BIMM 121: Microbiology Laboratory Fall 2017

Instructor: Cindy Gustafson-Brown

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email: cgb@ucsd.edu (Put **BIMM121** in the subject line!)
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.
DO NOT contact the instructor or IAs through TED. Email us directly.

Lecture: M/W/F, 9-9:50 AM, Pepper Canyon 122

Office hours: Thurs1:30-2:30 PM, York 2300 *(first office hours on Oct 5)*

Labs: York 2310 and 2332 – Check which room you are in!
Tu/Th 9:30-1:20 or 2:30-6:20

Instructional assistants (IAs)

A01	York 2310	Kaito Kikuchi	kakikuch@ucsd.edu
A02	York 2332	Alma Gutierrez	a6gutier@ucsd.edu
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A04	York 2332	Rachel To	r1to@ucsd.edu

Course Structure

This course will introduce you to the fundamentals of microbiology and allow you to explore the many ways in which microbes affect and are used in our world. We begin the course with a foundation in basic techniques, such as aseptic technique, microscopy, methods of quantitating microbes, and preparing and examining stained slides. This will be followed by: bacterial physiology, the roles of microbes in the nitrogen cycle, antibiotics, the use of microbes in food science, and the use of transposons for bacterial mutagenesis. Each of these units involves multi-day experiments, and there will be considerable overlap in the execution, methodology, and analysis. Throughout the course, you will also receive training in data analysis, scientific reasoning, and scientific writing.

Required equipment

For this lab you will need to bring:

1. A lab manual (pick up on first day of class if you ordered it on time)
2. A bound lab notebook (with carbons)
3. A lab coat
4. A Sharpie marker (black or blue fine point)
5. Eye protection (you may wear either safety glasses or goggles, but standard prescription eye glasses are not sufficient)
6. A calculator … yes – every day (you may NOT use a cell phone in the lab!)
7. Long pants (not leggings, or anything tight-fitting) and closed shoes
8. Something to tie back long hair

Lab safety training

Enrolled and waitlisted students MUST successfully complete the Biology Lab Safety Training and Assessment BEFORE the first lab session: https://dbsportal3.ucsd.edu:3443/safety-training/.

Attendance and Absences

1. Your attendance is required at EVERY **lab** and through the entire lab period, until all the experimental work for the day is completed. *This includes discussion/learning times in lab.*
2. Absences will NOT be treated lightly. Your absence will place an unnecessary burden on your partner. There are no make up labs and you will not be allowed in the lab on non-lab days or in the other Micro lab sections, although you may be asked to make up the work from the day you missed.
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. If you are ill or have an emergency on a day or when there is a lab, exam or assignment due, e-mail or call (instructor and IA) before 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.
5. If you are ill enough to miss lab, a due date, or an exam, you must go to a health clinic and provide documentation of your illness. Appropriate documentation will be required for all unavoidable absences. Provide this to your IA within 1 week of your absence.
6. YOU MUST MEET WITH YOUR IA TO DISCUSS MISSED WORK. Once you have done this, email your instructor the date of the meeting.
7. **75-point penalty** for the first unauthorized, unexplained absence from the lab. If there is a second such absence, you must drop the course or receive an F in the course.
8. **Tardiness** in lab will impact your grade. You may miss a quiz. You will also miss important announcements and instructions. This puts an undue burden on your partner. If you are late more than once, you may be asked to drop the course.

Assignment Deadlines and Submission Policies:

1. A hard copy of each assignment is due **at the start of lecture or lab** (as indicated on the assignment) on the due date. Assignments turned in more than 10 minutes after the start of class will be considered late. Penalty for late assignments is 50%, 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, well **in advance**, to turn in the late work.

2. In addition to the hard copy, you are required to submit an electronic copy of <u>some</u> assignments to Turnitin online. A link to the e-submission website will be provided on TED. There is a penalty for late online submissions. Failure to submit to Turnitin will result in zero points recorded for the assignment.

   By taking this course, students agree that their assignments will be subject to review for textual similarity by Turnitin.com for the detection of plagiarism. All submitted assignments will be included as source documents in the Turnitin.com reference database solely for the purpose of detecting plagiarism of such papers. Use of the Turnitin.com service is subject to the terms of use agreement posted on the Turnitin.com site.

3. Although you will be doing the experiments and collecting data with partners, you must hand in your own homework and paper, *written in your own words*. **Copying someone else's paper or homework is cheating** (see below).

4. Online assignments or extra credit must be submitted on time, you will not receive credit.

<u>Before</u> you start this course

It is assumed that before coming to his course, you already have a working knowledge of the topics listed below. If these are fuzzy, or fading in your memory, it would be a good idea to review them before class. We will assume you <u>already</u> know this material, and it may be necessary to answer questions on quizzes or exams.

- general categories of microbes and their definitions and characteristics
  - eukaryotic
    - protists (algae, protozoa)
    - fungi
  - prokaryotic
    - bacteria and Archaea
- basic cell structure
- basic biochemistry (glycolysis, TCA cycle, electron transport chain, photosynthesis, redox equations)
- central dogma of biology
- the scientific method
  - variables
  - controls
  - experimental arm and control arm of an experiment
  - Background articles are posted in the "study aids" folder on TED.
  - There is also a review in the lab manual.
- using Excel spreadsheets
  - calculating simple values such as totals, averages, and standard deviation
  - using data from the spreadsheet to create charts with error bars

Reading for BIMM 121

All required reading for the course is in the lab manual. You are responsible for reading ALL the assigned material in the manual, BEFORE the day when you will do the relevant experiments. Beyond reading the material, you are expected to STUDY it enough to have a good working understanding of the experiments BEFORE coming to class! A reading list corresponding to each day of experiments will be posted on TED. Material is likely to be covered in lecture the day BEFORE lab, therefore, you are encouraged to read the material before the accompanying lecture. This will maximize your understanding of the lecture and your clicker points.

Components of the course grade

All assignments	**Points**
iClicker points	64 points
6 notebook checks at 7 points each	42 points
Lab skills/competence	70 points
Scientific method activity in lab 1	18 points
Homework assignments #1-6	278 points
6 lab quizzes at 18 points each	108 points
Midterm 1	120 points
Midterm 2	130 points
Midterm 3	170 points
Total	**1000 points**

Homework assignments	**Due date**		**Points**
1. Library tutorial	Oct 5	11:59 PM	23 points
2. Simple dilutions	Oct 13	in lecture	20 points
3. Growth curve	Oct 26	in lab	34 points
4. Complex dilutions	Nov 3	in lecture	23 points
5. Unknown organism	Nov 28	in lab	98 points
6. Concept analysis paper	Dec 11	1 PM	80 points
Total			**278 points**

Extra credit opportunities	**Due date**		**Points**
Pre-course survey	Sept 28	8 AM	3 points
Quiz on syllabus & regrade policy	Sept 28	8 AM	8 points
Yogurt worksheet	Dec 5	in lab	10 points
Post-course survey	Dec 5	11:59PM	3 points

Lab quizzes are pop quizzes. They will be held without prior notice, during the first 15-20 minutes of the lab section. If you are late, you will not be given extra time to complete the quiz.

Every technician/researcher who works in a lab is expected to come to the lab prepared, thoroughly 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. Nearly all the students in this class are graduating in June. Think of this as “on the job training!”

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 (70%, cumulative) 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 210 points (50%).

Important dates

Midterm 1	Fri, Oct 20	in lecture
Midterm 2	Wed, Nov 15	in lecture
Midterm 3	Thur, Dec 7	in your lab
Concept analysis paper	Mon, Dec 11, 1 PM	check with IA for delivery instructions

Regrade Requests

All regrade requests should be submitted <u>in writing</u> within five days of receiving the graded material. You must read the regrade policy, posted on TED, and submit your request with a "regrade request form" stapled to the exam/quiz/assignment. If there is free time in the lab, it is recommended that you (respectfully) speak with your IA about material you did not understand. Alternatively you may make an appointment with your IA, or come to Dr. Gus' office hours.

iClickers – 64 points total

Your iClicker MUST be registered on TED in order for your responses to be assigned to you. (In the grey menu on the left, click on "tools.")

<u>Participation points – 40 points possible</u>

In order to receive these points each day, you must respond to 80% of the questions in that lecture. It does NOT matter if your answer is correct. Everyone gets 2 free absences.

There are different numbers of questions each day, so you may use the table below to determine how many times you must respond for participation credit a given day.

total questions	7	6	5	4	3	2	1
required responses	6	5	4	4	3	2	1

<u>Answering questions correctly – 24 additional "accuracy" points possible</u>

You may receive additional credit for answering questions correctly.

There are different numbers of questions during each lecture. Every question is graded individually, even if it is a repeated question (e.g. asked before and after group discussion). The total number of questions over the quarter is unpredictable, and will only be known when the quarter ends.

If you <u>correctly</u> answer 75% of the total questions in a quarter, you will receive the full 24 points possible for accuracy.

Here is a hypothetical example: IF there are 100 questions total in a quarter, you must answer 75 questions correctly to receive the maximum credit of 24 points. In

that case, you will receive 24 pt/75 Q = 0.32 points per question up to a maximum of 24 points.

This is NOT all or nothing. You get credit for as many as you answer correctly, up to 24 points.

iClicker FAQ

Q. What kind of clicker should I buy and where can I get it?

The iClicker, preferably version 2, although the regular iClicker works too. You can get one at the UCSD bookstore. iClicker 1 has had issues with "remembering" class settings even within the course of a lecture.

Q. Can I share a clicker with another student?

NO! 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.

Q. Where and when should I register my clicker?

Register it on class web site on TED. Look for the link in the Tools folder.

Q. When do the scored clicker questions start?

On Monday, Oct 2, in lecture.

Q. What are the maximum clicker points possible?

64 points = 6.4% of your grade.

Q. How many days will we have clicker questions?

probably ~21 days

Q. How many days will I have to be present to qualify for full participation points?

~19 … you get 2 free absences without penalty

Q. How many participation points is each day worth?

~2.1 points per day up to a maximum of 40 points

Q. How do I get the participation points each day?

You must answer 80% of the questions posed that day. The number of questions will vary from lecture to lecture.

Q. If my battery fails, or I forget my clicker, but I do attend the class, do I get participation for that day?

No. You are allowed two free absences – so you don't have to ask me about making up the missed days. We don't have to negotiate credit; you can still get all 40 participation points from the remaining days you click in.

Q. If I click in during fewer than 19 lectures, will I get any participation points?

Yes, you can still get 2.1 points each day if you answer 80% of the questions that day.

Q. Will you post the participation points and clicker accuracy points on TED?

No. It is your responsibility to keep track of your own progress accumulating points.

Q. What is my best strategy for getting all the points?

Do your reading in advance, show up for as many lectures as possible, stay awake, and PARTICIPATE!

Lab notebook

Periodically the IA's will collect the carbons from your notebooks, without prior notice. They will also check your table of contents. So keep your notebooks up to date!

General guidelines

- Notebook must be bound and have carbons.
- Pages should be numbered.
- Notebook must have a table of contents. On the first lab day leave several blank pages at the beginning of your notebook.
- If spiral bound, *the fringe must be cut off the carbon copies before submitting them for grading*.
- Use pen only, no pencil, no white-out
- Start a new page every day
- Every page must
  - be dated
  - include experiment topic at the top
  - be signed by you (no additional signatures are necessary)
- Notebook must be clear, organized, complete
- Handwriting must be legible
- Entries should be made in chronological order and EVERY day. Notes must be made continuously ("stream of consciousness writing"), in real time, filling all the space. No retroactive entries.
- Do not leave blank spaces to fill in later. If you have a space left over at the bottom of a page that you will not use, draw an X through the blank space.

For each experiment include (an experiment may continue over several lab days)

1. Purpose of experiment (once, at the start of the experiment)
2. Procedure
   a. Outline the procedure, or reference the page in the lab manual where one may find the procedure
   b. Note any changes in the procedure.
   c. Note who did which part (inoculated controls, etc.).
   d. Note which organisms were used (by genus and species), including the names of the control organisms!
   e. Record any errors in the procedure.
   f. All calculations must be recorded. Be sure to always include your units.
3. Observations
   a. Describe everything you observe, especially anything odd or unexpected. (Indicate if the culture grew!)
   b. All observations must be recorded in real time, not filled in retroactively.
   c. Draw what you observe, if that will help more effectively represent the data. Drawings of organisms in the microscope must include the magnification and bear some resemblance to what you actually saw!
   d. Note any questions or connections which come to your mind.
4. Conclusion or summary
   a. Note your conclusion at the end of each experiment (or major portion of an experiment).
   b. Answer any questions that are raised in the lab manual.

Lab skills and competence

A portion of your grade will be based on participation in the lab, workshops, and computer labs. All students are expected to be good lab citizens. Your attitude, cooperation with others, conscientiousness, work ethic, techniques and skill in the lab will contribute to your grade. Lab performance will be based on the following criteria:

1. PRE-LAB PREPARATION
2. PRE-LAB PREPARATION
3. PRE-LAB PREPARATION
4. Paying attention during instructions/introductions
5. Being responsive to correction
6. Technical skill and careful management of lab procedures (*e.g.* sterile technique, microscopy, experimental procedures, judicious use of reagents, proper storage of cultures, proper waste disposal, etc.)
7. Taking care of university property (properly cleaning/storing microscope, consistently locking your locker, etc.)
8. Ability to adapt to unforeseen procedural changes
9. Caliber of thinking before asking questions
10. Scientific approach (*e.g.* controls, experimental design, powers of observation)
11. Accuracy
12. Independence and initiative
13. Safety consciousness
14. Organization and general neatness in lab
15. Contribution to your group and cooperation with classmates
16. Integrity

Note: You will be expected to develop the habit of methodical, well-planned and organized work. This will help you with the experiments throughout the course.

Grade Distribution

A = 90% - 100%
B = 80% - 89.9%
C = 70% - 79.9%
D = 60% - 69.9%
F = below 60%

There will be pluses and minuses assigned.

Course Website

We will use TED to post announcements, old exams, schedules, readings, practice material, experimental data, homework and paper guidelines, etc. Please check the site regularly and familiarize yourself with the information provided.

Students with disabilities *(from their website)*

Students requesting accommodations for this course due to a disability must provide a current Authorization for Accommodation (AFA) letter issued by the Office for Students with Disabilities (OSD) which is located in University Center 202 behind Center Hall. Students are required to present their AFA letters to Faculty (please make arrangements to contact the instructor privately) and to the OSD Liaison in the department in advance so that accommodations may be arranged.

Contact the OSD for further information: 858.534.4382 (phone)
osd@ucsd.edu (email)
http://disabilities.ucsd.edu(website)

Policy on Integrity of Scholarship

The University Policy on the Integrity of Scholarship is printed on page 5 of the lab manual. You should read this! Be aware that there is one additional issue that should be added to the list on page 5. It is a violation of academic integrity to use another student's iClicker in class, or to allow another student to use your iClicker.

Your homework and paper for this class must be independently written, *i.e.* **your own ideas in your own words**. While discussion of data among lab partners is encouraged, each student must independently complete all text, references, figures, graphs, and tables. The submission of homework or papers by lab partners that contain shared or copied work is forbidden. *Both* students will be held accountable. The exception is when a figure or table contains the raw data that is supplied to all members of the group (*e.g.* absorption spectra or colony counts). In this case the creation and labeling of that figure must be done independently. If you have questions about the difference between discussing your work with others and unauthorized collaboration, please ask your instructor or IA for clarification.

Because homework and papers are to be your own work in your own words, **you may not view, copy or paraphrase, to any extent, current or past papers or 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.

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.*

Plagiarism in homework or papers is rigorously sought out and penalized.

Because all quizzes, exams, homework, iClicker participation and the paper are required for satisfactory completion of this course, any student caught cheating on a quiz, exam, homework, iClicker participation or paper may be given a failing grade for the course and referred to the Office of Academic Integrity for administrative discipline.