BIMM 121: Microbiology Laboratory
Winter 2016

Instructor: Cindy Gustafson-Brown

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DO NOT contact the instructor or IAs through TED. Email us directly.

Lecture: M/W/F 1-1:50 PM, Center 214

Office hours: Thurs 1:30-2:25, York 2300

Labs: York 2310 and 2332 – Check which room you are in!
Tu/Th 2:30-6:30 or W/F 2-6 PM

Instructional assistants (IAs)

B01	York 2310	Andrew Chen	agc003@ucsd.edu
B02	York 2332	Jimmy Do	jhdo@ucsd.edu
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B04	York 2332	Alma Gutierrez	a6gutier@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
2. A bound lab notebook (with carbons)
3. A lab coat
4. A Sharpie marker (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 and closed shoes

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 supplemental discussion/learning times in lab.*
2. If you are likely to have interviews for graduate school, please schedule them on non-lab days.
3. All absences without **PRIOR** approval of the instructor (not the IA) and the appropriate paperwork will be considered unauthorized.
4. 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.
5. Documentation will be required for all unavoidable absences. Provide this to your IA.
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. If you are ill or have an emergency on a lab day or when an important assignment/exam is imminent, e-mail or call (instructor and IA) before the start of the lab, 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. 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.
9. 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 your responsibility to make arrangements with your IA, **in advance**, to turn in the late work.
2. In addition to the hard copy, you are required to submit an electronic copy of some 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 lab paper or homework is cheating** (see below).

Before 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 already know this material.

- general categories of microbes and their definitions and characteristics
  - eukaryotic
    - protists (algae, protozoa)
    - fungi
  - prokaryotic
    - bacteria and Archaea
- general cell structure
- basic biochemistry (glycolysis, TCA cycle, electron transport chain, photosynthesis, redox equations)
- central dogma of biology
- understanding of 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.

Important dates

Midterm 1	Wed, Jan 27	in lecture
Midterm 2	Fri, Feb 19	in lecture
Midterm 3	Th/Fr, Mar 10/11	in your lab section
Concept analysis paper	Mon, Mar 14 (B01/02) Tue, Mar 15 (B03/04)	check with IA for delivery instructions

Grading Scheme

All assignments	Points
iClicker points	53 points
6 notebook checks at 7 points each	42 points
Lab skills/competence	70 points
Homework assignments #1-6	224 points
Concept analysis paper	80 points
6 lab quizzes at 18 points each	108 points
Midterm 1	120 points
Midterm 2	130 points
Midterm 3	173 points
Total	**1000 points**

Homework assignments	Due date		Points
Pre-course survey	Jan 5	8AM	3 points (extra credit)
1. Library tutorial	Jan 11	11:59P	23 points
2. Dilutions	Jan 20	in lecture	15 points
3. Growth curve	Feb 2/3	in lab	27 points
4. Scientific method	Feb 9/10	in lab	37 points
5. Dilutions	Feb 17	in lecture	19 points
6. Unknown organism	Mar 1/2	in lab	103 points
Post-course survey	Mar 7	11:59PM	3 points (extra credit)
Total			**224 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 all 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 211 points (50%).

Regrade Requests

All regrade requests should be submitted in writing within one week of receiving the graded material.

iClickers – 53 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.")

Participation points – 37 points possible

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.

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

Answering questions correctly – 16 additional "accuracy" points possible

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 correctly answer 75% of the total questions in a quarter, you will receive the full 16 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 16 points. In that case, you will receive 16 pt/75 Q = 0.213 points per question up to a maximum of 16 points.

This is NOT all or nothing. You get credit for as many as you answer correctly, up to 16 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!

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 Wed, Jan 6, in lecture.

Q. What are the max points possible?

53 points = 5.3% of your grade.

Q. How many days will we have clicker questions?

24

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

21 … you get 3 free absences without penalty

Q. How many participation points is each day worth?

1.76 points per day up to a maximum of 37 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 three "permitted" 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 37 participation points from the remaining days attended.

Q. If I attend fewer than 21 lectures, will I get any participation points?

Yes, you can still get 1.76 points each day if you answer 80% of the questions that day.

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.
    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
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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%

Course Website

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

University Policy on Integrity of Scholarship

Integrity of scholarship must be maintained by an academic community. The University expects that both faculty and students will honor his principle, and in so doing protect the validity of University grading. This means that all academic work will be done by the student to whom it is assigned, without unauthorized aid of any kind. Instructors, for their part, will exercise care in planning and supervising academic work, so that honest effort will be encouraged.

Student Responsibility

Students are expected to complete the course in compliance with the instructor's standards. No student shall engage in any activity that involves attempting to receive a grade by means other than honest effort, for example:

- No student shall knowingly provide, procure, or accept any unauthorized material that contains questions or answers to any examination or assignment to be given at a subsequent time.
- No student shall complete, in part or in total, any quiz, examination, or assignment for another person.

- No student shall knowingly allow any quiz, examination or assignment to be completed, in part or in total, for himself or herself by another person.
- No student shall plagiarize or copy the work of another person and submit it as his or her own work. *This includes rewriting the same ideas in different words without citing the source.*
- **If any work is plagiarized from that of another student, both students will be reported to the Office of Academic Integrity, even if one of the students has graduated already. Remember that most graduate schools check the undergraduate records for any indications of dishonesty before awarding a degree.**
- No student shall alter graded class assignments or examinations and then resubmit them for regrading.
- No student shall submit substantially the same material in more than one course without prior authorization.

Your homework and paper for the 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 each member 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 the ideas of your source and then *cite the reference.*

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

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