

## Biology 220 Microbiology

### Basic Course Information

Semester	<b>Fall 2015</b>	Instructor Name	<b>Eddie Chang</b>
Course Title & #	<b>BIOL 220, Microbiology</b>	Email	<b>eddie.chang@imperial.edu</b>
CRN #	<b>10047</b>	Webpage (optional)	<b>See below</b>
Room	<b>2712</b>	Office	<b>2778</b>
Class Dates	<b>8/17/15-12/9/15</b>	Office Hours	<b>See below</b>
Class Days	<b>Monday; Wednesday</b>	Office Phone #	<b>760-355-6301</b>
Class Times	<b>Lec: MW 515p-640p Lab: MW 650-1000p</b>	Office contact if student will be out or emergency	<b>Ofelia Duarte, SME secretary, 760-355-6155 ofelia.duarte@imperial.edu</b>
Units	<b>5</b>		

Tentative Office Hours: Effective, Aug 24, 2015

Monday	130-155p in 2778
Tuesday	6-630p in 2717
wednesday	1250-2p in 2712
Thursday	1130-1215 in 2778; 1250-2p in 2712

### 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.

### 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 Objectives

1. The student will list and describe the major historical events in the field of microbiology and the people and experiments involved.

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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. 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.

### **Textbooks & Class website**

#### Required Texts

1. *Microbiology, An Introduction*. By Tortora, Funke and Case, 11<sup>th</sup> ed. Pearson-Cummings (9<sup>th</sup> edition or later is OK)
2. Lab Manual- *Microbiology, Laboratory, Theory and Application*. By Michael Leboeffe and Burton Pierce (Brief Edition). 2<sup>nd</sup> edition. Morton Publishing Co.
3. Lab Manual Supplement, available from STEM club. (available from week 2)

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**Course website:** go to [www.imperial.edu](http://www.imperial.edu). 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 100 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 the materials on the site

### Course Requirements and Instructional Methods

This class includes both lectures and laboratory portions. In order to pass this class, students must participate in both portions of the class, including regular attendance and performing experiments. **Lectures are an essential part of this course; therefore, attendance and note-taking are required.**

Students are also expected to complete all assignments, take all exams, participate in any field trips or other class related activities

Out of Class Assignments: The Department of Education policy states that one (1) credit hour is the amount of student work that reasonably approximates not less than one hour of class time and two (2) hours of out-of-class time per week over the span of a semester. WASC has adopted a similar requirement.

### Course Grading Based on Course Objectives

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/or 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)

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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 79.8% it's 79.8% (C), NOT 80% (B)

### 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.

### **Attendance**

- A student who fails to attend the first meeting of a class or does not complete the first mandatory activity of an online class will be dropped by the instructor as of the first official meeting of that class. Should readmission be desired, the student's status will be the same as that of any other student who desires to add a class. It is the student's responsibility to drop or officially withdraw from the class. See General Catalog for details.
- Regular attendance in all classes is expected of all students. A student whose continuous, unexcused absences exceed the number of hours the class is scheduled to meet per week may be dropped. For online courses, students who fail to complete required activities for two consecutive weeks may be considered to have excessive absences and may be dropped.
- Absences attributed to the representation of the college at officially approved events (conferences, contests, and field trips) will be counted as ‘excused’ absences.

### Classroom Etiquette

- Electronic Devices: Cell phones and electronic devices must be turned off and put away during class. Absolutely NO TEXTING or other online activities are allowed during the lecture or laboratory sessions. **If you use any electronic devices during an exam, your exam score will be reduced by 50%.**
- Food and Drink **are prohibited** in all classrooms. Water bottles with lids/caps are the only exception. Additional restrictions will apply in labs. Please comply as directed.
- Disruptive Students: Students who disrupt or interfere with a class may be sent out of the room and told to meet with the Campus Disciplinary Officer before returning to continue with coursework. Disciplinary procedures will be followed as outlined in the General Catalog.  
If your disruptive behavior delays the progress of the class- **you OWE me time.** We will stay in class beyond the end of class so we can make up for time lost due to your disruptive behavior. Also, if we are unable to cover the material in class due to disruptions on your part, you will STILL be responsible for it on the exam.
- Children in the classroom: Due to college rules and state laws, no one who is not enrolled in the class may attend, including children.

### Academic Honesty- in other word, NO CHEATING allowed

- Plagiarism is to take and present as one's own the writings or ideas of others, without citing the source. You should understand the concept of plagiarism and keep it in mind when taking exams and preparing written materials. If you do not understand how to correctly 'cite a source', you must ask for help.
- Cheating is defined as fraud, deceit, or dishonesty in an academic assignment or using or attempting to use materials, or assisting others in using materials, or assisting others in using materials, which are prohibited or inappropriate in the context of the academic assignment in question.

Anyone caught cheating or will receive a zero (0) on the exam or assignment, and the instructor may report the incident to the Campus Disciplinary Officer, who may place related documentation in a file. Repeated acts of cheating may result in an F in the course and/or disciplinary action. Please refer to the General School Catalog for more information on academic dishonesty or other misconduct. Acts of cheating include, but are not limited to the following: (a) plagiarism; (b) copying or attempting to copy from others during an examination or on an assignment ;(c) communicating test information with another person during an examination; (d) allowing others to do an assignment or portion of an assignment, (e) use of a commercial term paper service

### Additional Help –

- Blackboard support center: <http://bbcrm.edusupportcenter.com/ics/support/default.asp?deptID=8543>
- Learning Labs: There are several 'labs' on campus to assist you through the use of computers, tutors, or a combination. Please consult your college map for the Math Lab, Reading & Writing Lab, and Learning Services (library). Please speak to the instructor about labs unique to your specific program
- Library Services: There is more to our library than just books. You have access to tutors in the learning center, study rooms for small groups, and online access to a wealth of resources.

**Disabled Student Programs and Services (DSPS)**

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. The DSP&S office is located in Building 2100, telephone 760-355-6313 if you feel you need to be evaluated for educational accommodations.

**Student Counseling and Health Services**

Students have counseling and health services available, provided by the pre-paid Student Health Fee. We now also have a fulltime mental health counselor. For information see <http://www.imperial.edu/students/student-health-center/>. The IVC Student Health Center is located in the Health Science building in Room 2109, telephone 760-355-6310.

**Student Rights and Responsibilities**

Students have the right to experience a positive learning environment and due process. For further information regarding student rights and responsibilities please refer to the IVC General Catalog available online at [http://www.imperial.edu/index.php?option=com\\_docman&task=doc\\_download&gid=4516&Itemid=762](http://www.imperial.edu/index.php?option=com_docman&task=doc_download&gid=4516&Itemid=762)

**Information Literacy**

Imperial Valley College is dedicated to help students skillfully discover, evaluate, and use information from all sources. Students can access tutorials at <http://www.imperial.edu/courses-and-programs/divisions/arts-and-letters/library-department/info-lit-tutorials/>

**Anticipated Class Schedule / Calendar- followed by lab syllabus**

Tentative Schedule- **DH**/double header: lecture continues in part of lab session

WK	DATE	LECTURE	Day	LABORATORY
1	08-17	Ch 1 introduction to the course	M	Lab 2-1 microbes are everywhere / Ex 3-1 microscope
	08-19	Ch 2 chemistry review	W	Ex3-1: use of oil/100x lens
2	08-24	ch 2	M	Ex 3-1 use of 100x lens; Ex3-4 simple staining
	08-26	Ch 2	W	Ex 3-4 simple staining; 3-6 gram stain
3	08-31	Finish Ch 2; start Ch 4 cell structure	M	<b>Ex 3-6 Gram stain</b>
	09-02	Ch 4	W	<b>Ex 3-8 capsule stain</b> ; practice gram stains

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4	09-07	HOLIDAY	M	
	09-09	Ch 4	W	Ex 3-9 endospore stain; practice gram stains
5	09-14	Ch 10-11 survey of bacteria (DH); start Ch14-15 how do bacteria cause disease	M	3-7 Acid fast stain; practice all other stain techs ; DH-lecture continues in lab
	09-16	Ch14-15 how do bacteria cause disease	W	Ex 1-4 aseptic transfer; ex 1-5 streak plate; ex2-6 thiglycollate; practice staining techniques
6	09-21	Ch 14-15; Ch 5 enzymes	M	Assign minor unknown and adapt a bacterium assignment 1; practice streak plate and staining techniques; Ex 4-3, 4-4, 4-5 (msa, mac, emb plates); review for exam 1
	09-23	Exam 1: Ch1-4; 10-11	W	intro lecture to minor unknowns; finish ex 4-3 to 4-5
7	09-28	Ch5 enzymes, metabolism (DH)	M	Gram staining "skills demo" (skills test); blood agar plate lab (in supplement); Dh-lecture continues in lab
	09-30	Ch 5	W	Carbohydrate metabolism labs: Ex 5-2 Fermentation, ex 5-3 mrvp, ex 5-7 citrate; practice streak plate techniques
8	10-05	Ch5 DH?	M	Respiration labs: ex5-4 Catalase, ex 5-5 oxidase, ex5-6 nitrate reduction
	10-07	Ch6 growth of bacteria	W	Exoenzyme labs 5-10,-11,-13, -14; streak plate skills demo/test; review for lab quiz 1
9	10-12	CH 7 controlling bacterial growth; start ch 8 genetics DH	M	Amino acid metabolism labs: 5-12 urea, 5-8 decarboxylation, 5-9 deamination; lecture continues in lab; lab quiz 1 (all labs from 9/16 to 9/30); adapt bacterium assignment 1 due
	10-14	CH8 genetics DH	W	Multiple assay labs: 5-18 sim; 5-19 tsi/kligliers; Chemical Control lab (in supplement); review for exam 2
10	10-19	Ch8 genetics DH?	m	assign major unknown and major unknown lecture; gram +

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				experiment (in supplement)
	10-21	<b>Exam 2 Ch 5-7,14-15 MINOR unknown due</b>	W	
<b>11</b>	10-26	Ch8; Ch 13 viruses <b>DH</b>	M	Gram + experiment cont'd
	10-28	Ch13 viruses	W	Finish Gram + experiment; review for lab quiz
<b>12</b>	11-02	Ch 13 <b>DH</b>	M	major unknown; <b>lab quiz 2</b> (all labs from 10/5 to 10/14);
	11-04	Ch 13	W	major unknown
<b>13</b>	11-09	Ch 20 antibiotics	M	major unknown; review for exam 3
	11-11	<b>Exam 3- Ch 8, 13</b>	W	
<b>14</b>	11-16	<b>Ch20; ch 16 innate defences</b>	M	major unknown
	11-18	Ch 16 innate defences <b>DH</b>	W	major unknown; antibiotics lab in supplement
<b>15</b>	11-30	Ch 17-19 immune system	M	major unknown
	12-02	Ch 17-19 immune system	W	major unknown should be done by this time
<b>16</b>	12-07	CH 17-19 DH	M	Clean up and check out; review for final; wrap-up major unknown if needed
	12-09	Final exam Ch 16, 17-19, 20	W	Final exam ch 16-20

Make a mental note of which tests are used for G+ or G- bact in the lab

Look at lab manual for application of test

Look at the tables in Bergeys to see which tests/char are used for telling different groups (chapters) of bacteria apart; i.e., the tables in each chapter contain different tests (tho some may overlap)- you'll see that different tests are used for telling gram+ and gram(-) bact apart



## **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 1<sup>st</sup> 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.

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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

2<sup>nd</sup> and 3<sup>rd</sup> Page- table of contents ( Lab exercises)

4<sup>th</sup> 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.

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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!!!