0Cznypp4SxQJOsFMgP9nFDjJ0zzYPISBWsiP3\\_wiWkdjaA/viewform](https://docs.google.com/forms/d/e/1FAIpQLScs0Cznypp4SxQJOsFMgP9nFDjJ0zzYPISBWsiP3_wiWkdjaA/viewform). Your instructor will not have access to the list of students who opted out until after grades are posted. Note that you must separately opt-out of the study for each course involved in this study.

[ ] I am not 18 years or older or I do not consent to anonymized research use of my data from the course specified below.

Course name: \_\_\_\_\_

Course section number: \_\_\_\_\_

Term: \_\_\_\_\_

Name: \_\_\_\_\_

PID: \_\_\_\_\_