MICROBIOLOGY 20 (3252 & 3253)

Los Angeles Mission College, Fall 2013 Stephen Brown (instructor)

Lecture: TTh 5:15-6:40, CMS 105 **email:** brownst@lamission.edu **Lab:** T 6:50-10:00, CMS 002 *(3252)* **voicemail:** 818-364-7665

Lab: Th 6:50-10:00, CMS 002 *(3253)* **office hours:** MW 9:20-10:35 (CMS 002)

TTh 3:30-5:00 (CMS 002)

PREREQUISITES - Successful completion of the following courses:

Required - Biology 3 or 6, AND Chemistry 51, 65 or 101 (or the equivalent) Advisory – English 28 (or the equivalent)

<u>COURSE DESCRIPTION</u> - This course is an introduction to the fundamental principles of microbiology. The laboratory portion of the course covers microscopy and culturing techniques for studying and identifying microorganisms.

STUDENT LEARNING OUTCOMES

Microbiology 20 students will: (1) Demonstrate understanding of key concepts in the course by designing a brochure for an infectious disease or immune system disorder, and (2) Identify an unknown bacterium using lab skills learned in the course.

<u>COURSE OBJECTIVES</u> - Upon completion of this course a successful student will:

- Employ microbiology terminology correctly in the laboratory and workplace.
- Analyze the differences between prokaryotic and eukaryotic cells. List subcellular structures and organelles of prokaryotic and eukaryotic cells and their functions, draw the structure of prokaryotic and eukaryotic cells and label their parts.
- Compare and contrast eukaryotic organisms including fungi, algae, and multicellular parasites using the compound light microscope, and describe important features.
- Describe the underlying mechanisms of chemical reactions in microbes, including energy and material flow.
- Compare and contrast the effect of pH, temperature, radiation, O₂ concentration, osmotic pressure, and nutrients on microbial growth. Differentiate important events of the four growth stages of bacterial populations (lag, log, stationary, and decline).
- Describe the processes of DNA replication, mutations, transcription, and translation. Distinguish among mechanisms of genetic recombination in bacteria (transformation, transduction, and conjugation).
- Organize and name the major taxonomic categories of bacteria, fungi, viruses, algae, protozoa, and helminthes.
- Demonstrate knowledge of the different features of prokaryotes, their different taxonomical groupings and to use reference sources for microbial identifications.
- Analyze the traits of important microbiological eukaryotes and their clinical and environmental relevance.
- Explain viral structure and the major steps in the life cycle of an animal virus. Describe the structure of a bacteriophage and distinguish between lytic and lysogenic life cycles.

- Examine and distinguish the stages of infectious disease (incubation, prodromal, illness, decline, and convalescence). Explain Koch's postulates for infectious diseases and exceptions to them.
- Distinguish between bacterial endotoxins and exotoxins and give examples of each. Describe microbial mechanisms to enter host, evade host defenses, and cause cellular damage.
- Explain the role of the nonspecific host defenses against microbial infection.
- Examine the features of IgA, IgD, IgM, IgG, and IgE immunoglobulins. Analyze specific host defenses
 against microbial infection, and distinguish between humoral and cell-mediated immunity. Discuss
 cells and cell fragments found in human blood and describe their functions in nonspecific and
 specific host responses.
- Distinguish among the major categories of immune disorders in humans, their signs and symptoms and the genetic and environmental factors that may play a role in the etiology of such diseases.
- Compare and contrast the major categories of antimicrobial drugs.
- Summarize the causes and characteristics of major human microbial diseases.

REQUIRED BOOKS AND MATERIALS

MICROBIOLOGY with Diseases by Body System. Robert W. Bauman, 3rd ed. 2012 Pearson-Benjamin Cummings: ISBN 978-0-321-71271-4 (textbook only)

Textbook/Mastering Microbiology bundle (in bookstore only): ISBN 978-0-321-77839-0

MICROBIOLOGY Laboratory Theory & Application (LAMC custom edition). Michael Leboffe & Burton Pierce, 2012. Morton Publishing Company (ISBN 978-1-61731-141-3)

MATERIALS: bound notebook (graph ruled), *Sharpie* pen, colored pencil set, **8** Scantron 815-E forms, **7** Scantron 882-E forms, **4** blue books (or Scantron 886-E), digital camera (optional)

COURSE GRADE

Your Course Grade will be weighted as follows: <u>60% Lecture</u> – <u>40% Laboratory</u>. There will be 1000 possible points for the entire course as shown below:

8 Lecture Quizzes	12% of Grade (120 points)
4 Lecture Exams	40% of Grade (400 points)
Disease Assignment	8% of Grade (80 points)
Laboratory Exam	14% of Grade (140 points)
3 Lab Quizzes	6% of Grade (60 points)
Morphological Unknown	3% of Grade (30 points)
Biochemical Unknown	7% of Grade (70 points)
Lab Notebook	5% of Grade (50 points)
Lab Participation	5% of Grade (50 points)
	4000

1000 points total

LECTURE: The lowest lecture quiz will be replaced with your average quiz score. Exams and quizzes will consist of multiple choice, short answer and essay questions. Multiple choice questions are to be answered on **Scantron** forms. Short answer and essay questions are to be answered in Blue Books or on Scantron form 886-E. **There will be NO makeup exams or quizzes except in case of a documented emergency, and any makeups will be more challenging than the original**. Guidelines for the Disease Assignment will be detailed in a handout.

LAB: Students are expected to read each lab exercise *BEFORE* class. Completed lab notebooks are to be turned in to the instructor periodically as indicated in the schedule. Guidelines for Lab Notebooks and Bacterial Unknowns will be detailed in handouts. Lab participation scores will be based on preparation, attendance, completion of labs, lab safety, cleanup, teamwork, microscope care and usage, and appropriate use of equipment and supplies. You will be assigned a microscope for the semester and will be responsible for its proper use and maintenance. I will routinely inspect microscopes before, during, and after you use them. *Participation points may be deducted for storing your microscope improperly (e.g. storing with slides, oil on the microscope, "arm in")*. You will be allowed to miss one laboratory without penalty, after which *5 points will be deducted from your participation score for each additional unexcused absence from the laboratory*. Lab quizzes can be answered on a single <u>Scantron 882-E</u> form which can be reused.

Grading Scale:	900+ pts (90-100%)	Α
	780-899 pts (78-89%)	В
	650-779 pts (65-77%)	С
	550-649 pts (55-64%)	D
	0-549 pts (below 55%)	F

ATTENDANCE POLICY

Attendance is required and roll will be taken. <u>You</u> are responsible for any information, date changes, etc., presented in class, whether or not you are present. Students missing more than 2 consecutive classes may be dropped. Students given add slips *must* complete the process by <u>Friday September 6th</u>. Students withdrawing from the class must do so by:

<u>Sunday September 8th</u> to avoid receiving a "W" and to receive a refund **Sunday November 17th** to receive a "W"

NOTE: A new state policy in effect as of Summer 2012 limits students to <u>3 attempts per course</u>.

Receiving a grade or "W" for a course counts as an attempt, regardless of when the course was taken. Withdrawal by February 18th (avoiding a "W") will not count as an attempt.

IMPORTANT WEBSITES

https://eweb3.laccd.edu/WebStudent/signon.asp

-this is the district website where you can add/drop courses and view your grades

http://www.lamission.edu/~brownst

- your instructor's website for downloading course notes and handouts

https://myetudes.org/portal

-here you can monitor your scores and overall standing in the course and engage in discussion forums with the instructor and fellow students

http://www.masteringmicrobiology.com/

-your textbook publisher's online supplemental study material, practice quizzes, etc.

^{*} Keep in mind the LACCD website is not always available on Sundays due to routine maintenance.

http://www.lamission.edu/stem/

-this is the website for the LAMC STEM program where you can find information about the advantages of enrolling in the program and services such as tutoring

COLLEGE RESOURCES FOR STUDENTS

Bookstore: For hours of operation, book availability, buybacks, and other information call 818-364-7767 or 7768 or visit http://www.lamissionbookstore.com/

Counseling Department: For appointments and information call 818-364-7655 or visit http://www.lamission.edu/counseling/

Disabled Students Programs and Services (DSP&S): For appointments, eligibility and information call 818-364-7732 or visit http://www.lamission.edu/dsps/

Extended Opportunity Programs and Services (EOPS): For appointments, eligibility and information call 818-364-7645 or visit http://www.lamission.edu/eops/

Financial Aid: For information and applications call 818-364-7648 or visit http://www.lamission.edu/financialaid/

Library: For information on hours, resources, workshops, and other services contact 818-364-7106 or visit http://www.lamission.edu/library/

Tutoring Services in Learning Center: Laboratories for Learning, Writing, Math & Science. Walk-in and appointment services offered. Call 818-364-7754 or visit www.lamission.edu/learningcenter/

RECOMMENDATIONS FOR SUCCESS

This is a demanding class covering a lot of information. Here are some suggestions:

- do NOT fall behind in the course, keep up with the material on a weekly basis
- each time you study, spend a few minutes reviewing previous lessons (this is the secret to long term memory)
- <u>outline</u> the Powerpoint notes, this will help you to mentally organize the large amount of material you will be learning
- use associations, acronyms to help you remember things
- create flash cards and form study groups if you find that helpful
- know the key terms (you can't answer questions correctly if you don't!)
- at a <u>minimum</u>, you should <u>learn</u> the course material <u>3 times</u> in order to retain it well for the exams and quizzes:

- 1) comprehend the class material during the lecture
- 2) read the corresponding material in the text while reviewing your notes
- 3) **review** your notes and key terms before the exams

If you don't do at least this much, you won't do well in this class

SPECIAL ACCOMMODATIONS

If you require special accommodations for a disability, religious holiday, etc, please inform me within the first week of the course and I will accommodate you if at all possible. For accommodations due to disability, you must consult the Disabled Student Programs and Services office after which we will abide by their recommendations.

Code of Honor and Integrity

Los Angeles Mission College Department of Life Sciences

Students at Los Angeles Mission College, because they are members of an academic community dedicated to the achievement of excellence and the pursuit of honor, are expected to meet high standards of personal, ethical, and moral conduct. These standards require personal integrity and a commitment to honesty without compromise. Without the ability to trust in these principles, an academic community and a civil society cannot exist. Los Angeles Mission College students and faculty are as committed to the development of students with honesty and integrity as they are to the academic and professional success of its students.

The Code of Honor and Integrity is an undertaking of the students, first and foremost, both individually and collectively, that they will:

- 1. Not give or receive dishonorable aid during exams, guizzes or assignments
- 2. Do their share and take an active part in seeing to it that fellow students, as well as themselves, uphold the spirit and letter of the Code of Honor and Integrity.

Some examples of conduct that are regarded as being in violation of the Honor Code include:

- Copying from another's examination or quiz, or allowing another to copy from one's own papers
- Using any unpermitted source of information, human or other, during an exam, quiz or assignment that influences the grade; this includes the use of technological devices

- Any student-to-student collaboration that is unpermitted
- Plagiarism (plagiarism is defined as the use, without giving reasonable and appropriate credit to, or acknowledging the author or source, of another person's original work)
- Representing the work of another as one's own work
- Giving or receiving aid on an academic assignment under circumstances in which a reasonable person should have known that such aid is not permitted

As a part of the effort to promote an environment of honesty and integrity during quizzes and examinations, the following guidelines will apply for any courses in the Department of Life Sciences:

- Students will leave all books and all other non-essential items (e.g. paper, electronic devices)
 on the floor so that they are not useable nor block the sight line between professor and
 student. No electronic devices will be in reach.
- 2. Students will not communicate in any way that will dishonorably assist themselves or another student.
- 3. Students will leave the room during an exam only if permitted by the professor's policy. If permitted, only one student may leave the room at any time and be gone for only the average length of time needed for the stated purpose. Students will leave all purses, bags, books, phones, jackets, etc., in the classroom during the absence.
- 4. Students will promote the spirit and letter of the Code of Honesty and Integrity by dissuading fellow students from dishonest activity and, when such casual persuasion does not work, informing the professor of the possible dishonest activity, either anonymously, or otherwise.
- 5. Students will make every effort to avoid even the appearance of dishonesty or lack of integrity.

Violation of this policy will not be tolerated and violators will be subject to severe penalties. The success of the Code of Honor and Integrity is based upon the collective desire of students, faculty and the community to live in an environment that embraces respect for that which is right – both in the college and in society as a whole.

LECTURE SCHEDULE

(tentative)

Week	Date	*LECTURE TOPIC (textbook chapter)	
1	Aug 27	Introduction & History of Microbiology (ch 1)	
		Review of Chemical Principles (ch 2)	
	Aug 29	Eukaryotic, Prokaryotic Cell Structure & Function (ch 3)	
2	Sep 3	Prokaryotic Cell Structure & Function (cont'd) (ch 3)	
	Sep 5	*Quiz: Microscopy, Staining & Microbial Classification (ch 4A)	
3	Sep 10	Characterizing & Classifying Prokaryotes (ch 11)	
	Sep 12	Eukaryotic Microorganisms: Algae & Protozoa (ch 12)	
4	Sep 17	*Quiz: Eukaryotic Microorganisms: Fungi & Helminths (ch 12)	
Sep 19 Microbial Metabolism (ch 5)		Microbial Metabolism (ch 5)	
5	Sep 24	Ехам #1 on chapters 1-4A, 11 & 12	
	Sep 26	Microbial Nutrition & Growth (ch 6)	
6	Oct 1	*Quiz: DNA Replication & Gene Expression (ch 7)	
	Oct 3	Gene Regulation & Mutations (ch 7)	
7	Oct 8	Gene Transfer (ch 7); Methods of Identification (ch 4B)	
	Oct 10	*Quiz: Controlling Microbial Growth in the Environment (ch 9)	
8	Oct 15	EXAM #2 on chapters 4B, 5-7 & 9	
	Oct 17	Controlling Microbial Growth with Antimicrobial Drugs (ch 10)	
9	Oct 22	Overview of Viruses, Bacteriophages (ch 13)	
	Oct 24	Animal Viruses & Prions (ch 13)	
10	Oct 29	*Quiz: Innate Immunity (ch 15)	
	Oct 31	Adaptive Immunity: Overview & Antibody Structure (ch 16)	
11	Nov 5	Adaptive Immunity: Antigens, Antigen Presentation & T Cells (ch 16)	
	Nov 7	*Quiz: Adaptive Immunity: Humoral & Cell-Mediated Immune Resp. (ch 16)	
12	Nov 12	Immunization & Immune Testing (ch 17)	
	Nov 14	EXAM #3 on chapters 10, 13, 15 & 16	
13	Nov 19	Immune Disorders (ch 18)	
	Nov 21	Principles of Disease: Disease Concepts & Onset of Disease (ch 14)	
14	Nov 26	*Quiz: Principles of Disease: Bacterial Toxins, Disease Transmission &	
		Epidemiology (ch 14) **Disease Brochure due**	
	Nov 28	THANKSGIVING HOLIDAY	
15	Dec 3	Selected Bacterial Pathogens (ch 19-24)	
	Dec 5	Selected Viral & Eukaryotic Pathogens (ch 19-24)	
16	Dec 12	EXAM #4 on chapters 14, 17-24 (5:30-7:30 in CMS 105)	

^{*} Quizzes will be given from 5:15-5:30 after which we will review the answers. The 8^{th} quiz will be given along with Exam 4 during finals week.

NOTE: The lecture notes and various handouts are available in PDF format on the instructor's LAMC website http://www.lamission.edu/~brownst.

LABORATORY SCHEDULE

Week	Tuesday (3252)	LAB TOPIC (exercise #)	Thursday (3253)	
1	Aug 27	Lab Orientation; Use and Care of the Microscope (3-1); Metric System		
2	Sept 3	Microbes in the Environment (2-1); Aseptic Technique (1-3); Streak (1-4) & Spread Agar Plates (1-6)		
3	Sept 10	Preparation of Smears and Simple Staining (3-4); Gram Stain (3-6) **Turn in notebook**		
4	Sept 17	Acid Fast (3-7), Endospore (3-9), & Capsule Stains (3-8); Motility – Wet Mount & Hanging Drop (3-10), Motility Agar (5-22)		
5	Sept 24	Morphological Unknown	Sept 26	
6	Oct 1	LAB QUIZ #1: Fungi, Protozoa & Helminths (3-3)	Oct 3	
7	Oct 8	PCR amplification of DNA (handout); Standard Plate Counts (6-1); Effect of Temperature on Bacterial Growth (2-8) **Morphological Unknown due**		
8	Oct 15	Control of Bacterial Growth – UV light (2-11); Control of Bacterial Growth – Chemical Disinfectants (2-12); Control of Bacterial Growth – Antimicrobial Drugs (7-2)		
9	Oct 22	LAB QUIZ #2: Biochemical Unknown Oxidation-Fermentation (5-1), Phenol Red (5-2), & MR-VP (5-3) tests		
10	Oct 29	Catalase (5-4), Oxidase (5-5), Citrate (5-7), Urease (5-12) & Starch Hydrolysis (5-11) tests		
11	Nov 5	Nitrate Reduction (5-6), Decarboxylase (5-8), Phe Deaminase (5-9), Gelatinase (5-14) & SIM agar (5-17) tests		
12	Nov 12	Enterotube II (9-5); Water Testing-PR Lactose (7-6)		
13	Nov 19	LAB QUIZ #3: Water Testing-EMB agar (4-4); Microbes in Food (handout)		
14	Nov 26	review for Laboratory Exams **Biochemical Unknown due**		
		HOLIDAY (Thanksgiving Day)	Nov 28	
15	Dec 3	LABORATORY OPEN BOOK EXAM; LABORATORY PRACTICAL EXAM	Dec 5	

^{*} These exercises do <u>not</u> need to be entered into you notebook.

NOTE: Many of the lab exercises are continued in the following lab session.

SCORE SHEET

LECTURE POINTS

Quiz #1		Exam 1	
	15		100
Quiz #2		Exam 2	
	15		100
Quiz #3		Exam 3	
	15		100
Quiz #4		Exam 4	
	15		100
Quiz #5		Disease	
	1 5	Assign.	/80
Quiz #6			
	1 5		
Quiz #7			
	15		
Quiz #8			
	1 5		

LAB POINTS

Lab Quiz #1	
•	/ 20
Lab Quiz #2	
	20
Lab Quiz #3	
	/ 20
Unknown #1	
	/30
Unknown #2	
	7 0
Open Book	
Exam	70
Practical Exam	
	/ 70
Lab Notebook	
	50
Lab	
Participation	/ 50

LECTURE possible points:

- Quizzes 15 points each
- Exams 100 points each
- Disease brochure 80 points

LAB possible points:

- Open book exam 70 points
- Practical exam 70 points
- Lab Quizzes 20 points each
- Morphological unknown (#1) 30 points
- Biochemical unknown (#2) 70 points
- Lab notebook 50 points (25 points each for completeness and quality of notebook)
- Lab participation 50 points

To keep track of your performance throughout the course, enter your scores in the chart above as you receive them. At any point you can add up your total points earned and divide by the total points possible at that stage of the course. Multiply this by 100% and then compare with the grade scale on page 3 of the syllabus to see how you are doing.