

ENV H 452/542: Environmental & Occupational Health Microbiology II: Detection and Control of Environmentally Transmitted Pathogens

Winter Quarter, 2008
Monday, Wednesday, and Friday, 11:30-12:20
Room T-635

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OFFICE HOURS: By Appointment

COURSE DESCRIPTION: This course will review environmental detection and control of pathogenic organisms. The first half of the course will cover methods of sample collection, processing and target detection. The second half of the course will examine methods of decontamination and disinfection, as well as other engineered controls of environmentally transmitted pathogens. This course will be of use for public health and health care professionals, microbiologists, civil and environmental engineers, environmental scientists and bio-defense specialists.

COURSE OBJECTIVES: At the conclusion of this class, students should be able to:

1. identify various routes of pathogen transmission through environment
2. describe the methods of sample collection and processing from various environmental media
3. categorize the various methods to detect environmentally transmitted pathogens
4. explain the advantages and disadvantages of the detection methods
5. identify several major measures to control and prevent environmentally transmitted pathogens
6. distinguish between sterilization, disinfection, and preservation methods
7. identify different classes of disinfectants and explain disinfection kinetics
8. describe several methods to decontaminate infectious wastes and acceptable biosafety practices in the laboratory

9. recognize the importance of clinical hygiene and institutional infection control practices
10. recognize the importance and magnitude of emerging antimicrobial resistance

TEXTS AND REFERENCES: The recommended text for this course is Environmental Microbiology (Maier, Pepper, and Gerba, Academic Press). Additional Readings and course materials will be available through the course webpage or handed out in class. The following texts are recommended references for more in-depth detail on course topics (more will be given during the duration of the course):

Books-

Manual of Environmental Microbiology, 2nd edition, ASM Press
Disinfection, Sterilization and Preservation, 5th edition, LWW
Metcalf and Eddy's Wastewater Engineering: Treatment and Reuse, McGraw-Hill
Water Quality and Treatment, 5th edition, AWWA
Bioaerosols Handbook, Lewis
Food Microbiology, Doyle
Any Basic Microbiology Text (e.g. Madigan, Martinko and Parker; Prescott, Harley and Klein; etc.)

Journals-

Journal of Applied Microbiology
Letters in Applied Microbiology
Journal of Applied and Environmental Microbiology
Journal of American Water Works Association
Journal of Food Protection
International Journal of Food Microbiology
Water Science and Technology
Water Research
Emerging Infectious Disease

READINGS: Students will typically be assigned readings for each class session. These readings will typically be 20-25 pages in length (though combined readings may be assigned for multiple sessions exceeding this length). Readings will commonly be chapters from the recommended text or other reference texts, but may include website or journal articles.

CLASS PARTICIPATION: Although class attendance is not expressly required, students will be expected to participate in classroom discussion and in-class group learning activities. Students will not have the opportunity to earn class participation credit for course periods during which they are absent.

COURSE FORMAT: Class periods will be lecture and discussion sessions. Lecture sessions will typically consist of 5 minutes of review questions, 30-40 minutes of lecture material, and 5-10 follow-up questions. Discussion sessions will be student led and mediated by one of the instructors. Students will be divided into 3 groups for student-led discussion sessions. For each session one group will be in charge of selecting a series of articles on the listed topic and preparing a list of discussion questions/topics. During the sessions the leading group will lead/facilitate the discussion for the course session. These are intended to be discussions not lectures. Articles and discussion questions/topics should be submitted to mediating instructor one week prior to discussion session to insure adequate time for distribution to the class.

GRADING OPPORTUNITIES: For the sake of this class, letter and numerical grades will typically be distributed according to the university grading scale between the following standards:

A(4.0)= Excellent and exceptional work (typically >90% of available points)

D (1.0) = Deficient work (typically <66% of available points)

It is expected that most students will perform at a level of ~3.5 .

Graduate student points will be available according to the following % breakdown:

Curriculum Vitae (5%): Each student will be required to provide a 1-2 page CV describing the student's background and interests. CVs will be due by the third class period.

Homework (10%): Students will have the opportunity to complete 2 homework assignments, each worth 5 % of the overall grade. Once graded homeworks are returned, students will have one week to provide an explanation of why any incorrect answers were wrong and provide the correct answers as an opportunity to recover up to ½ of missed points. Homework assignments will be due as indicated on the course outline. Late assignments will be penalized 10% of point value for each class period that they are late.

Midterm Exam (25%): Midterm exam will consist primarily of short answer questions, but may include multiple choice, and fill-in the blank questions as well. Exams will be conducted during a scheduled course period. Exam will be open book and open note. Once graded exams are returned, students will have one week to provide an explanation of why any incorrect answers were wrong and provide the correct answers as an opportunity to recover up to ½ of missed points. Early or make-up exams will only be offered in case of emergencies or prior arrangement with instructor. Format for early and make-up exams is left to the discretion of instructor.

Class Participation (5%): Class participation credit will be awarded for participation in classroom discussions, asking of questions that further the instruction, email response to instructor-posed questions, and peer reviews of manuscripts.

Oral Exam (15%): Students will be required to make an appointment with the instructor on March 5th, 7th, or 10th. Exams will consist of a relaxed discussion (~15 minutes) during which instructor will evaluate students grasp of course content.

Review Paper (15%): Graduate students will be expected to write and submit a detailed review paper on a particular topic relevant to this course. Students will work

in pairs and must have topics approved by instructors. Papers are expected to be as long as necessary to cover the topic, but should not exceed 25 pages of text double spaced (not including references). Research topics should be approved by January 23rd. A progress check in the form of a reference check is due by February 6th. First drafts of the Manuscript are due on February 20th. Peer reviews are due February 25th and final drafts are due on March 10th. Formatting should in accordance with ASM journal guidelines.

Final Exam (25%): Final Exam will be offered on **March 20th from 8:30am-10:20am**. Final exam will be comprehensive and will consist of multiple choice, matching, short answer and problem solving questions. Exam will be open book and open note.

Undergraduate student points will be available according to the following % breakdown:

Curriculum Vitae (5%): Each student will be required to provide a 1-2 page CV describing the student's background and interests. CVs will be due by the third class period.

Homework (20%): Students will have the opportunity to complete 2 homework assignments. Once graded homeworks are returned, students will have one week to provide an explanation of why any incorrect answers were wrong and provide the correct answers as an opportunity to recover up to ½ of missed points. Homework assignments will be due as indicated on the course outline. Late assignments will be penalized 10% of point value for each class period that they are late.

Midterm Exam (30%): Midterm exam will consist primarily of short answer questions, but may include multiple choice, and fill-in the blank questions as well. Exams will be conducted during a scheduled course period. Exam will be open book and open note. Once graded exams are returned, students will have one week to provide an explanation of why any incorrect answers were wrong and provide the correct answers as an opportunity to recover up to ½ of missed points. Early or make-up exams will only be offered in case of emergencies or prior arrangement with instructor. Format for early and make-up exams is left to the discretion of instructor.

Class Participation (5%): Class participation credit will be awarded for participation in classroom discussions, asking of questions that further the instruction, email response to instructor-posed questions, and peer reviews of graduate student manuscripts.

Oral Exam (10%): Students will be required to make an appointment with the instructor on March 5th, 7th, or 10th. Exams will consist of a relaxed discussion (~15 minutes) during which instructor will evaluate students grasp of course content.

Final Exam (30%): Final Exam will be offered on **March 20th, 8:30am-10:20am**. Final exam will be comprehensive and will consist of multiple choice, matching, short answer and problem solving questions. Exam will be open book and open note.

ACADEMIC ACCOMODATIONS: To request academic accommodations due to disability, please contact Disabled Student Services, 448 Schmitz, (206) 543-8924 (V/TTY). If you have a letter from Disabled Student Services indicating that you have a disability that

requires academic accommodations, please present the letter to me so we can discuss the accommodations you might need in this class.

COURSE OUTLINE:

Date	Topic	Instructor	Due
7-Jan	Introduction/Sampling of Environmental Media	Meschke	
9-Jan	Concentration and Purification of Airborne Microbes and Biotoxins	Meschke	
11-Jan	Sampling of Food and Fomitic Surfaces for Pathogens	Meschke	CVs
14-Jan	Concentration and Purification of Waterborne Pathogens	Shin	
16-Jan	Microscopy/Immunoassays	Meschke	
18-Jan	Culture/Biochemical Assays	Meschke	
21-Jan	Holiday-MNK Day-No class		
23-Jan	Molecular Methods of Detection I	Shin	Research Topics
25-Jan	Molecular Methods of Detection II	Meschke	
28-Jan	<i>Student Led Discussion on Sampling</i>	Meschke	HW1
30-Jan	<i>Student Led Discussion on Detection</i>	Shin	
1-Feb	Handwashing/Antisepsis/PPE	Meschke	
4-Feb	Water and Wastewater Treatment	Shin	
6-Feb	<i>Student Led Discussion on Host Control</i>	Shin	Reference Check
8-Feb	HVAC Controls/Filtration of Air/BSCs	Meschke	
11-Feb	Midterm Exam		
13-Feb	Control and Prevention of Foodborne Disease	Meschke	
15-Feb	Antimicrobial Use and Resistance/Vaccination	Roberts	
18-Feb	Holiday-President's Day-No class		
20-Feb	<i>Student Led Discussion on Containment and Removal</i>	Shin	First Draft Paper
22-Feb	Principle of Disinfection, sterilization and Preservation	Shin	
25-Feb	Disinfection Classes (Chemical and Physical)	Shin	Reviews of Paper
27-Feb	Kinetics of Disinfection	Shin	
29-Feb	Media-Specific Disinfection (Air and Surface)	Meschke	
3-Mar	Decontamination of Infectious Wastes	Meschke	HW2
5-Mar	<i>Student Led Discussion on Disinfection</i>	Shin	Oral Exam
7-Mar	<i>Student Led Discussion on Control of Microbial Exposures in the Workplace</i>	Meschke	Oral Exam
10-Mar	Laborator Design/Biosafety Practices	Meschke	Oral Exam
12-Mar	Clinical Hygiene/Institutional Infection Control Practices		Final Draft of Paper
20-Mar	Final Exam: 8:30am-10:20am		

COURSE RULES

1. Come to class, please try to let me know ahead of time if you can not make it.
2. Arrive on time
3. Turn in assignments on time
4. Come to class prepared (keep up with reading)
5. Be courteous (No newspapers, audible cell phones, PDAs, beepers)
6. Food and drinks are welcome (but keep it quiet)
7. Refrain from unnecessary talking
8. ASK QUESTIONS
9. Try to remain awake (at least no snoring please)
10. Let me know how I am doing (if I am moving too fast, not being clear, or otherwise not getting the message across, I need to know.)