

Course: Biology 220- General Microbiology (5units), CRN 20234/52

Term: Spring 2014

Instructor: Eddie Chang

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Tentative Office Hours:

| | |
|------------------|---|
| Monday/Wednesday | 1245-125p in 2778 |
| Tuesday | 5-615p in 2712 |
| Thursday | 1130a-noon in 2778 100-130p and 445-515p in 2712 |

Or by arrangement

Class Times:

| section | 20234 | 20252 |
|--------------------|--------------|---------------------|
| Lecture- room 2712 | MW 445p-610p | Tues 130-440p |
| Lab- room 2712 | MW 630p-940p | Thurs, Fri 130-440p |

****please READ the laboratory exercise before your scheduled lab session!!!****

Required Materials:

1. *Microbiology, An Introduction*. By Tortora, Funke and Case, 9th or 10th ed. Pearson-Cummings

2. Lab Manual- *Microbiology, Laboratory, Theory and Application*. By Michael Leboeffe and Burton Pierce (Brief Edition). Morton Publishing Co.

Course Description:

Course provides students with fundamental concepts of the structure and physiology of non-disease and disease producing microorganisms with particular attention to bacteria. Basic techniques for culturing, staining, counting and identifying microorganisms. Designed to meet the requirement to enter one of the medical fields as well as general education.

Pre-requisites: MATH 090 and CHEM 100 and BIOL 100 with grades of "C" or better; or MATH 090 with a grade of "C" or better and current California LVN license.

Course objectives

1. The student will list and describe the major historical events in the field of microbiology and the people and experiments involved.
2. The student will also describe different schemes of classification and utilize them to classify and identify microorganisms.
3. The student will describe the general morphology of microorganisms and explain their associated cellular physiology.
4. The student will recognize and apply various techniques and factors necessary for optimum growth of different microorganisms.
5. The student will describe different modes of reproduction among microorganisms and calculate reproduction rates and population size of microorganisms. Student will differentiate among methods of producing pure cultures and describe cultural characteristics of microorganisms.
 6. The student will describe enzyme structure and explain enzyme function, regulation, and measurement of activity.
 7. The student will describe and explain the various biochemical reactions and pathways of metabolism.
 8. The student will describe the various means of inheritance and recombination in microorganisms and explain the results of various genetic situations. The student will describe technique of recombinant DNA.
 9. The student will describe death and death-rate determination in microorganisms and explain the effects of various physical and chemical agents on microorganisms.
 10. The student will describe chemotherapeutics including antibiotics and will explain the action of antibiotics in microorganisms including measurement of activity.
 11. The student will describe the normal microbial flora of the human and explain the infection process and the host's defensive response.
 12. The student will explain the theory of common diagnostic techniques and describe their usage.
 13. The student will describe the epidemiology and the various modes of transmission of infectious diseases.
 14. The student will list and describe the cause, symptoms, prognosis, and treatment of selected human diseases caused by bacteria, viruses and other microbes.

Student Learning Outcomes

satisfactory completion of the class entails the ability to do the following:

1. Accurately explain the basic principles of microbiology, which include but are not limited to: structure, features and functions of prokaryotic and eukaryotic cells; bacterial/molecular genetics; microbial metabolism; pathogenesis; virology and immunology (ISLO 1,2)
2. Devise a dichotomous key to aid in the identification of disease-causing bacteria in the lab, and accurately identify disease cause-bacteria by using the key and experimental techniques (ISLO 1, 2).

3. Perform experimental techniques in microbiology correctly to test hypotheses, determine characteristics of microbes and perform diagnostics. (ISLO 2)
4. Apply lecture and laboratory concepts with critical thinking to explain experimental data and scenarios in microbiology not addressed directly in class/laboratory (ISLO 1, 2)
5. Fully participate in classroom and laboratory activities (ISLO 3).

Course website: go to imperial.edu first. Once you're on the college site, you'll see some tabs near of the top of the web page. Click on the "Home" tab. Once you click on the home tab, a list of other tabs will then appear—now click on the "blackboard" tab and you can now log onto blackboard. To log onto blackboard, use the part of your official IVC student email address BEFORE the "@" symbol as the username and the password is your IVC email password. Once you log in, you'll see the list of courses you're registered for and simply click on the course you're taking for me (eg, BIOL 220 CRN#^*%+) and you're in!

The website contains the syllabus as well as lecture slides, assignments, review guides, announcements and reminders and other teaching materials for the class . Please check the website often. Feel free to view and download course materials on the website

Accommodation for DSPS/disabled Students:

Any student with a documented disability who may need educational accommodations should notify the instructor or the Disabled Student Programs and Services (DSP & S) office as soon as possible. If you need testing accommodations please bring me the forms ASAP.

DSP&S Office- Room 2117, Health Sciences Building, (760) 355-6312

Assignments and Grading: remember, I do NOT "hand out" grades. You earn your grade!!! Your grade is the result of what YOU do. your grade is based on both Lecture and Laboratory. **Do NOT miss any lecture or lab sessions.** If you miss 4 or more instructional sessions(**lecture and lab**), you may be dropped from the course. If you cannot make it to class due to illness or emergency, please contact me **ASAP!!!!** Your overall grade is based on the following:

1. Four lecture exams=400pts total. **If you are a DSPS student, please inform me ASAP and remember to submit the forms at least 1week before EACH exam (including the final) so I can make the proper accommodations in a timely manner.**
2. There will also be several "homework" assignments or pop quizzes worth 10-20 pts each. These are designed to help you to review the materials covered in class.

3. “Adapt a bacterium” assignment- more on this later in the semester (points TBA)
4. Laboratory portion: streak plate skills demonstration (25pts), lab notebook (20pts), lab reports (10-15pts each), two lab quizzes (25-30pts each) plus 2 bacteria identification exercises- known as “minor unknown” and “major unknown” exercises (at least 50pts each-exact points TBA).

Grading Scale: The student's semester grade will be determined by the total number of points the student has earned in both the laboratory and lecture sections. The points are then divided by the total number of points possible to get a “percentage score.” I do not “curve” exam scores or overall grades

A=90.0% of total points

B=80.0% “

C=70.0% “

D=60.0% “

F <60.0% “

I also do not “round off.” If you get 78.8% it’s 78.8%, NOT 79%

Make up Policy: **There will be NO make-up labs!!!**

A student may take a make up a test due to the following reasons:

1. Medical reasons – student’s or immediate family member’s illness.
2. Legal reasons – student is required to be in court.
3. Family tragedy/emergency – e.g. death in the family.

Make up exam must be taken within 2 weeks of the originally scheduled date.

Course Rules/Regulations/Policies: see college catalog for more details

1. Attendance Policy: **BE ON TIME!!!** Students are expected to attend class meetings AND the lab sessions **ON TIME**. Please make arrangements with the instructor or your classmate in case you cannot attend a class session for any reason so you do not fall behind. Any student who misses the first class will be dropped. Thereafter, students may be dropped at instructor discretion if they miss more than a week of class hours continuously.

If you are constantly LATE or ABSENT, you will NOT do well in this class

2. Classroom Behavior and Conduct: Simply put: Treat others as you would like to be treated. To preserve a productive learning environment, students who disrupt or interfere with the class may be sent out of the

classroom and be told to meet with the Dean of Student Affairs/Campus Disciplinary Officer, who will then follow disciplinary procedures as described in the college catalog.

Note: **While in the classroom, cellular phones are to be turned off or set on vibratory or silent mode.**

if we are unable to cover topics in class due to disruptive behavior, you will still be tested on the topics!!!!

3. Plagiarism and Cheating:

Please Do NOT Cheat! If you do you will get a score of 0 (zero) for that assignment/test and you will be sent to the Chief Disciplinary Officer who will take appropriate action as stated in the college catalog. A 2nd occurrence may result in dismissal from class or expulsion from the college as stated in the catalog.

Cheating is basically using other people's work as your own. This includes plagiarism and copying other people's exam answers or assignments. Cheating also includes helping others to cheat (like providing your answers to others).

Note: **Electronic devices (laptops, phones, blackberries, PDA's, IPODS, iPADS, etc) are not allowed during an examination.** If you use the things during an exam, or if these things are even ON during the exam, you will lose at least 50% of your exam score!

4. Withdrawal Policy: If you wish to drop this class you must do so by going through the proper procedure (ie-thru WebStar) by the proper deadlines. Don't just stop showing up!!! Students will not be automatically dropped for missing classes. **If you simply stop showing up instead of dropping a class thru webstar, you will receive a grade of "F" for the course.**

Lab Syllabus

You will need your own: lab coat or outer protection (like an oversized apron or T-shirt); Colored wax pencils or permanent marker; a sewn in signature laboratory book w/ sturdy cover.

PLEASE READ THE LAB EXERCISE IN ADVANCE!!! I cannot emphasize this enough. We have a tight schedule in the lab- as a result, you must be ready to do the lab the second you walk into the lab. Reading the exercises in advance will enable you to finish the lab exercises successfully within the allotted time. Remember, lab exercises cannot be made up, since the materials are available ONLY on the day we're scheduled to do the lab.

No food in lab, safe shoes (closed-toe), no jewelry that may cause risk. Tie back long hair- we do work with open flames in the lab. Please observe all safety and disposal rules (to be discussed in the 1st lab session; summarized in "Introduction" chapter of your laboratory manual)

You will be instructed in and checked for proper storage and cleaning of your microscope. If your scope is found to be dirty or not stored properly, you will have points taken off from your overall grade.

Lab Format:

1. Lab is held twice a week. Each lab session begins with instructions and background info which will help you understand what you need to do in lab. This usually lasts 20 minutes or so. So please be on time for these important instructions.
2. During the lab "lecture", I will give an overview of the lab exercises we'll do for that day- but I will not cover all the details in the interest of time. I expect you to know these details by reading the lab in advance. The "lectures" are meant to give you an idea of what you need to do. So read all lab assignments in advance or you will not be able to do and complete the lab successfully.
3. you will work in groups of 2 most of the time (ie-w/ a lab buddy); however, you will work individually on the minor and major unknown exercises.
4. Most labs require multiple sessions to complete. Usually you set up the lab in one session, let the bacteria multiply until the next lab session, and then you'll look at the results. It's up to you to keep track of when you start and finish a lab exercise- reading the lab exercise in advance helps you to keep track of this!
5. to grow bacteria, put it in the incubator. Then remove bacteria from incubator next session. If you need to "store" bacteria (ie if you need the bacteria beyond the next session), store them in the 'fridge--do NOT return the bacteria to the incubator. Discard bacteria as soon as you're done with the experiment.
6. We will also do more than one exercise per lab session—it's up to you how you organize your time (and decide which experiment to do first). Again, reading the exercises in advance will enable you to organize your time more efficiently. If you do not pre-read the exercises you will not be able to organize your time and you'll end up wasting a lot of time deciding what to do.

7. All materials needed will be placed on the front desk or the counters in the lab, do not take anything from the prep room or the 'fridges without the instructor's permission.
 8. Follow all safety rules.- including where to discard things!!! (will go over this in lab)
 9. There are NO make-up labs. Please do NOT be absent from the lab!
- Again, I cannot emphasize the importance of reading the lab exercises in advance. This will help you organize your work in lab, allow you to make efficient use of your time and help you keep track of the progress of your lab experiments.

Grading and points in the lab:

- A. you will perform a basic but important skill in the microbiology lab called the "streak plate" technique without any notes or help- 25 pts.
- B. Minor unknown: lab exercise in which you identify bacteria using mostly staining techniques learned in the first half of the semester. Need to devise a strategy for doing this based on the techniques you learn in the lab and on the characteristics of the bacteria determined by using these techniques. Worth At least 50 points
- C. Major unknown: Identification of unknown bacteria using staining techniques AND biochemical tests that you have learned during the ENTIRE semester- worth at least 50 points. (we will go over the minor and major unknowns in more detail later in the semester)
- D. You will also turn in lab reports on several labs (10-15pts each)- I will tell you which ones as we go along.
- E. two lab quizzes on the materials we covered in the lab-25-30pts each
- E. Lab Log book/ notebook. due at the end of semester, format given below-25 points

Lab Log Book/notebook Format- please use notebook w/ sewn-in spine!

Name on Cover

First Page- Name, Location, Date

2nd and 3rd Page- table of contents (Lab exercises)

4th Page. Start recording lab exercises in this style:

1. Title of lab exercise
2. Purpose: why we're doing this lab; why are we trying to find out by doing this lab.
3. Materials and Methods: what did you do? please use your own words- the best way is to summarize what you did (pretend you have to explain what you did in a paragraph)
4. Data/Results: what did you see or observe? Use tables, drawings if needed
5. Conclusions/Discussion: what does the data tell you? Did you find out what you were trying to find out? (did you address the questions/issues you mentioned in the "purpose" section?). Explain how the data allowed you to draw these conclusions.
6. please number the pages.

I will spot check your lab log book/notebook several times this semester (no advanced warning given). If you are not keeping a proper lab notebook at the time of the spot check, I will take 5 points off your overall grade. In other words, start keeping your lab notebooks NOW!!!

TIPS FOR SUCCESS (based on feedback from former students):

1. READ THE LAB EXERCISES **IN ADVANCE**, so you'll be ready to do the lab and finish it in time! Remember LAB EXERCISES CANNOT BE MADE UP! We have a limited amount of time in the lab- so you need to be ready to do the lab the minute you walk into the lab.
2. preview the relevant lecture slides and/or chapters in the text prior to each lecture. You may not understand it at first, but you'll get an idea of what will be covered and it'll help you to understand the lecture. It also helps to look at the lecture slides in advance- you can view and/or download these on the course website.
3. You will need to study the material after the lecture and lab in order to understand the topic. Ideally, you should review the material on the same day (or within 24 hours of the lecture or lab). Your goal should be to know the material well enough to explain it accurately to somebody else without looking at your book and notes.- pretend you have to explain the stuff to a fellow student.
4. If there is material that you do not understand, please ask me as soon as possible. That's what office hours are for. If you cannot make office hours, feel free to speak to me during lab time. Better yet, contact me to set up a meeting time that's convenient for you. **Do NOT wait until the day before the exam**—it'll be too late then. When you contact me, please identify yourself and which class you're in.
5. Feel free to ask me questions during the lecture-I will pause at times to see if there are any questions, please take advantage of this opportunity.
6. Use the lecture slides to help you to review the material and to understand the textbook.
7. Tutoring may be available. Please go to the library to ask about the tutoring services offered by the college. I also encourage you to form study groups. Sometimes 2 or more brains are better than one. You'd be surprised by how much you can learn from each other. Study groups may also allow you to test your knowledge by giving you an opportunity to explain the materials to other students.

Tentative Schedule- section 20234

| WK | DATE | LECTURE (DH- lecture continues in lab) | LABORATORY |
|---|--------|---|---|
| 1 | 1-20 M | HOLIDAY | HOLIDAY |
| | 1-22 W | Ch 1 introduction to the course | Lab 2-1 microbes are everywhere |
| 2 | 1-27 M | Ch 2 chemistry review | Into to microscope/in class exercise |
| | 1-29 W | ch 2 | Ex 3-1 microscope |
| 3 | 2-3 M | Ch 2 | Ex 3-4 simple staining; 3-6 gram stain |
| | 2-5 W | Finish Ch 2; start Ch 4 cell structure | Ex 3-6 Gram stain |
| 4 | 2-10 M | Ch 4 | Ex 3-8 capsule stain ; practice gram stains |
| | 2-12 W | Ch 4 | Ex 3-9 endospore stain; practice gram stains |
| 5 | 2-17 M | HOLIDAY | HOLIDAY |
| | 2-19 W | Ch 10-11 survey of bacteria (DH); start Ch14-15 how do bacteria cause disease | 3-7Acid fast stain; practice all other stain techs ; DH-lecture continues in lab |
| 6 | 2-24 M | Ch14-15 how do bacteria cause disease | Ex 1-3 aseptic transfer; ex 1-4 streak plate; ex2-6 thiglycollate; practice staining techniques; review for exam 1 |
| | 2-26 W | Exam 1: Ch1-4; 10-11 | |
| 7 | 3-3 M | Ch 14-15; Ch 5 enzymes | Assign minor unknown and adapt a bacterium assignment 1 ; practice streak plate and staining techniques; intro lecture to minor unknowns; Ex 4-1, 4-4, 4-6; msa, emb, mac plates |
| Work on minor unknowns from 3-3 to 4-2 | | | |
| | 3-5 W | Ch5 enzymes, metabolism (DH) | Gram staining "skills demo" (skills test); Dh-lecture continues in lab |
| 8 | 3-10 M | Ch 5 | Carbohydrate metabolism labs: Ex 5-2Fermentation, ex 5-3 mrvp, ex 5-7citrate; practice streak plate techniques |
| | 3-12 W | Ch5 DH? | Respiration labs: ex5-4Catalase, ex 5-5oxidase, ex5-6nitrate reduction |
| 9 | 3-17M | Ch6 growth of bacteria | Exoenzyme labs 5-10,-11,-13, -14; streak plate skills demo/test ; review for lab quiz 1 |
| | 3-19W | CH 7 controlling bacterial growth; start ch 8 genetics DH | Amino acid metabolism labs: 5-12urea, 5-8 decarbox, 5-9 deamination; lecture continues in lab; lab quiz 1 (labs from 2/24 to 3/10); adapat assignment 1 due |

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| 10 | 3-24M | Ch8 genetics DH | Multiple assay labs: 5-17sim; 5-18 tsi/kligliers; Chemical Control lab (handout); review for exam 2 |
| | 3-26W | Exam 2 Ch 5-7,14-15 | Finish above labs |
| 11 | 3-31M | Ch8 genetics DH? | assign major unknown and major unknown lecture; gram + experiment |
| Work on MAJOR unknown from 3-31 to 5-7 | | | |
| | 4-2W | Ch8; Ch 13 viruses DH | Gram + experiment cont'd; assign adapt a bacterium assignment 2 |
| 12 | 4-7M | Ch13 viruses | Finish Gram + experiment; Hemolysis/blood agar plate experiment (handout); MINOR unknown due; review for lab quiz |
| | 4-9W | Ch 13 DH | major unknown; lab quiz 2 (labs from 3-12 to 3-26); |
| 13 | 4-14M | Ch 13 | major unknown; review for exam 3 |
| | 4-16W | Exam 3- Ch 8, 13 | major unknown |
| 14 | 4-28M | Ch 20 antibiotics | major unknown; Ex 7-2 antibiotics |
| | 4-30W | Ch 16 innate defences DH | major unknown |
| 15 | 5-5M | Ch 17-19 immune system | major unknown |
| | 5-7W | CH 17-19 DH | major unknown should be done by this time |
| 16 | 5-12M | Ch 17-19 | Clean up and check out; review for final; wrap-up major unknown if needed |
| | 5-14W | Final exam: ch 16-20 | Final exam |

Tentative schedule section 20252

| WK | DATE | Lecture (blank= catch up or no lecture) | Laboratory Exercise (Ex) |
|-----------|-------------|--|---|
| 1 | 1-21T | Intro to course and Ch1 | Ex 2-1 microbes are everywhere |
| | 1-23R | Ch 2 chemistry | Finish above lab; Microscope exercise (handout) |
| | 1-24F | | Ex 3-1 microscope |
| 2 | 1-28T | Ch2 | none |
| | 1-30R | | Ex 3-4 simple staining; 3-6 gram stain |
| | 1-31F | | Ex 3-6 Gram stain |
| 3 | 2-4T | Ch 4 cells | none |
| | 2-6R | | Ex 3-8 capsule stain; practice gram stains |

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|--|-------|--|---|
| | 2-7F | | Ex 3-9 endospore stain; practice gram stains |
| 4 | 2-11T | Ch4 cells; ch 10-11 survey of bacteria | NONE |
| | 2-13R | Ch 10-11 | 3-7Acid fast stain; practice all other stain techs ; lecture continues in lab |
| | 2-14F | Holiday | holiday |
| 5 | 2-18T | Ch 14-15 | none |
| | 2-20R | | Ex 1-3 aseptic transfer; ex 1-4 streak plate; ex2-6 thioglycollate; practice staining techniques; review for exam 1 |
| | 2-21F | Exam 1 Ch 1-4, 10-11 | Finish above labs |
| 6 | 2-25T | Ch 5 enzymes and metabolism | Ex 4-1, 4-4, 4-6; msa, emb, mac plates |
| | 2-27R | Ch5 | Finish above labs; practice staining and streak plate techniques |
| | 2-28F | Ch5 | practice staining and streak plate techniques |
| 7 | 3-4T | Ch5 | Assign minor unknown and adapt a bacterium assignment 1 ; practice streak plate intro lecture to minor unknowns; |
| WORK ON MINOR UNKNOWNNS FROM 3-4-14 TO 4-3-14 | | | |
| | 3-6R | Ch5 | No labs |
| | 3-7 F | | Gram staining skills demo/test |
| 8 | 3-11T | Ch6 growth of bacteria; Ch7 controlling growth | No labs |
| | 3-13R | | Carbohydrate metabolism labs: Ex 5-2 Fermentation, ex 5-3 mrvp, ex 5-7citrate; practice streak plate techniques |
| | 3-14F | | Respiration labs: ex5-4Catalase, ex 5-5oxidase, ex5-6nitrate reduction |
| 9 | 3-18T | Ch7; Ch 8 genetics | No labs |
| | 3-20R | Ch8 | Exoenzyme labs 5-10,-11,-13, -14; adapat assignment 1 due; review for lab quiz |
| | 3-21F | | Amino acid metabolism labs: 5-12urea, 5-8 decarbox, 5-9 deamination; lab quiz 1 (labs from 2/20 to 3/13); streak plate skills demo/test ; |
| 10 | 3-25T | Ch8 | No labs |

| | | | |
|---|-------|---|---|
| | 3-27R | Ch8 | Multiple assay labs: 5-17sim; 5-18 tsi/kligliers; Chemical Control lab (handout) review for exam 2 |
| | 3-28F | Exam 2: ch 5-7, 14-15 | Finish above lab |
| 11 | 4-1T | Ch8; Ch9 biotechnology | assign major unknown and major unknown lecture; gram + experiment |
| WORK ON MAJOR UNKNOWN UNTIL END OF WEEK 15 | | | |
| | 4-3R | Ch9; Ch 13 viruses assign adapt a bacterium assignment 2 | Gram + experiment cont'd Work on major unknown |
| | 4-4F | Ch13 viruses | Finish Gram + experiment; work on major unknown; <u>MINOR unknown due</u> |
| 12 | 4-8T | Ch 13 | No labs |
| | 4-10R | Ch13 | Hemolysis/blood agar plate experiment (handout); work on major unknown; review for lab quiz 2 |
| | 4-11F | | major unknown; <u>lab quiz 2</u> (labs from 3-14 to 3-28); |
| 13 | 4-15T | Ch20 antibiotics; Ch 16 innate defences | No labs |
| | 4-17R | | Major unknown; Review for exam 3 |
| | 4-18F | Exam 3 Ch 8,9,13 | Major unknown |
| 14 | 4-29T | Ch16 | Ex 7-2 antibiotics |
| | 5-1R | Ch 17-19 immunology | Finish lab above ; Major unknown |
| | 5-2F | | Major unknown |
| 15 | 5-6T | Ch 17-19 | No labs |
| | 5-8R | | Major unknown |
| | 5-9F | | Major unknown should be done by now |
| 16 | 5-13T | Ch 17-19 | No labs |
| | 5-15R | | clean up and check out; review for final; finish major unknown if needed |
| | 5-16F | Final exam | Major unknown, lab notebook/logbook, assign a bacterium assignment 2 due |