ENV H 451/541
Environmental & Occupational Health Microbiology I: Ecology of Environmentally Transmitted Microbial Hazards
Autumn Quarter, 2014
Monday, Wednesday, and Friday, 12:30-1:30
Room: Sig 134

INSTRUCTORS: John Scott Meschke
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Phone: (206) 221-5470
Email: jmeschke@u.washington.edu

TA: Jessica Levasseur (jlevas@uw.edu)

OFFICE HOURS: By Appointment

COURSE DESCRIPTION:
This course will review environmentally transmitted pathogens with respect to their sources and occurrence, mobility, and fate in the environment. 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:
On completion of this course, students will be able to:

1. Recognize the major classes of environmentally transmitted pathogens and describe specific examples for each class in different environmental media;
2. Discuss the major epidemiological elements of environmentally transmitted infectious disease;
3. Summarize the major exposure pathways and routes of transmission;
4. Compare and contrast the different types of microbiologically relevant foodborne disease;
5. Discuss factors that affect occurrence, growth, and persistence of microbiologic agents and by-products in food;
6. Outline and distinguish the factors affecting the persistence, fate and mobility of microbial hazards in water;
7. Discuss the trends in waterborne disease;
8. Identify and describe factors affecting transmission of microbiological agents by surfaces;
9. Summarize fomitic and sharps-based transmission of infectious agents;
10. Demonstrate an understanding of occupationally relevant exposures to microbiological hazards;
11. Identify and describe factors affecting the airborne transmission of microbiological hazards;
12. Categorize the different mechanisms of antimicrobial resistance and factors affecting their development;
13. Define and contrast zoonotic and vectorborne transmission of microbiological hazards; and
14. Interpret, summarize and discuss relevant research articles on environmental transmission of microbiological hazards.

TEXTS AND REFERENCES:
The recommended text for this course is Environmental Microbiology 3rd edition (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-
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
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

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 an interactive lecture format or will be dedicated to student-led discussion.

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 >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 of ~3.5.

**Undergraduate Student** Points will be available according to the following percentage 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 second class period.
- **Homework (20%)**: Students will have the opportunity to complete 2 homework assignments, each worth 10% of the overall grade. Homework assignments will be due as indicated on the course outline. Late assignments may 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. Early or make-up exams will only be offered in case of emergencies or prior arrangement with instructor. Formats for early and make-up exams are left to the discretion of instructor.
- **Class Participation (15%)**: Participation credit may be earned by participating in classroom question answer sessions. Additionally, participation-credit questions may be asked in class for email response. Participation in group learning activities will be evaluated by quality of group presentation.
- **Pathogen Profile (10%)**: Students will have the opportunity to complete a pathogen profile for their “pet bug”. These will be a 5-10 page single spaced review of the transmission of their chosen organism by environmental routes.
- **Final Exam (25%)**: Final Exam will be offered on December 11th 8:30-10:20. Final exam will be comprehensive and will consist of short answer multiple choice, true/false-explain, and problem solving questions. Exam will be open book and open note.

**Graduate Student** Points will be available according to the following percentage 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 second class period.
- **Homework (20%)**: Students will have the opportunity to complete 2 homework assignments. 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. Early or make-up exams will only be offered in case of emergencies or prior arrangement with instructor. Formats for early and make-up exams are left to the discretion of instructor.
Class Participation (10%): Participation credit may be earned by participating in question answer sessions, or Friday article discussions. Additional participation credit questions may be asked in class for email response.

Pathogen Profile (15%): Students have the opportunity to complete a pathogen profile for their “pet bug” and report it in class. These will be a 5-10 page single spaced review of their chosen organism followed by a 10-12 minute oral presentation. Time for presentation will be strictly enforced.

Final Exam (25%): Final Exam will be offered on December 11th 8:30-10:20. Final exam will be comprehensive and will consist of 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/

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.)
<table>
<thead>
<tr>
<th>Date</th>
<th>Day</th>
<th>Lecture Topic</th>
<th>Lecturer</th>
<th>Homework Assignment</th>
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<tbody>
<tr>
<td>24-Sep</td>
<td>W</td>
<td>Introduction/History of Environmental Transmission of Infectious Disease</td>
<td>Meschke</td>
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<tr>
<td>26-Sep</td>
<td>F</td>
<td>Principles of Infectious Disease Epidemiology</td>
<td>Meschke</td>
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<tr>
<td>29-Sep</td>
<td>M</td>
<td>Article Discussion: Emerging Infectious Diseases</td>
<td>Levasseur</td>
<td>CV Due</td>
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<td>1-Oct</td>
<td>W</td>
<td>Climate Influence on Infectious Disease</td>
<td>Cangelosi</td>
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<td>3-Oct</td>
<td>F</td>
<td>Viruses/Prions</td>
<td>Meschke</td>
<td>HW#1 Available</td>
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<td>6-Oct</td>
<td>M</td>
<td>Bacteria</td>
<td>Meschke</td>
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<td>8-Oct</td>
<td>W</td>
<td>Fungi/Algae</td>
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<td>10-Oct</td>
<td>F</td>
<td>Protozoa</td>
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<td>13-Oct</td>
<td>M</td>
<td>Helminthes</td>
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<td>15-Oct</td>
<td>W</td>
<td>Microbial Toxins</td>
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<td>17-Oct</td>
<td>F</td>
<td>Recombinant DNA</td>
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<td>20-Oct</td>
<td>M</td>
<td>Vectorborne Disease</td>
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<td>22-Oct</td>
<td>W</td>
<td>Zoonotic Disease and One Health</td>
<td>Rabinowitz</td>
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<td>MIDTERM EXAM</td>
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<td>27-Oct</td>
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<td>Waterborne Disease</td>
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<td>29-Oct</td>
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<td>Fate and Transport of Microbes in Water</td>
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<td>31-Oct</td>
<td>F</td>
<td>Article Discussion: Factors affecting pathogen occurrence in water</td>
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<td>3-Nov</td>
<td>M</td>
<td>Foodborne Disease</td>
<td>Easterberg</td>
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<td>5-Nov</td>
<td>W</td>
<td>Fate and Transport of Microbes in Food</td>
<td>Meschke</td>
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<td>7-Nov</td>
<td>F</td>
<td>Article Discussion: Factors leading to Foodborne Outbreaks</td>
<td>Meschke</td>
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<td>10-Nov</td>
<td>M</td>
<td>Airborne Transmission of Microbial Hazards</td>
<td>Meschke</td>
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<tr>
<td>12-Nov</td>
<td>W</td>
<td>Fate and Transport of Microbes in Air</td>
<td>Meschke</td>
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<td>14-Nov</td>
<td>F</td>
<td>Fate and Transport of Microbes on Surfaces and Fomitic Transmission</td>
<td>Meschke</td>
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<td>17-Nov</td>
<td>M</td>
<td>Article Discussion: Air Travel Related Diseases</td>
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<td>19-Nov</td>
<td>W</td>
<td>Antimicrobial Resistance</td>
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<td>21-Nov</td>
<td>F</td>
<td>Occupational Exposure Related Microbial Hazards</td>
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<td>Biosafety considerations for Biotechnology</td>
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<td>26-Nov</td>
<td>W</td>
<td>Article Discussion: Health Risks from Recombinant Biotechnology</td>
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<td>28-Nov</td>
<td>F</td>
<td>NO CLASS - Thanksgiving Break</td>
<td>Meschke</td>
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<td>1-Dec</td>
<td>M</td>
<td>Group Discussion: Microbiome and Health</td>
<td>Meschke</td>
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<td>3-Dec</td>
<td>W</td>
<td>Student Presentation of Pathogen Profile</td>
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<td>5-Dec</td>
<td>F</td>
<td>Student Presentation of Pathogen Profile</td>
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<td>11-Dec</td>
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<td>FINAL EXAM 8:30-10:30</td>
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