

**College of Public Health**  
**Diagnostic Microbiology for Epidemiologists**

**I. BRIEF COURSE DESCRIPTION**

This course will introduce public health students to microbiological culture, antigen detection, immunological, and molecular amplification laboratory techniques for bacteria, viruses, parasites, and fungi. Course materials: readings, lectures, and laboratory demonstrations.

**II. CREDIT HOURS: 3 s.h.**

**III. COURSE DIRECTOR / INSTRUCTORS**

Course director: Michael Pentella

Instructors: Mary DeMartino, Lucy DesJardin, Gary Doern, Tom Gahan, Dennis Gaunt, Gregory Gray, Nancy Hall, Sandy Jirsa, Alan Junkins, and Mike Last

**IV. EVALUATION OF STUDENT PERFORMANCE**

Students will be evaluated by their performance on examinations and class participation.

- 25% Exam 1
- 25% Exam 2
- 15% Student Presentation
- 35% Exam 3 (comprehensive final exam)

**VI. COURSE OBJECTIVES**

After completing this course, the student should be able to:

1. Collect, preserve, and transport appropriate clinical specimens for diagnostic evaluation
2. Understand the distinction between microbiological culture, antigen detection, immunological, and molecular amplification laboratory techniques.
3. Have an appreciation for various diagnostic approaches in bacteriology, virology, parasitology, and mycology
4. Be aware of the limitations of diagnostic testing
5. Select and interpret diagnostic test data in conducting epidemiological studies.
6. Have a fundamental understanding of clinical microbiological laboratory safety.

The overall goal of this course is to prepare graduate students to effectively use diagnostic microbiological data in pursuing a career in infectious disease epidemiology

**VII. INSTRUCTIONAL MATERIALS**

Text: Brooks, G.F, J. S. Butel, and S.A. Morse. Medical Microbiology. 23<sup>rd</sup> Edition. Lange Medical Books/McGraw-Hill. 2004. (ISBN 0-07-141207-7)

**VIII. TOPIC OUTLINE**

<u>Date</u>	<u>Title</u>	<u>Speaker</u>	<u>Required readings (chapters)</u>
Jan 18	Course introduction, laboratory safety, bacteriology basics; microscopy	Pentella	1,2,3
Jan 23	Host-microbial interactions; Normal Flora and Lab Values in Infectious Diseases	Gray; DeMartino	9, 11

Jan 25	Cultivation, isolation, identification of bacteria	Junkins	4, 5
Jan 30	<i>Lab demonstration 1</i> – Cultivation, isolation, identification of bacteria	Junkins	
Feb 1	Immunochemical methods used for organism detection	Pentella	8
Feb 6	Molecular methods used for organism detection	DesJardin	6, 7
Feb 8	Molecular methods 2	DesJardin	
Feb 13	Immune Response to Infection	Pentella	8
Feb 15	Blood Stream and CSF Pathogens: Strep pneumoniae, N. meningitidis, H. influenzae, Listeria, Rabies	Pentella	15, 21, 19, 13, 42
Feb 20	<b>Exam 1</b> (followed by optional lab tour)	Pentella	
Feb 22	Respiratory Agents - Bacteria: Legionella, Pertussis and Haemophilus	DesJardin	23
Feb 27	Mycobacteria	DesJardin	24
Mar 1	Enteric Pathogens – Salmonella, Shigella, Campylobacter, E. coli, Vibrio	DeMartino	16, 18
Mar 6	Enteric Pathogens – Giardia, Cryptosporidium, Entamoeba histolytica	Last	46
Mar 8	Respiratory Viral Agents	Jirsa	39, 40
	<i>Spring break</i>		
Mar 20	Problem of antimicrobial resistance (epidemiology, mechanisms and clinical significance)	Doern	10
Mar 22	Role of the laboratory in antimicrobial susceptibility testing.	Doern	10 Note: Presentation topics due
Mar 27	Sexually Transmitted Diseases: Gonorrhea, Chlamydia, Syphilis, Herpes, Human Papilloma Virus	Jirsa, Pentella	21, 28, 33
Mar 29	Systemic Fungal Infections	Pentella	45
Apr 3	<b>Exam 2</b>	Pentella	
Apr 5	Bacterial Wound Infections: MRSA, BSGA, Pseudomonas, Vibrios	Pentella	14, 15, 12, 17, 18
Apr 10	Vector Borne Diseases: SLE, EEE, WEE, WNV	Gahan	38
Apr 12	Blood Borne Pathogens: HIV, HBV, HCV	Gahan	44, 43
Apr 17	Anaerobic Infections	DeMartino	22
Apr 19	Imported Infectious Agents: Malaria, Measles, Leishmania, Monkey Pox, etc.	Group UHL	40, 34
Apr 24	Agents of Bioterrorism: Bacillus anthracis, Brucella sp., Francisella tularensis, Yersinia pestis, Smallpox	Group UHL	13, 19, 20
Apr 26	Outbreak investigation	Hall	Readings to be distributed
May 1	<b>Student Presentations</b>	UHL Group	
May 3	<b>Student Presentations</b>	UHL Group	
TBD	<b>Final exam</b>	Pentella	

- IX. LABORATORY TOUR: A tour of the laboratory will be available for students after the first exam or by appointment at any time during the semester.
- X. Presentation topics are due by March 22, 2006
- XI. Lecturer Outline:
  - a. Agent
  - b. Occurrence
  - c. Transmission
  - d. Lab Diagnosis
    - i. Culture
    - ii. Molecular
    - iii. Immunochemical
    - iv. Serological assays
  - e. Sensitivity and Specificity of available methods
  - f. Interpretation of results

Last revised January 6, 2005