Biology 220 Microbiology

Basic Course Information

Semester	**Fall 2023**	Instructor Name	**Eddie Chang**
Course Title & #	**BIOL 220, Microbiology**	Email	**eddie.chang@imperial.edu via canvas mail**
CRN #	**10025**	Course website	**Via Canvas- See below**
Room	**2712**	Office	**Up in the cloud…**
Class Dates	**8.14-12.6.23**	Office Hours	**See below for times; online via zoom**
Class Days	**MW**	Office Phone #	**n/a: Email me via canvas mail or call the SME secretary if there is an emergency**
Class Times	**Lecture: 940a-1105a** **Lab: 1115a-225p**	Office contact if student will be out or emergency	**Sylvia Murray, SME secretary, 760-355-6155** **sylvia.murray@imperial.edu**
Units	**5**		

REVISED Office Hours (subject to change), effective **Monday, Sept 11,** 2023: office hours are online via zoom unless indicated otherwise. Please use the link on the courses website in Canvas to access the office hour sessions.

Mondays	4-5p
Tuesdays	230-4p: online and in person in 2712 830-9p: online only
Wednesdays	430-5p
Thursdays	330-4p
Other days/times	By arrangement

Open Lab (optional): Tuesdays 230p-430p and Wednesdays 230-4p in 2712. to be used for working on your unknown identification lab projects or extra practice on new lab techniques you learned recently, NOT for making up lab sessions you missed.

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 standard experimental techniques in microbiology such as gram stain and streak plate 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 glecture/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.

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 Text: *Microbiology, Laboratory, Theory and Application*. By Michael Leboeffe and Burton Pierce (Brief Edition). 3rd edition. Morton Publishing Co. (may use 2nd edition as well)

Recommended text for lecture (not required): *Microbiology, An Introduction*. By Tortora, Funke and Case, 13th ed or later. Pearson-Cummings (may use any edition from the 9th onwards). This text may be available as a rental from the campus bookstore.

Course website: go to 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 "canvas" tab and you can now log onto canvas. 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 course 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 and labs are an essential part of this course; therefore, attendance in both 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)

4. Laboratory portion: gram stain skills demonstration (30pts), 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 10 CALENDAR days 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 –

- In-class/embedded tutor: will go over in class

- 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/tutoring center: 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. Please submit test proctoring forms to me at least 1 week before an exam so I can make the proper accommodations/arrangements with DSPS in a timely manner.

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

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	LABORATORY (chapter headings found in second edition of lab manual)
1	8.14	Ch 1 intro to microbiology	Lab 2-1 microbes are everywhere
	8.16	Ch2 chemistry	Ex3-1: microscope -letter E and yarn slides

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2	8.21	**Ch 2**	Ex 3-1: 100x lens/bacteria slide; 3-4 simple staining
	8.23	Ch2	**Ex 3-6 Gram stain**
3	8.28	Ch2; ch 4	**Continue EX3-6 practicing the gram stain**
	8.30	Ch4	**Ex 3-8 capsule stain**; practice gram stains
4	9.4	**LABOR DAY HOLIDAY**	Labor day HOLIDAY
	9.6	ch 4	Ex 3-9 endospore stain; practice gram stains
5	9.11	Ch4; Ch 10-11	Ex 1-4 aseptic transfer; ex 1-5 streak plate; ex2-6 thioglycollate/ oxygen requirements; practice staining techniques; **EX 3-7** acid fast stain
	9.13	Ch 14-15 **DH ***	**EX3-7 Acid fast stain**; **Ex 4-3, 4-4, 4-5 (msa, mackonkey and emb plates);** intro lecture to minor unknowns
6	9.18	Ch 5	finish ex 4-3, 4-4, 4-5; **gram staining "skills demo"** (skills test); **ASSIGN MINOR UNKNOWN- work on minor unknowns 9.20-10.18**
	9.20	**Exam 1: ch 1, 2, 4, 10-11**	**Look at minor unknowns and make subcultures as needed**
7	9.25	Ch 5	Ex 5-2Fermentation/phenol red broth, ex 5-3 mrvp, ex 5-7citrate; practice streak plate technique
	9.27	Ch5	Respiration labs: ex5-4Catalase, ex 5-5oxidase, ex5-6nitrate reduction
8	10.2	Ch 5, Ch 6 **DH***	Exoenzyme labs 5-10, -11, -13, -14 (bile esculin, starch, casein, gelatin hydrolysis tests); streak plate skills demo/test; review for lab quiz 1
	10.4	Ch 6; lab quiz 1 during lab	Amino acid metabolism labs: 5-12 urease/urea hydrolysis, 5-8 decarboxylase, 5-9 deaminase tests; **lab quiz 1** (labs from 9.11 to 9.25, **excluding** acid-fast stain)

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9	10.9	Ch7, Ch 8 **DH***	Multiple assay labs: 5-18 sim; 5-19 tsi/kligliers; Chemical Control lab (handout)
	10.11	**Exam 2; ch 5-7, 14-15.**	major unknown lecture
10	10.16	Ch8	**G+ experiment (make the key); Major unknown lecture; assign major unknown** - work on it from 10.18 to 11.29
	10.18	Ch 8 **DH***	**Gram + experiment (discuss key; do 1st 1 or 2 tests); work on major unknown (subculture)**
11	10.23	Ch 8 **DH* minor unknown DUE**	Gram + experiment cont'd (do more tests); major unknown
	10.25	Ch8, Ch13 **DH***	Gram + experiment; major unknown
12	10.30	**Ch13**	Finish Gram + experiment if not done; major unknown; review for lab quiz
	11.1	Ch 13 **DH***; lab quiz 2 during lab	major unknown; **lab quiz 2** (labs from 9.27-10.9)
13	11.6	Ch16 **DH***	Major unknown lab
	11.8	**Exam 3: ch 8,13**	Major unknown lab
14	11.13	Ch 16 ; Ch 17-19 DH*	Major unknown lab
	11.15	ch 17-19	Major unknown lab
Week of nov 20-26: thanksgiving break			
15	11.27	Ch 17-19 **DH***	Major unknown lab
	11.29	**Ch 17- 19; 20 DH***	antibiotics lab (handout); finish up major unknown- **major unknown due by Friday 12.1.23**
16	12.4	**Ch 20**	**Clean out lockers/check out**; review for final
	12.6	**Final exam ch 16-20. lab notebook due**	

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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. Skills demo: in each skills demo, you will perform an important lab skill in microbiology that you have learned without any notes or help form others. These skills demo will evaluate whether you can perform these lab techniques on your own correctly.IN the first skills demo (scheduled for sept 20), you will perform the gram staining lab technique on bacteria and answer a few questions about the gram staining technique and other staining techniques you learned in lab (acid-fast, endospore and capsule stains). In the second skills demo (scheduled for Oct 4), you will perform the streak plate technique to separate a mixture of different bacteria from each other. You will also answer a few questions about the streak plate technique. Each skills demo is worth 25-30 points

B. Minor unknown: lab exercise in which you identify bacteria using mostly staining techniques learned in the first 5 weeks of the semester. Need to devise a strategy identifying the bacteria based on the characteristics of the bacteria that can be determined with the techniques you learned from weeks 1-5 ONLY. 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-20 points

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

Write in ink, not pencil. If you make a mistake, just cross it out. don't use liquid paper

Name on Cover

First Page- Name, Location, Date

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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). Make sure you write down anything you did that was not specified in the lab manual or lab worksheets/handouts/insturctions

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!!!