

Los Angeles Mission College, Fall 2009
Lab: TTh 5:20-6:45, INST 2016 (3265)
Lecture: TTh 7:00-8:25, INST 2001
Lab: TTh 8:35-10:00, INST 2016 (3266)

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MICROBIOLOGY 20 (3265 & 3266)

PREREQUISITES: Successful completion of any of the following courses:
required - *Biology 3 or 6, AND Chemistry 51, 65 or 101 (or the equivalent)*
recommended – *English 28 (or the equivalent)*

COURSE DESCRIPTION: This course is an introduction to the fundamental principles of microbiology. The laboratory portion of the course covers microscopic and cultural techniques for studying and identifying microorganisms.

COURSE OBJECTIVES: Upon completion of this course a successful student will be able to:

- 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 different 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 environmental factors on microbial growth (pH, temperature, pressure, radiation, oxygen concentration, osmotic pressure, and nutrients). 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 helminths.
- 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 the five categories of immunoglobulins (IgA, IgD, IgM, IgG, and IgE). 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 major diseases that affect different human organ systems due to specific microbial pathogens.

STUDENT LEARNING OUTCOMES:

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

REQUIRED BOOKS AND MATERIALS:

BOOKS:

MICROBIOLOGY with Diseases by Body System. Robert W. Bauman, 2nd ed. 2009
Pearson-Benjamin Cummings (ISBN 978-0-321-51341-0)

MICROBIOLOGY Laboratory Theory & Application (brief edition). Michael Leboffe
& Burton Pierce, 2008. Morton Publishing Company (ISBN 978-0-89582-705-0)

MATERIALS:

bound notebook (graph ruled), *Sharpie* pen or wax pencil, colored pencil set
7 Scantron 815-E forms, 7 Scantron 882-E forms, 4 blue books (or Scantron 886-E)

OTHER RESOURCES:

<http://www.microbiologyplace.com> (website for the course text)

<http://www.lamission.edu/lifesciences> (Mission College department website)

<http://www.lamission.edu/~brownst> (instructor website for notes and handouts)

COURSE GRADE:

Your Course Grade will be weighted as follows: 65% Lecture – 35% Laboratory.

6 (of 7) Lecture Quizzes	12% of Grade (120 points)
4 Lecture Exams	48% of Grade (480 points)
Written Assignment	5% of Grade (50 points)
Laboratory Exam	10% of Grade (100 points)
3 Lab Quizzes	6% of Grade (60 points)
Morphological Unknown	3% of Grade (30 points)
Biochemical Unknown	6% of Grade (60 points)
Lab Participation	5% of Grade (50 points)
Lab Notebook	5% of Grade (50 points)
	1000 points total

Lecture: The lowest quiz score will be dropped. 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. **Any make-up exams or quizzes will be short answer, essay ONLY.** Guidelines for grading of the Written Assignment will be detailed in a handout.

Lab: Students are expected to have read each lab exercise ***BEFORE*** class. Completed lab notebooks are to be turned in to the instructor periodically as indicated in the schedule. Lab participation scores will reflect the number of labs completed (e.g., 80% completed = 80% credit). Guidelines for grading of Lab Notebooks and Unknown Bacteria will be detailed in handouts.

<u>Grading Scale:</u>	900+ pts (90-100%)	A
	780-899 pts (78-89%)	B
	650-779 pts (65-77%)	C
	550-649 pts (55-64%)	D
	0-549 pts (below 55%)	F

ATTENDANCE POLICY:

Attendance is required and roll will be taken. **You 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 **Friday September 11th**. Students withdrawing from the class must do so by:

Monday September 14th to receive a refund
Friday September 25th to avoid receiving a “W” on your transcript
Friday November 20th to receive a “W” and avoid a non-passing grade

SPECIAL ACCOMMODATIONS:

If you require special accommodations, religious or ADA, inform me **IN WRITING** within the first two weeks of the semester. You will need to provide the appropriate documentation after which we will arrange to meet your needs.

CHEATING/ACADEMIC DISHONESTY:

Each student is expected to do his/her own work on all assignments, reports, examinations, etc. **Cheating in any form will at a minimum result in ZERO points for the assignment or test, and may result in an "F" for the course.**

Here is a list of some actions that are considered cheating:

- Copying answers from someone else's paper**
- Using notes of any kind, in any form, during an exam**
- Showing a fellow student your exam or passing information**
- Presenting the work of someone else as your own (plagiarism)**
- Providing your work for someone else to copy**
- Taking a call or text-message on your cell phone (please turn them off!)**
- Any sort of communication with someone else (besides me) during an exam**

If you have a question during an exam, raise your hand or quietly walk up to the instructor and whisper your question. **Translation dictionaries are not permitted during exams or quizzes. Exiting the room during an exam or quiz is not permitted.**

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
- read the relevant chapters in your textbook, hi-lite pertinent lines and add these notes to your class notes (always write as you read)
- use associations, acronyms to help you remember things
- create flash cards and form study groups if you find that helpful
- keep a neat, well-organized, up-to-date lab manual
- **know the key terms** (you can't answer questions correctly if you don't!)
- at a **minimum**, you should **learn** the course material **3 times** 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

LECTURE SCHEDULE (tentative)

Week	Date	*LECTURE TOPIC (textbook reading)
1	Sep 1	Introduction; History of Microbiology (ch 1) Review of Chemical Principles (ch 2)
	Sep 3	Eukaryotic, Prokaryotic Cell Structure & Function (ch 3)
2	Sep 8	Microscopy, Staining & Microbial Classification (ch 4)
	Sep 10	QUIZ: Characterizing & Classifying Prokaryotes (ch 11)
3	Sep 15	Microbial Metabolism (ch 5)
	Sep 17	Microbial Nutrition & Growth (ch 6)
4	Sep 22	EXAM #1 on chapters 1-6 & 11
	Sep 24	Microbial Genetics (ch 7)
5	Sep 29	Recombinant DNA Technology (ch 8)
	Oct 1	Controlling Microbial Growth in the Environment (ch 9)
6	Oct 6	QUIZ: Controlling Microbial Growth: Antimicrobial Drugs (ch 10)
	Oct 8	Characterizing/Classifying Eukaryotes: Algae, Protozoa (ch 12)
7	Oct 13	Characterizing/Classifying Eukaryotes: Fungi, Helminths (ch 12)
	Oct 15	QUIZ: Characterizing & Classifying Viruses (ch 13)
8	Oct 20	EXAM #2 on chapters 7-10 & 12
	Oct 22	Animal Viruses, Virioids & Prions (ch 13)
9	Oct 27	Innate Immunity (ch 15)
	Oct 29	QUIZ: Adaptive Immunity: Overview & Antibody Structure (ch 16)
10	Nov 3	Humoral & Cell-Mediated Immune Responses (ch 16)
	Nov 5	Immunization & Immune Testing (ch 17)
11	Nov 10	QUIZ: Immune Disorders (ch 18)
	Nov 12	Infection, Infectious Diseases and Epidemiology (ch 14)
12	Nov 17	EXAM #3 on chapters 13, 15-18
	Nov 19	Selected Bacterial Pathogens (ch 19-24)
13	Nov 24	Selected Bacterial Pathogens (ch 19-24)
	Nov 26	<i>HOLIDAY (Thanksgiving Day)</i>
14	Dec 1	QUIZ: Selected Viral Pathogens (ch 19-24)
	Dec 3	Selected Viral Pathogens (ch 19-24)
15	Dec 8	Selected Eukaryotic Pathogens (ch 19-24)
	Dec 10	QUIZ: Applied & Environmental Microbiology (ch 25) **Written Assignment due**
16	Dec 15	EXAM #4 on chapters 14, 19-25 (8:00-10:00 in INST 2001)

* The lecture notes and various handouts will be available in PDF format through my LAMC website <http://www.lamission.edu/~brownst> or by e-mail.

NOTE: Quizzes will cover material from the 3 previous lectures.

LABORATORY SCHEDULE

Week	Date	LAB TOPIC (exercise #)	Att?
1	Sep 1	Lab Orientation	
	Sep 3	Use and Care of the Microscope (3-1)	
2	Sep 8	Microbes in the Environment (2-1); Aseptic Technique (1-3)	
	Sep 10	Streak (1-4) & Spread Agar Plates (1-6)	
3	Sep 15	Preparation of Smears and Simple Staining (3-4)	
	Sep 17	Gram Stain (3-6) **Turn in lab notebook**	
4	Sep 22	Acid Fast Stain (3-7) & Endospore Stain (3-9)	
	Sep 24	Capsule Stain (3-8); Motility – Wet Mount & Hanging Drop (3-10)	
5	Sep 29	Morphological Unknown (3-12)	
	Oct 1	LAB QUIZ #1: Morphological Unknown (cont'd)	
6	Oct 6	Fungi (3-3A)	
	Oct 8	Protozoa & Helminths (3-3B) **Morphological Unknown due**	
7	Oct 13	Effect of Temperature on Bacterial Growth (2-8)	
	Oct 15	Standard Plate Counts (6-1)	
8	Oct 20	Control of Bacterial Growth – UV light (2-11)	
	Oct 22	Control of Bacterial Growth – Chemical Disinfectants (2-12)	
9	Oct 27	Control of Bacterial Growth – Antimicrobial Drugs (7-2)	
	Oct 29	Biochemical Unknown (9-1, 9-2, 9-3)	
10	Nov 3	LAB QUIZ #2: Biochemical Unknown (cont'd)	
	Nov 5	Oxidation-Fermentation (5-1), Catalase (5-4), Oxidase (5-5) tests	
11	Nov 10	Phenol Red (5-2), MR-VP (5-3), Starch Hydrolysis (5-11) tests	
	Nov 12	Nitrate Reduction (5-6), Citrate (5-7), Urease (5-12), Gelatinase (5-14)	
12	Nov 17	SIM agar (5-17), Decarboxylase (5-8), Phe Deaminase (5-9) tests	
	Nov 19	Multiple Test Systems – Enterotube II (9-5)	
13	Nov 24	Water Testing-PR Lactose (7-6) **Biochemical Unknown due**	
	Nov 26	THANKSGIVING DAY	
14	Dec 1	Water Testing-EMB agar (4-4); Microbes in Food (handout)	
	Dec 3	LAB QUIZ #3: review for open book exam	
15	Dec 8	LABORATORY OPEN BOOK EXAM; review for practical exam	
	Dec 10	LABORATORY PRACTICAL EXAM	

NOTE: Most of the lab exercises overlap 2 laboratory sessions (inoculate on Day 1, interpret on Day 2). The schedule shows the *start* (Day 1) of each exercise, which may carry over to the following lab session.

SCORE SHEET

LECTURE POINTS

Quiz #1	Exam 1
Quiz #2	Exam 2
Quiz #3	Exam 3
Quiz #4	Exam 2
Quiz #5	Written
Quiz #6	
Quiz #7	

LABORATORY POINTS

Open Exam	3-1	3-3A	5-11
Practical	2-1	3-3B	5-6
Unkn. #1	1-3	2-8	5-7
Unkn. #2	1-4	6-1	5-12
Quiz #1	1-6	2-11	5-14
Quiz #2	3-4	2-12	5-17
Quiz #3	3-6	7-2	5-8
notebook	3-7	5-1	5-9
lab part.	3-9	5-4	9-5
	3-8	5-5	7-6
	3-10	5-2	4-4
	3-12	5-3	food

LECTURE possible points:

- quizzes – 20 points each (lowest score is dropped)
- exams – 120 points each
- written assignment – 50 points

LAB possible points:

- open book exam – 50 points
- practical exam – 50 points
- quizzes – 20 points each
- morphological unknown (#1) – 30 points
- biochemical unknown (#2) – 60 points
- lab notebook – 25 points for entries (~1.5 points/exercise), 25 points for overall quality
- lab participation – 50 points (~2 points per lab session)

To keep track of your performance throughout the course, add up your total points earned and divide by the total points possible at that stage of the class. Then multiply by 100 to get a percent score to compare with the grade scale on page 3 of the syllabus.