



MEDICAL MICROBIOLOGY 2022

MEDS 3024C (undergraduate), PMM 7004C (graduate)

MWF 10:10 – 11:05 am

Lectures: MSB 4051

Labs: Cardiovascular center (CVC) teaching labs, G-level

Course Director:

David S. Askew, Ph.D., Dept. of Pathology & Laboratory Medicine

Office: MSB 1256A, 558-2395, email:david.askew@uc.edu

Course Description

Medical Microbiology is a branch of medical science that studies the biology of microbial pathogens and how it influences the diagnosis, prevention and treatment of infectious disease. Where do microbial pathogens come from? How are they transmitted to humans? What are the biological features of the microbe that explain the clinical presentation of the patient? How do we distinguish which organism is responsible for a specific disease? Why do some microbes cause life-threatening infections while others cause only mild illness? This course considers each of these questions in relation to human microbial pathogens, focusing on bacteria and fungi, but with brief comparisons to parasites and viruses.

Integration with other courses in the medical sciences

Medical microbiology integrates microbial biology with infectious diseases. As such, it fits into any curriculum that prepares students for entry into health professions or biomedical PhD programs. The prerequisite is introductory college-level biology, but previous coursework in immunology or biochemistry is useful.

Learning outcomes

After taking this class, students will be able to:

- Describe the pathogenesis of infections caused by the major bacterial and fungal pathogens.
- Compare and contrast the structure of bacteria and fungi.
- Describe the mechanism of action of the major classes of antibacterial and antifungal drugs
- List the principle organisms associated with infection of a specific organ system.
- Correlate clinical manifestations with laboratory information to establish a diagnosis.
- List examples of prokaryotic and eukaryotic pathogens, explaining key differences between bacteria, fungi parasites, and viruses.
- List the clinical, research, and allied health careers in medical microbiology.

Textbook

The textbook Medical Microbiology (Sherris 7th Ed), is available online at no charge to U.C. students. This text is for reference only; I encourage you to consult specific chapters if there is something that you don't understand, but you won't need to use it on a regular basis. [Textbook website.](#)

Lectures

The lectures are in person in MSB 4051 and will be recorded and posted on Canvas.

Laboratory

The lab uses live microorganisms to teach basic principles in microbiology. These organisms are not known to consistently cause disease in healthy immunocompetent adult humans, and the American Society for Microbiology considers them to have minimal potential hazard to laboratory personnel and the environment (officially classified in Risk Group 1). Students who are immune-compromised (including those who are pregnant or may become pregnant) and students living with or caring for an immune-compromised individual should consult with their physician to determine the appropriate level of participation in the lab (a list of the organisms will be provided).

The lab is located on the ground floor of the Cardiovascular Center (CVC) in the College of Medicine. Exit the Eden Avenue shuttle, cross the street (Eden Avenue) and go up the wide steps. Enter through glass doors into the CARE building. Cross the large atrium into the MSB (E-level). There is no direct access to the labs from E-level of the MSB (unless you go outside). However, if you take the elevators (or stairs) to G-level of the MSB, you can walk directly into G-level of the CVC.

Office hours

The instructor is usually available following each lecture, but appointments can be scheduled by email request.

Attendance policy

Attendance is required for the laboratories. An absence from a lab requires prior permission from the course director and may require documentation. Attendance is not required for the lectures. However, I urge you to make attendance a priority for the following reasons:

- You will get a sense of how you are doing relative to your classmates.
- You will learn better in an in-person environment where there is the added pressure of being "on stage". Microbiology has a language of its own and, like any language, you will learn it much better by using it rather than memorizing from documents.
- You will notice the emphasis of key points, which will help you anticipate exam questions.
- You can ask questions on-the-fly to clarify confusing concepts.

Academic integrity

University Rules related to academic integrity will be enforced.

Accessibility

If a student requires special accommodation, they should file their request with U.C. Accessibility Services before the start of the semester.

Pass/fail option, audit policy, and withdrawal policy

There are no pass/fail or audit options for this class. Withdrawal procedures follow U.C. guidelines.

Grading

There are 3 online (but in-person) exams that together comprise 75% of the total grade (20%, 25% and 30%). Each exam focuses on material since the last exam. However, there is some cumulative content that will be

pointed out in class. Lab exercises and case presentations comprise 25% of the final grade. There are no makeup exams or extra credit. Under exceptional circumstances, a student may ask to take the exam before a scheduled date. Unexpected absences due to medical emergencies must be reported as soon as possible.

- Three exams, including the final 75% (20%, 25%, 30%)
- Lab exercises 20% (graduate students: 10% lab exercises + 10% a term paper).
- Student case presentations 5%

All post-lab assignments are due by Sunday at midnight following the lab. Missing assignments automatically receive a zero. Late assignments are allowed, but an automatic penalty of 25%/day is applied.

Graduate students: a term paper is worth 50% of the lab grade (i.e. 10% lab exercise/10% term paper). This is a 5-page review paper on some aspect of medical microbiology, similar to review articles published in the journal Current Opinion in Microbiology. A draft may be submitted before the first Fall reading day in order to receive feedback, and the final paper is due at the last class. This paper is distinct from the case presentation.

Student case presentations are group powerpoint lectures on a student-chosen clinical case that deals with any organism that has not been covered in the course.

A	94-100	B+	87-89	C+	77-79	D+	67-69	F	0-59
A-	90-93	B	84-86	C	74-76	D	64-66		
		B-	80-83	C-	70-73	D-	60-63		

What you can expect from your instructors

- We will start and end the class/lab on time.
- We will stick to the syllabus schedule, topics, and exam schedule as closely as possible.
- We will answer email questions from students within 24 hours, during the work week.
- We will welcome questions in class and the lab.
- We will grade student exams promptly.
- We will be respectful, civil, and professional in all student interactions.

What we expect from students

- Attend class “with purpose”. Focus only on the class materials and do not allow distracting devices to control your attention.
- “5 minutes early is on-time; on-time is late; late is unacceptable”. Living by this expression, commonly used in the corporate world, will serve you well in any future career.
- Accept that all course policies apply to all students equally, no exceptions.
- Be respectful, civil and professional in your dealings with your instructors.

Week	Date	Topic	Lecturer
FUNDAMENTALS OF MICROBIOLOGY			
WEEK 1	M 08-22	The nature of infection & the microbiome	Askew
	W 08-24	Bacterial structure	Askew
	F 08-26	Bacterial growth & genetics	Askew
WEEK 2	M 08-29	Immune responses & infection	Askew
	W 08-31	Antibiotics & mechanisms of resistance	Askew
	F 09-02	LAB 1: Intro to biosafety, human/envirom microbiota, plating for isolation, anthrax case: role of sentinel microbiology labs	
WEEK 3	M 09-05	No class: Labor Day holiday	
PROKARYOTIC PATHOGENS			
	W 09-07	<i>Staphylococci</i>	Askew
	F 09-09	LAB 2: Principles of differential and selective media	
WEEK 4	M 09-12	<i>Streptococci & Enterococci</i>	Askew
	W 09-14	<i>Haemophilus & Bordetella</i> , Intro to vaccinology	Weiss
	F 09-16	LAB 3: Analysis of 1-2	
WEEK 5	M 09-19	<i>Corynebacterium & Listeria</i>	Askew
	W 09-21	<i>Mycobacteria spp.</i>	Askew
	F 09-23	EXAM 1	
WEEK 6	M 09-26	STDs: <i>Neisseria, Chlamydia & Treponema</i>	Askew
	W 09-28	Serology case exercise: dengue fever	Askew
	F 09-30	LAB 4: The gram-stain	
WEEK 7	M 10-03	Enterobacteriaceae I	Askew
	W 10-05	Enterobacteriaceae II	
	F 10-07	LAB 5: Horizontal gene transfer & antibiotic resistance	
WEEK 8	M 10-10	No class: Fall reading day	
	W 10-12	<i>Vibrio, Campylobacter & Helicobacter</i>	Askew
	F 10-14	LAB 6: Analysis of 4-5	
WEEK 9	M 10-17	<i>Legionella & Pseudomonas</i>	Askew
	W 10-19	Zoonotic infections I	Askew
	F 10-21	LAB 7: Antibiotic susceptibility testing	
WEEK 10	M 10-24	Zoonotic infections II	Askew
	W 10-26	<i>Mycoplasma & Rickettsia</i>	Askew
	F 10-28	EXAM 2	
WEEK 11	M 10-31	Anaerobes: <i>Clostridium & Bacteroides</i>	Askew
OTHER MICROBIAL PATHOGENS			
	W 11-02	Eukaryotic pathogens I: intro to fungi and superficial infections	Askew
	F 11-04	LAB 8: Intro to fungi	
WEEK 12	M 11-07	Eukaryotic pathogens II: opportunistic fungi	Askew
	W 11-09	Eukaryotic pathogens III: systemic fungi	Askew
	F 11-11	No class: Veteran's Day	
WEEK 13	M 11-14	Eukaryotic pathogens IV: Intro to parasites	Askew
	W 11-16	Intro to viruses: SARS-Cov-2	Miller
	F 11-18	LAB 9: analysis of 7-8, agar art	
WEEK 14	M 11-21	LAB 10: art photography, anthrax case conclusion, lab shutdown	
	W 11-23	Careers in microbiology & infectious diseases	Powers
	F 11-25	No class: Thanksgiving holiday	
STUDENT CASE PRESENTATIONS			
WEEK 15	M 11-28	Student case presentations (6 groups of 8)	
	W 11-30	Guest lecture: the microbiology of body decomposition	Ben Criss
	F 12-02	Student case presentations	
Ex week	12/7	EXAM 3 (8:00-10:00 am)	