

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

Winter Quarter, 2019
Monday, Wednesday, and Friday, 9:30-10:20
Room: RR134 HSC

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OFFICE HOURS: By Appointment

TA: Elisabeth Burnor (elisann@uw.edu)

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 will examine methods of decontamination and disinfection, as well as other engineered controls for 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. Outline the various types of sampling plan and define their appropriate use;
2. Describe and distinguish the major 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 each type of detection methods;
5. Identify major approaches 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. Summarize the importance of clinical hygiene and institutional infection control practices
10. Explain the principles of a multi-barrier approach to controlling microbial hazards

TEXTS AND REFERENCES: The recommended text for this course is the Third Edition of Environmental Microbiology (Pepper, Gerba, and Gentry, Academic Press). Additional Readings and course materials will be available through the course webpage. The following texts are recommended references for more in-depth detail on course topics:

Books-

Manual of Environmental Microbiology, 3rd 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

Journals-

Journal of Applied Microbiology
Letters in Applied Microbiology
Applied and Environmental Microbiology
Journal of American Water Works Association
Journal of Water and Health
Journal of Food Protection
International Journal of Food Microbiology
Water Science and Technology
Water Research
Indoor Air
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 within a module 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 learning activities. Students will NOT have the opportunity to earn class participation credit for course periods during which they are absent. Note that attendance alone is not sufficient to earn class participation credit.

COURSE FORMAT: The course will be broken into 5 modules. Each module will typically consist of 3-5 lectures and culminate in a group discussion and learning activity. Class periods allocated for lecture sessions will typically consist of 5 minutes of review questions, 30-40 minutes of lecture material, and 5-10 follow-up questions. During discuss sessions, the instructor will pose hypothetical questions and scenarios relevant to the topics covered in the module. Students will be broken into 5 groups and discuss the questions/scenario provided for

25 minutes. Each group will have ~5 minutes to report back to their solutions to the class. Questions/Scenario will be posted the night before and students will each be expected to browse the relevant literature in order to be able to contribute to their group for the topic at hand. These class periods are intended to be discussions not lectures or strict summaries of the articles.

GRADING OPPORTUNITIES: 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 >95% of available points)

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

It is expected that most students will perform at a level between 3.0 and 3.5, though the typical number of 4.0s is quite high.

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 (20%): Students will have the opportunity to complete 2 homework assignments, each worth 10 % 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 (20%): 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. 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 will be 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.

Module quizzes (5%): Short on-line quizzes will be given at the conclusion of each module. Quizzes will consist of 3-5 short questions designed to ensure students are keeping up with lectures and readings.

Review Paper (20%): Graduate students will be expected to write and submit a detailed review paper on a particular topic relevant to this course. Papers are expected to be as long as necessary to cover the topic, but should not exceed 15 pages of text single spaced (including tables and figures, but not including references). Formatting should in accordance with ASM journal guidelines.

Final Exam (25%): Final Exam will be offered on **March 20th from 8:30-10:20**. 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, each worth 10% 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 may be penalized up to 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. 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 (10%): Class participation credit will be awarded for participation in classroom discussions, asking of questions that further the instruction, and email responses to instructor-posed questions.

Module quizzes (15%): Short on-line quizzes will be given at the conclusion of each module. Quizzes will consist of 3-5 short questions designed to ensure students are keeping up with lectures and readings.

Final Exam (25%): Final Exam will be offered on **March 20th from 8:30-10:20**. 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 ACCOMMODATIONS: Disability Resources for Students (DRS) offers resources and coordinates reasonable accommodations for students with disabilities. Reasonable accommodations are established through an interactive process between you, your instructor(s) and DRS. If you have not yet established services through DRS, but have a temporary or permanent disability that requires accommodations (this can include but not limited to; mental health, attention-related, learning, vision, hearing, physical or health impacts), you are welcome to contact DRS at 206-543-8924 or uwdrs@uw.edu or <http://depts.washington.edu/uwdrs/>

ACADEMIC INTEGRITY: Students at the University of Washington (UW) are expected to maintain the highest standards of academic conduct, professional honesty, and personal integrity. The UW School of Public Health (SPH) is committed to upholding standards of academic integrity consistent with the academic and professional communities of which it is a part. Plagiarism, cheating, and other misconduct are serious violations of the University of Washington [Student Conduct Code](#) (WAC 478-120). We expect you to know and follow the university's policies on cheating and plagiarism, and the [SPH Academic Integrity Policy](#). Any suspected cases of academic misconduct will be handled according to University of Washington regulations. For more information, see the University of Washington [Community Standards and Student Conduct](#) website.

COURSE OUTLINE:

Date	Topic	Instructor	Due
M 7-Jan	Introduction/Sampling of Environmental Media	Meschke	
	Module 1 - Sampling		
W 9-Jan	Sampling Plans	Meschke	
F 11-Jan	Sampling of Food	Meschke	
M 14-Jan	Sampling for Bioaerosols	Meschke	CVs
W 16-Jan	Sampling of Surfaces	Meschke	
F 18-Jan	Sampling of Waterborne Microbes	Meschke	
M 21-Jan	Holiday-MLK Day- NO CLASS		
W 23-Jan	<i>Group Discussion and Learning Activity on Sampling</i>		Research Topics
	Module 2 - Detection and Characterization		
F 25-Jan	Microscopy/Immunoassays	Cangelosi	
M 28-Jan	Culture/Biochemical Assays	Cangelosi	HW1
W 30-Jan	Molecular Methods of Detection	Cangelosi	
F 1-Feb	High Throughput Sequencing Methods	Cangelosi	
M 4-Feb	Sequence Analysis	Beck	
W 6-Feb	<i>Group Discussion and Learning Activity on Detection</i>		Reference Check
F 8-Feb	Midterm Exam (In-Class)		
	Module 3 - Personal Controls		
M 11-Feb	Antimicrobial Use/Vaccination	Cangelosi	
W 13-Feb	Handwashing/Antisepsis/PPE	Cangelosi	
	Module 4 - Disinfection		
F 15-Feb	Principle of Disinfection, sterilization and Preservation	Meschke	Outline Check
M 18-Feb	Holiday-President's Day- NO CLASS		
W 20-Feb	Disinfection Classes (Chemical and Physical)	Cangelosi	
F 22-Feb	Kinetics of Disinfection	Cangelosi	
M 25-Feb	Decontamination of Infectious Wastes	Cangelosi	First Draft Paper
W 27-Feb	<i>Student Led Discussion on Disinfection</i>		
	Module 5 - Media Specific Controls		
F 1-Mar	Water and Wastewater Treatment	Meschke	Reviews of Paper
M 4-Mar	HVAC Controls/Filtration of Air/BSCs	Meschke	
W 6-Mar	Control and Prevention of Foodborne Disease	Meschke	
F 8-Mar	Clinical Hygiene/Institutional Infection Control	Meschke	HW2
M 11-Mar	Laboratory Design/Biosafety Practices	Meschke	Final Draft
W 13-Mar	<i>Group Discussion and Learning Activity on Control of Microbial Exposures</i>		
F 15-Mar	Wrap up		
W 20-Mar	Final Exam		

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, etc.)
6. Food and drinks are welcome (but keep it quiet)
7. Refrain from unnecessary talking, but...
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.)