

UCSD BIMM 121: Microbiology Lab

Lab Schedule **Winter** 2024

Quarter start: **1/8/24**

Quarter end: 3/15/24

Professor: **Dr. Brooke Pickett**

Professor contact: bpickett@ucsd.edu

Office Hour: M, 12:30 – 1:30pm, H&SS 1145B

Overview: Welcome to BIMM 121! In this class, we'll be using techniques in microbial physiology, microbial genomics, microbial evolution, and microbial ecology to explore the role of microbes in health, industry, and the environment. Inquiry-based experiments will cover the fundamentals of both working with live microscopic organisms at the bench and bioinformatically analyzing their genomes at the computer. I know college can be stressful, so let's keep that in mind and make sure to treat each other with patience and understanding. **We're in this together, so if you have any issues or concerns, please let me know right away.**

COURSE MEETING TIMES

This course is fully in-person. Please look closely at the following course meeting times and the more detailed lab schedule in this syllabus.

Lab Lecture:

Section	Day	Time	Room
All	TTh	9:30 – 10:50am	WLH 2113

Lab Meeting:

Section	Day	Time	Room	IA	IA Email
A01	TTh	11am – 1:50pm	Tata 2101	Taylor Forman	tforman@ucsd.edu
A02	TTh	11am – 1:50pm	Tata 2102	Andy Trinh	a4trinh@ucsd.edu

COURSE DESCRIPTION

Required Materials: BIMM 121 physical lab manual from the bookstore. You'll also need PPE (full-length lab coat, safety glasses), a lab notebook (any kind), and CANVAS access. A lab coat and safety glasses can be purchased from the student bookstore, Amazon, or Target. This protective gear must be with you in the first lab. If you do not have access to a computer, please see "student resources" on our CANVAS page to request a loaner.

Course Structure: Each lecture covers the important concepts and background information needed to accomplish that day's lab tasks. During lab, you will work in small groups and then answer questions regarding each lab's accomplishments. **Lecture and lab attendance are required** and will contribute to your grade (you must attend the lab section you are officially enrolled in). There will be lab quizzes, weekly discussion posts, notebook assignments, three lab reports, and lecture participation points as described below.

DETAILED COURSE SCHEDULE

Below is the **tentative** lab schedule; i.e. lab schedule may be a little ahead or behind track as the course progresses. The course schedule is composed of several topics: lab basics, biofilm experiment, yogurt and CRISPR, DNA library prep, and genomic data analysis. We will not be completing the lab modules in the order

that is presented in the lab manual (ex. A1, A2, A3, etc.), but rather the order presented in the below schedule.

Week	Dates	Tuesday	Thursday
1	Jan 9, 11	Lecture: intro to microbes, culturing, biofilms, isolation, aseptic technique, micropipettes Lab: BASICS1 (micropipetting), A1 (surface swabbing & plating), safety	Lecture: inoculation, T-streak plate, examining cultures, colony morphology Lab: examine A1, A2 (inoculating a test tube with sterile technique), A3 (streak plate of A2)
2	Jan 16, 18	Lecture: microscope basics, biofilm evolution Lab: examine A2 and A3, BASICS2 (microscopy with prepared slides)	Lecture: Rainey and Travisano, model organism Lab: B1 (set up microcosms)
3	Jan 23, 25	Lecture: serial dilution 1, wet mounts, literature and discussion posts Lab: B2 (observe vials), B3 (streak out vials), B4 (wet mounts of microcosms), B5 (dilute & plate)	Lecture: simple stain, heat fixation, serial dilution 2 Lab: B3 (examine location streaks), B6 (count dilution plates), B7 (heat fix, stain from colonies), C1 (inoculate cultures)
4	Jan 30, Feb 1	Lecture: DNA extraction, microbial genome, species definition, cryoprotection, plasmids Lab: C3 (extract DNA), C2 (freezer stock)	Lecture: DNA quantification Lab: C4 (nanodrop DNA), C5 (qubit DNA)
5	Feb 6, 8	Lecture: Illumina sequencing, library prep Lab: C6 (library prep part 1)	Lecture: tape station, fermentation Lab: C7 (library prep part 2), C8 (qubit DNA, aliquot for tape station/bioanalyzer)
6	Feb 13, 15	Lecture: pixel to um ration, calculate molar concentrations for pooling, tape station analysis Lab: D1 (calibration with stage micrometer), C9 (submit library for sequencing)	Lecture: making yogurt, protists, microanimals Lab: E1 (make yogurt), D2 (tardigrades, algae survey mix, <i>Bacillus subtilis</i>)
7	Feb 20, 22	Lecture: cell appearance and arrangement, gram staining, MRS agar Lab: E2 (compare yogurt: obs, wet-mounts, heat-fix grams), F1 (streak yogurt - heirloom on MRS x 3, commercial on <i>S. therm agar</i> x 3)	Lecture: what we know about CRISPRs of LAB Lab: G1 (PCR CRISPR loci)
8	Feb 27, 29	Lecture: gel electrophoresis, Sanger seq Lab: G2 (gel), G3 (submit)	Lecture: using CRISPR-Cas finder and BLAST, gut microbiome, HGT

			Lab: G4 (find spacers, BLAST), G5 (determine strain ID of <i>S. thermophilus</i>), G6 (search for evidence of HGT)
9	March 5, 7	Lecture: Unix, fastq files, Illumina quality scores Lab: C10 (unix tutorial), C11 (examine fastq, locate files)	Lecture: breseq, resequencing, common SBW25 mutations (WspF, FuzY), interpreting mutations Lab: C12 (breseq), C13 (research mutations), start LR3
10	March 12, 14	Lecture: QIIME artifacts, QIIME basics (biome matrix) Lab: H1 (QIIME part 1), finish LR3	Lecture: more QIIME (diversity metrics) Lab: H2 (QIIME part 2)

GRADING CRITERIA AND SCALE

The grading scale for the course is standard (see second table below). The course will not be curved and the final grades will not be rounded. For example, this means a grade of 89.9% will not be rounded up to a 90%.

Assessment	Points
Quizzes (10, 15pts)	150
Lab Reports (3, 40pts)	120
Lab Notebooks (~19, 5pts)	95
Discussion (9, 5pts)	45
Participation (19, 2pts)	38
Group Professionalism	5
Extra Credit	3
Total for Course	453

Letter	Percent	GPA
A+	96-100	4.0
A	94-95	4.0
A-	90-93	3.7
B+	86-89	3.3
B	84-85	3.0
B-	80-83	2.7
C+	76-79	2.3
C	74-75	2.0
C-	70-73	1.7
D	60-69	1.0
F	<60	0

QUIZZES

Quizzes will be given once a week and cover material from the week's lectures and labs. Quizzes are available on CANVAS from Friday 5pm – Monday 5pm and can be taken any time within that window. Quizzes are open-note, contain 15 questions, and must be completed within 30min of opening. At the end of the quarter, your lowest quiz grade will be dropped. There are no make-up quizzes (unless you have a doctor's note).

LAB REPORTS

Guidelines regarding how to write each lab report are posted on CANVAS under the module “Lab Reports”. Lab report rubrics are built directly into the lab report assignment and can be viewed by clicking on the assignment under the “assignments” tab in CANVAS. There will be three lab reports, none of the lab report grades will be dropped. The third lab report will be a group report – if a group member does not complete their allotted work as per the confidential group evaluation sheets, that group member will receive a point penalty of 30% on their report 3 grade.

LAB NOTEBOOK

Students will complete a Googledoc lab notebook entry for every lab session (so 2 per week). Each assignment will be worth 5pts. Students must be present in lab in order to receive any notebook assignment points for that day. The notebook assignment will be completed during lab or by the end of the lab day (you should be able to complete them by the end of lab, but we wanted to give you some wiggle room). Notebooks will be checked once a week by the IA, at a time of their choosing, which means notebooks must be kept up to date.

Do not follow the notebook directions listed in the lab manual. Instead, notebooks should have a table of contents and each lab entry should have a title/date (1pt), objective (1pt), procedure (1pt), results/data analysis/questions (1pt), and interpretation/conclusion (1pt). The objective should be 2-3 sentences, in your own words, describing the purpose of *all* tasks performed that day. The procedure should only include any procedures you performed that differed from those in the lab manual (also state if there were no differences). The results/data analysis/questions section includes your live observations, any calculations, and the answers to any questions posed in the lab manual (label these answers i.e. “Q-A1”, so your IA can easily find them). The interpretation/conclusion includes 1-2 sentences interpreting your observations (i.e. what do the results mean?).

DISCUSSION

The CANVAS discussion forum is a key learning tool for this course. 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 two posts, at least one of which must be an answer and the other can be a question or an answer (so not two questions). Your questions should be insightful and curious in order to earn points, asking a simple “googleable” question like “what is agar?” or questions regarding class assignments will not earn points. Your questions should relate (loose connections are fine) to something we covered in the course that week. In addition, answers to other student’s questions should not be guesses, but backed up by relevant literature (only journal articles, books) with a link to the reference. Discussions are graded this way: 2.5 pts for post one and 2.5 points for post two, 1pt is deducted if a peer-reviewed reference is not provided for answers. Posts must be made by 11:59pm on Fridays. At the end of the quarter, your lowest discussion grade will be dropped.

PARTICIPATION

At some point during every lecture, a simple question will be asked based on the material we just went over. Students will scan a QR code and fill out their name and answer on a Google form. **The Google form must be filled out while still in the lecture room**, otherwise it will not count toward your grade. If you **have issues signing into the Google form, immediately notify Dr. Pickett after class**, otherwise nothing can be done. The participation answers are not graded for accuracy, just completion. Students must be present in lecture the entire lecture to receive participation points. Each lecture is worth 2pts for a total of 38pts by the end of the quarter. The lowest participation grade will be dropped at the end of the quarter (to account for any Google form issues). See attendance policy below for further information.

GROUP PROFESSIONALISM

This portion of the course grade is intended to engage students in considering the impact of their actions on their own learning and the learning of others in the course. We want to prepare you for a career in science, which means it's important to understand not only the material, but how to interact with your fellow researchers. Unprofessional interactions consume time yet have no meaningful benefits to you, your fellow students, and/or the instructional team. Analogously in the workplace, being unprofessional to your colleagues or supervisors will only discount you. When you are discounted, you may not be invited for new opportunities that you may or may not be aware of. Professionalism can be demonstrated through community efforts: during the quarter, based on observations by the teaching team, your lab group will be graded on their professionalism. **The professionalism credit for a lab group may be deducted in steps of 1pt if the below examples of professional interactions are not followed.** Note: if chronic non-participation or professional violations occur for an individual lab member, this will result in loss of all professionalism points for that *individual*, not the entire lab group.

Examples of professional interactions:

1. Contributing **equitably** to teamwork in class, in section, or on team assignments
2. Contributing equitably to lab procedures performed during lab
3. Being **on time** to lab and filling out the absence form in advance if a class will be missed
4. Cleaning up the lab bench and ensuring all drawers and cabinet doors are **completely closed** at the end of class
5. **Cleaning microscopes** thoroughly, allowing them to be checked by IA/professor, and covering the microscopes
6. Turning off **gas valves** at the end of class
7. Carrying out procedures safely and **paying attention to waste disposal** in the laboratory
8. Behaving in a respectful and fair manner to all other students, IAs, and professors
9. Turning assignments in on time and **communicating effectively** with the IA/professor if a goal will not be met

EXTRA CREDIT

There are three points of possible extra credit in this course. Extra credit assignments may take the form of student surveys or paper analysis – these assignments will be announced during class and via email toward the end of the course. Asking for extra credit points beyond this or asking for added points to boost your grade is inappropriate and not in line with the ethics of academia; any requests of this nature will be dismissed.

WEEKLY CHECKLIST

Below is a helpful checklist that students can follow each week to make sure they are up to date on all tasks:

- ☐ Attend lecture and lab each week
- ☐ Answer notebook questions during lab
- ☐ Make two discussion posts each week by Friday at midnight
- ☐ Answer quiz questions by every Monday at 5pm
- ☐ Check if any lab reports are due

COURSE POLICIES

Below you will find the class policies regarding attendance, late assignments, extra credit, accommodations, and cheating.

ATTENDANCE

Lecture and lab attendance is required and is essential to understanding the material and performing well in the course. If lecture is missed, students can watch the lecture podcast (via the “Media Gallery” tab in CANVAS). If you will be absent from either lecture or lab, **please fill out the absence form on CANVAS. Any emails regarding absences, will not be addressed, all absences must be entered into the absence form.** Please fill out the form once for each day you will be absent. This form must be filled out **before the absence will occur** (except in emergencies). Your response will be sent directly to your professor and IAs. If the absence is excused, participation points will be awarded, if not, participation points will not be awarded. Please see the detailed guidelines below regarding unexcused and excused absences in lecture and lab:

Lecture attendance: The following guidelines apply to lecture absences. Students who miss lecture can watch the lecture recording via the Media Gallery in CANVAS.

Unexcused absences: will result in no participation points for that lecture. Unexcused absences include: 1) missing lecture without first filling out the absence form (except in medical emergencies), 2) arriving to lecture 15min late or more, 3) leaving lecture with 15min or more remaining, or 4) absences due to scheduling conflicts (other coursework, vacations, planned meetings, etc.).

Excused absences: will result in full participation points for that lecture. Excused absences include feeling sick, being COVID-positive, having COVID symptoms, unexpected occurrences, or events out of the student’s control. Students must fill out the absence form **ahead of time** (this excludes emergencies) **in order for the absence to be excused.**

Lab attendance: Lab work will include wet lab procedures and therefore cannot be completed remotely. Students who are feeling sick, or who are COVID-positive, can complete a make-up assignment after notifying their professor/IA that they will not be attending lab. The make-up assignment must be completed on time, or the lab will be counted as a missed lab. The following guidelines apply to lab absences:

Unexcused lab absences: will result in no lab notebook points for that day. Unexcused absences include: 1) not completing a make-up assignment on time if a lab is not attended, 2) missing lab without first filling out the absence form, 3) arriving to lab 15min late or more, 4) leaving lab with 15min or more remaining, 5) **not participating during lab**, 6) lab absences due to scheduling conflicts (other coursework, vacations, planned meetings, etc.), or 7) attending a lab section the student is not registered for. If a student is marked as absent for **three lab sessions and/or misses four lab quizzes, they must drop the course as too much information has been missed.** If a student refuses to drop the course, they will receive an automatic grade of “F” in the course after the drop deadline has passed.

Excused lab absences: will result in the student being able to make up lab notebook points for that day via the makeup assignment and checking in with their group to get the information they’ll need for the next lab. Excused absences include feeling sick, being COVID-positive, having COVID symptoms, unexpected occurrences, or events out of the student’s control. Students must let Dr. Pickett and their IA know of any excused absences **ahead of time** via the absence form (this excludes medical emergencies).

Attendance and COVID: **DO NOT** attend lecture/lab if you are feeling sick, have been in contact with a COVID-positive person, or are COVID-positive – please protect your fellow students, IAs, and professors. As stated above, lecture can be completed remotely, and lab can be substituted with a make-up assignment without any penalties.

Add/drop deadlines: Deadlines are different for lab courses than lecture courses. Students who drop a biology lab class after the end of the **second class meeting** will be assigned a “W” – so please make sure to drop the class **by the end of the first day** if you are planning to drop. Additional details: <http://biology.ucsd.edu/go/ug-labs>.

LATE ASSIGNMENTS

Late assignments/quizzes/reports are **not accepted** unless there is a doctor's note, a prior request for accommodations, or existing accommodations. If a student is struggling, it is their responsibility to seek out help and let the professor know of their circumstances before assignments/quizzes are to take place. Students cannot ask for accommodations retroactively – this includes asking for an extension for work that has already been due. It is the responsibility of the student to turn in assignments on time, to manage their time accordingly, and to communicate with the professor in a timely manner if goals will not be met. Time-management and effective communication are integral skills in any professional environment.

GROUP WORK ISSUES

A major goal of the course is to learn to collaborate with others. Unfortunately, despite best efforts and intentions, groups do not always function optimally. Dealing with these challenges is a natural part of the learning experience. Everyone is expected to **contribute fully and equitably to group work** as part of the university learning community. If disputes occur over the relative contribution of individual members of the group, **please contact Dr. Pickett immediately** so the issue can be resolved.

SAFETY TRAINING

Enrolled and waitlisted students must successfully complete the Biology Lab Safety Training and Assessment before the first lab session: <https://biolabclass-safetyquiz.ucsd.edu/introduction>. Please note that courses offered by other departments (Chemistry, for example) may have additional safety training requirements. Students are not allowed into the lab for the second lab session unless they have successfully passed the safety assessment. Instructors need to enforce this policy without exception. Please make sure to always follow the waste disposal guidelines provided during lab and in the lab manual.

LEARNING OUTCOMES (LOs)

1. Appreciate the structure, physiology, and diversity of microorganisms.
2. Appreciate interactions of microbes with other organisms.
3. Appreciate interactions of microbes with their environment.
4. Detect and interpret evidence of microbial evolution.
5. Isolate, identify, grow, and quantitate microorganisms.
6. Execute laboratory tasks using aseptic technique.
7. Plan an experiment from a general outline of research objectives.
8. Analyze and interpret experimental data to draw accurate and statistically sound conclusions.
9. Communicate scientific research - its justification, methods, and findings - effectively.
10. Recognize unknowns in microbiology
11. Value the relevance of microbiology today

ACADEMIC INTEGRITY

Honesty is primarily the responsibility of each student. The College considers cheating to be a voluntary act for which there may be a reason, but for which there is no acceptable excuse. It is important to understand that collaborative learning is considered cheating unless specifically allowed for by the professor. The term

cheating includes but is not limited to: plagiarism, receiving or knowingly supplying unauthorized information, using unauthorized material or sources, changing an answer after work has been graded and presenting it as improperly graded, illegally accessing confidential information through a computer, taking an examination for another student or having another student take an examination for you, and forging or altering grade documents.

If any act of academic dishonesty is observed, **the professor is required to report it**. The student will **automatically receive a zero** on that test or assignment (the grade received as a result of an academic integrity violation stays calculated into the student's GPA even if the student retakes the class). There will also be an AI Administrative Fee of \$50 (posted to the student account), mandatory AI Training, at least one Disciplinary Action, and possibly other actions per the professional judgement of the Appropriate Administrative Authority (AAA). Discipline may include probation, suspension (from a Quarter to Two Years), or dismissal. Please do not risk your GPA and/or future career by cheating.

RESOURCES FOR STUDENTS

A complete list of student resources can be found on the CANVAS homepage.

1. **Triton Food Pantry** – (<https://basicneeds.ucsd.edu/food-security/pantry/index.html>) Please don't go hungry! Triton Food Pantry is **free and available for any student**. The pantry has food staples such as oatmeal, canned soups, fresh produce, dry goods, and milk that students can access for free at Student Center A (next to The Hub) or Graduate Housing (a.k.a "OMS") on Miramar Street. For food pantry hours, please see the above website. In general, food items are assigned a point value and **any** registered student is able to pick up 15 points worth of food per week. There is **no parental salary requirement or anything like that**. The Triton Food Pantry also provides a range of services including care packages, emergency food relief, basic needs events, and various pop-up locations on campus.
2. **The Hub Basic Needs Center** – (<https://basicneeds.ucsd.edu/index.html>) If you are facing challenges with your access to adequate food, stable housing, or general resources, please complete this form so assistance can be provided: <https://basicneeds.ucsd.edu/forms/basicneeds/index.html>. The Basic Needs Center also provides free hygiene products on an emergency basis.
3. **Teaching + Learning Commons** – (<https://commons.ucsd.edu/students/academic%20support.html>) Made up of six unique, but integrated hubs, The Teaching + Learning Commons provides comprehensive academic support for students. Includes tutoring, writing help, learning strategy workshops, and study groups.
4. **The Writing and Critical Expression Hub** – (<http://commons.ucsd.edu/students/writing/index.html>) provides support for undergraduates working on course papers, i.e. lab reports as well as other independent writing projects. Writing mentors can help at any stage of the writing process, from brainstorming to final polishing. The Writing and Critical Expression Hub offers: one-on-one writing, tutoring by appointment, supportive and in-depth conversations about writing, help with every stage in the writing process, walk-in tutoring, and workshops on writing.
5. **Office for Students with Disabilities (OSD)** – (<https://osd.ucsd.edu/>) Assists students with documented disabilities (psychological, psychiatric, learning, attention, chronic health, physical, vision, hearing, brain injury) to provide accommodations in classrooms and labs. For example, if you think you may have test anxiety due to an underlying condition that interferes with your ability to learn, focus, or concentrate, OSD is a great resource. In many cases, students are entitled to assistance with test

taking, such as extra time to complete a test, testing in a less distracting room or having questions read aloud. OSD's mission is to offer quality programs and services that empower students with disabilities to access and engage in educational activities at UCSD. Please notify your instructor immediately if you require special health or disability accommodations.

6. **Counseling and Psychological Services (CAPS) –**

(<https://wellness.ucsd.edu/CAPS/services/Pages/Appointments.aspx>) This is an amazing resource for coping with anxiety and stress issues. For first-time appointments, you can now go directly to MyStudentChart.ucsd.edu and book an appointment online.

7. **The Office for the Prevention of Harassment & Discrimination (OPHD) –** (<https://ophd.ucsd.edu/>)

OPHD provides assistance to students, faculty, and staff regarding reports of bias, harassment, and discrimination. OPHD is the UC San Diego Title IX office. Title IX of the Education Amendments of 1972 is the federal law that prohibits sex discrimination in educational institutions that are recipients of federal funds. Students have the right to an educational environment that is free from harassment and discrimination. Students have options for **reporting incidents of sexual violence and sexual harassment**. Sexual violence includes sexual assault, dating violence, domestic violence, and stalking.

Information about reporting options may be obtained at OPHD at 858-534-8298, ophd@ucsd.edu, or <http://ophd.ucsd.edu>. Students may receive confidential assistance at CARE at the Sexual Assault Resource Center at 858-534-5793, sarc@ucsd.edu, or <http://care.ucsd.edu>, or Counseling and Psychological Services (CAPS) at 858-534-3755 or <http://caps.ucsd.edu>.

Students may feel more comfortable discussing their particular concern with a trusted employee. This may be a student affairs staff member, a faculty member, a department chair, or other university official. These individuals have an obligation to report incidents of sexual violence and sexual harassment to OPHD. This does not necessarily mean that a formal complaint will be filed. If you find yourself in an uncomfortable situation, ask for help. The university is committed to upholding policies regarding nondiscrimination, sexual violence, and sexual harassment.

8. **If you want more microbiology**, I also teach BIMM 120 Microbiology Lecture. There are also all kinds of microbial media (pun intended!) out there. Here's a few I like: This Podcast Will Kill You (it's on Spotify), 93 Days (movie about Ebola containment in Lagos), The Butchering Art by Lindsey Fitzharris (love this book), and Dr. Mutter's Marvels by Cristin O'Keefe Aptowicz (microbe-adjacent book). Have fun learning about microbes!

OTHER TIPS

Office hours

Office hours are a great resource if you have any questions about the course content. You can also consider office hours to be more like study sessions or free-formed chats, where we can talk about anything related to your academic and general experiences on campus. Stop by for just a few minutes or stay for the entire duration – your choice! Please feel free to email and set up a separate appointment with me if necessary. Office hours with instructional assistants will be posted on CANVAS.

College Survival Skills

- Keep a calendar of all exam/assignment due dates and appointments
- Plan on spending two to three hours of studying for every hour of class

- Be on time to class, ask questions when needed, and participate
- Take notes in class and review them often
- Complete all assignments on time
- Take advantage of services on campus to help you succeed such as tutoring
- Arrange for needed accommodations early in the term
- Visit the ACCESS office for assistance, questions, counseling, and class selection – they are here to help
- Plan time to eat, sleep and have some fun
- **Join a club on campus** to feel more comfortable
- Attend office hours if you have questions or concerns
- If trouble arises, **seek assistance as soon as possible**

Coping Skills for Test Anxiety

- Breathing techniques or holding something small to fidget with (like a hair band)
- Reframing thoughts: believing in yourself and remembering this is just one exam
- Doing the hardest questions (like short answer) first so you can relax a little bit
- Studying as you go, instead of all at once
- Studying in a place that is relaxing or familiar
- Making a routine – maybe adding a few questions to a study guide right after each lecture. Routine tends to decrease stress.
- Having breakfast and water (no coffee) right before a test

Self-Advocacy Tips

- Understand my disability and learn ways to compensate
- Learn how to explain my disability and needs to others
- Learn how to ask for appropriate accommodations
- Learn that it is OK to use appropriate accommodations
- Identify my strengths and weaknesses
- Learn that it is OK to ask for help
- Express my needs clearly to all college employees, especially the ACCESS staff and my instructors, early in the term
- Take responsibility and develop independence in coordinating your services
- Meet with instructors when needed

*** This syllabus is subject to change. Any changes will be announced in class and on CANVAS. Students will be responsible for all changes.