

ENV H 451/551
ENVIRONMENTAL & OCCUPATIONAL HEALTH MICROBIOLOGY I:
ECOLOGY OF ENVIRONMENTALLY TRANSMITTED MICROBIAL HAZARDS
Winter Quarter 2023

Monday, Wednesday, and Friday, 10:30-11:20

SOCC 221

INSTRUCTOR: John Scott Meschke (He/His)
Office: 4225 Roosevelt Way NE, Suite 2337
Phone: (206) 221-5470
Email: jmeschke@uw.edu

TA: Shannon Cassel (scassel1@uw.edu)

OFFICE HOURS: By appointment

COURSE WEBSITE: <https://canvas.uw.edu/courses/1612716>

LAND ACKNOWLEDGEMENT: The university of Washington acknowledges the Coast Salish people of this land, the land which touches the shared waters of all tribes and bands within the Duwamish, Suquamish, Tulalip and Muckleshoot nations.

WINTER QUARTER RESPIRATORY ILLNESSES - PROTOCOLS AND SAFETY: Winter quarter is a time of increased risk of acquiring respiratory illnesses including COVID, RSV, cold, and flu.

If you feel ill or exhibit respiratory or other symptoms, you should not come to class. Seek medical attention if necessary and notify your instructor(s) as soon as possible by email.

Please check your email daily BEFORE coming to class. If we need to conduct class remotely because the instructor or a guest speaker is unable to attend in person, we will send all registered students an email with a Zoom link for remote instruction or a plan for making up the class.

Additional recommendations include:

1. **Get boosted with the updated COVID-19 vaccines.** These vaccines are available at clinics and pharmacies, as well as [through UW Medicine](#) and local health agencies.
2. **Get your annual flu shot.**
3. **Wear a high-quality mask in indoor public spaces and while traveling. Masks are strongly recommended the first two weeks of winter quarter.** High-quality masks help protect against a range of respiratory viruses, and are [available for free in locations on each UW campus](#).
4. **Take a coronavirus test if you have symptoms or have been exposed.** Rapid antigen tests are widely available for [free in at on campus locations linked here](#). The [Husky Coronavirus Testing](#) voluntary research study is also available for UW students.
5. **Activate WA Notify on your phone** to receive exposure notifications and so that you can anonymously let others know of their exposure if you test positive.

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 should be able to:

1. Recognize and describe the major classes of environmentally transmitted pathogens and other microbiological hazards;
2. Distinguish infectious disease epidemiology from other types of epidemiology;
3. Recognize and assess exposure pathways and routes of transmission;
4. Outline and distinguish the factors affecting the persistence, fate and mobility of microbial hazards in environmental media; and
5. Summarize and discuss relevant research articles on environmental transmission of microbiological hazards.

In addition, graduate students should be able to:

1. Identify and define factors in an exposure scenario that may affect risk from microbiological hazards.
2. Critically review and interpret the scientific and gray literature on microbiological hazards; and
3. Effectively communicate (in oral and written manner) their knowledge of environmental transmission of microbiological hazards.

TEXTS AND REFERENCES: There is no required text for this class. Readings and course materials will be available through Canvas. The following texts are recommended references for more in-depth detail on course topics:

Books-

Manual of Environmental Microbiology 4th edition (ed. Yates et al., 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

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

COURSE FORMAT: The course will be organized in 5 modules. Much of the didactic lecture material will be available asynchronously online. However, course will meet in person for in class group discussions and learning activities.

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:

Introduction Video (5%): Each student is required to submit a 1-2 minute long introduction video. The video should indicate the students name, what they like to be called, what degree program they are in, any experience they have that is relevant to the class, and what they hope to get out of the class. Students that do not have the

capacity to record a video (though most should on their phones) may submit a 1-2 page long statement describing the same information. Videos/Statements will be due by the beginning of the third class period.

Quizzes (15%): Students will have the opportunity to complete 7 quizzes. Quizzes will be due at 5 pm on the day indicated in the course outline. Late quizzes may 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 online. 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.

Group Discussions (20%): Students may earn points by participating in group discussions.

In the News (5%): Student may earn points by providing 5 "In the News" articles.

Pathogen Profile (10%): Students will have the opportunity to complete a pathogen profile for their "pet bug". These will be a powerpoint poster following a provided rubric describing the transmission of their chosen organism by environmental routes.

Questions for Graduate Panel (5%): Undergraduate students will have the opportunity to earn 5% of their grade by formulating questions for graduate student panels based on the graduate students' pathogen profile videos.

Final Exam (20%): Final Exam will be offered on **ONLINE during finals week**. 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:

Introduction Video (5%): Each student is required to submit a 1-2 minute long introduction video. The video should indicate the students name, what they like to be called, what degree program they are in, any experience they have that is relevant to the class, and what they hope to get out of the class. Students that do not have the capacity to record a video (though most should on their phones) may submit a 1-2 page long statement describing the same information. Videos/Statements will be due by the beginning of the third class period.

Quizzes (20%): Students will have the opportunity to complete 7 quizzes. Quizzes will be due at 5 pm on the day indicated in the course outline. Late quizzes may 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 online. 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.

Group Discussions (15%): Students may earn points by participating in group discussions.

Pathogen Profile (20%): Students have the opportunity to complete a pathogen profile for their "pet bug" and report it to the class. These will be a 10 minute video presentation addressing points in the pathogen profile rubric, and participation in a graduate student panel to answer questions posed by undergraduates.

Final Exam (20%): Final Exam will be offered **ONLINE during finals week**. Final exam will be comprehensive and will consist of short answer and problem-solving questions. Exam will be open book and open note.

IMPORTANT POLICIES & RESOURCES

Communication and Writing Skills

Communication through writing and speaking is an important transferable skill for all career pathways. Establishing a strong foundation in communication skills will help you be successful throughout your future course work and career. Therefore, this course includes assignments with the goal to help you identify areas of strength and improvement in your communication. If you feel that you could benefit from additional opportunities to improve your writing skills in particular, a list of resources at the UW and others accessible online can be found on the SPH website [here](#).

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 \(WAC 478-121\)](#). 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](#).

Access and Accommodations

Your experience in this class is important to me. It is the policy and practice of the University of Washington to create inclusive and accessible learning environments consistent with federal and state law. If you have already established accommodations with Disability Resources for Students (DRS), please activate your accommodations via myDRS so we can discuss how they will be implemented in this course.

If you have not yet established services through DRS, but have a temporary health condition or permanent disability that requires accommodations (conditions include but not limited to; mental health, attention-related, learning, vision, hearing, physical or health impacts), contact DRS directly to set up an Access Plan. DRS facilitates the interactive process that establishes reasonable accommodations. Contact DRS at disability.uw.edu.

Religious Accommodations

Washington state law requires that UW develop a policy for accommodation of student absences or significant hardship due to reasons of faith or conscience, or for organized religious activities. The UW's policy, including more information about how to request an accommodation, is available at [Religious Accommodations Policy](#) (<https://registrar.washington.edu/staffandfaculty/religious-accommodations-policy/>). Accommodations must be requested within the first two weeks of this course using the [Religious Accommodations Request form](#) (<https://registrar.washington.edu/students/religious-accommodations-request/>).

Inclusion & Diversity

Diverse backgrounds, embodiments and experiences are essential to the critical thinking endeavor at the heart of University education. In SPH, we are expected:

1. To respect individual differences, which may include, but are not limited to, age, cultural background, disability, ethnicity, family status, gender, immigration status, national origin, race, religion, sex, sexual orientation, socioeconomic status and veteran status.
2. To engage respectfully in the discussion of diverse worldviews and ideologies embedded in course readings, presentations and artifacts, including those course materials that are at odds with personal beliefs and values.
3. To encourage students with concerns about classroom climate to talk to their instructor, adviser, a member of the departmental or SPH EDI Committee, the Assistant Dean for EDI, or the program's director.

Classroom Climate

We are co-creators of our learning environment. It is our collective responsibility to develop a supportive learning environment for everyone. Listening with respect and an open mind, striving to understand others' views, and articulating your own point of view will help foster the creation of this environment. We engage our differences with the intent to build community, not to put down the other and distance our self from the other. Being mindful to not monopolize discussion and/or interrupt others will also help foster a dialogic environment.

The following guidelines can add to the richness of our discussion:

- We assume that persons are always doing the best that they can, including the persons in this learning environment.

- We acknowledge that systematic oppression exists based on privileged positions and specific to race, gender, class, religion, sexual orientation, and other social variables and identities.
- We posit that assigning blame to persons in socially marginal positions is counter-productive to our practice. We can learn much about the dominant culture by looking at how it constructs the lives of those on its social margins.
- While we may question or take issue with another class member's ideology, we will not demean, devalue, or attempt to humiliate another person based on her/his experiences, value system, or construction of meaning.
- We have a professional obligation to actively challenge myths and stereotypes about our own groups and other groups so we can break down the walls that prohibit group cooperation and growth.

[Adapted from Lynn Weber Cannon (1990). Fostering positive race, class and gender dynamics in the classroom. *Women Studies Quarterly*, 1 & 2, 126-134.]

We are a learning community. As such, we are expected to engage with difference. Part of functioning as a learning community is to engage in dialogue in respectful ways that supports learning for all of us and that holds us accountable to each other. Our learning community asks us to trust and take risks in being vulnerable.

Here are some guidelines that we try to use in our learning process:

- LISTEN WELL and be present to each member of our group and class.
- Assume that I might miss things others see and see things others miss.
- Raise my views in such a way that I encourage others to raise theirs.
- Inquire into others' views while inviting them to inquire into mine.
- Extend the same listening to others I would wish them to extend to me.
- Surface my feelings in such a way that I make it easier for others to surface theirs.
- Regard my views as a perspective onto the world, not the world itself.
- Beware of either-or thinking.
- Beware of my assumptions of others and their motivations.
- Test my assumptions about how and why people say or do things.
- Be authentic in my engagement with all members of our class.

Pronouns

We share our pronouns because we strive to cultivate an inclusive environment where people of all genders feel safe and respected. We cannot assume we know someone's gender just by looking at them. So we invite everyone to share their pronouns.

Bias Concerns

The Office of the Dean has a [student concern policy](#), a faculty concern policy and standard HR procedures for staff concerns. Our 2018 climate survey states that most people in SPH do not report bias incidents because they do not know where to go. Students are encouraged to report any incidents of bias to someone they feel comfortable with, including instructors, advisers or department staff. They can email dcinfo@uw.edu for immediate follow up. Bias concerns can be anonymously and confidentially reported via the online form found here: <https://sph.washington.edu/about/diversity/bias-concerns>. Data is collected by the Assistant Dean for EDI and the Director of Program Operations for Student and Academic Services and tracked for resolution and areas are identified for further training.

Sexual Harassment

Sexual harassment is a form of harassment based on the recipient's sex that is characterized by:

1. Unwelcome sexual advances, requests for sexual favors, or other verbal or physical conduct of a sexual nature by a person who has authority over the recipient when:
 - Submission to such conduct is an implicit or explicit condition of the individual's employment, academic status, or ability to use University facilities and services, or
 - Submission to or rejection of the conduct affects tangible aspects of the individual's employment, academic status, or use of University facilities.

2. Unwelcome and unsolicited language or conduct that creates an intimidating, hostile, or offensive working or learning environment, or has the purpose or effect of unreasonably interfering with an individual's academic or work performance.

If you believe that you are being harassed, or have observed harassment, you can report it to SPH using the [bias concerns link](#). The University also has designated offices to help you: [SafeCampus](#); [Office of the Ombud](#); [Title IX Investigation Office](#); and [University Complaint Investigation and Resolution Office](#).

Date	Day	Session Topic	Recorded Lectures			Homework Assignment
4-Jan	W	Class Organization		Infectious Disease Importance	Infectious Disease Emergence	
Microbiological Contaminants and Infectious Disease Epidemiology Module						
6-Jan	F	Group Discussion: What is the R_0 ? Why isn't it a perfect metric for control of an outbreak?	Infectious Disease Epidemiology - Terms and Definitions	Infectious Disease Epidemiology - Transmission	Infectious Disease Epidemiology - Association and Causation	
9-Jan	M	Group Discussion: How can microbial risk be assessed? QMRA vs. Epidemiology.	Bacterial Structure and Taxonomy	Example Bacterial Pathogens - Gram +	Example Pathogens - Gram -	CV Due/Submit News article
11-Jan	W	Group Discussion: Emerging Infectious Diseases - What factors lead to emergence/spillover?	Fungal Structure and Taxonomy	Example Fungal Hazards	Algae	Quiz
13-Jan	F	Group Discussion: Virus Hunters - Should we be looking for the next pandemic?	Protozoan Structure and Taxonomy	Example Protozoan Parasites	Examples Protozoan Parasites II	
16-Jan	M	NO CLASS - Martin Luther King Jr. Day	Virus Structure and Taxonomy	Example Enteric Viruses	Example Respiratory Viruses	Submit News Article
18-Jan	W	Group Discussion: Do size and structure matter	Other Viruses	Prions		Quiz
20-Jan	F	Group Discussion: This Wormy World	Global Burden for Helminths	Helminth Structure and Taxonomy	Helminthic Parasites	
23-Jan	M	Group Discussion: Vectorborne Disease or Zoonoses: Semantics?	Vectorborne Disease - Vectors	Example Vector borne Diseases		Submit News Article
25-Jan	W	Q&A\In the News	Zoonotic Diseases - Terms and Definitions	Example Zoonoses	One Health	Quiz
27-Jan	F	Group Discussion: Microbial Intoxication	Microbiological Toxins - Types and Classification	Bacterial Toxins	Fungal Toxins	Pathogen Profile Organism Choice Due
Waterborne and Water-related Disease Module						
30-Jan	M	Group Discussion: What goes in to assessing microbial exposures from water	Epidemiology of Waterborne Disease	WASH	Water-related Infectious Diseases	Submit News Article
1-Feb	W	Q&A\In the News	Sources of Waterborne Disease Agents	Transmission Pathways	Survival/Persistence of Pathogens in Types of Water	Quiz
3-Feb	F	Group Discussion: Environmental Surveillance	Transport of Pathogens in Water-based systems	Biofilms		
Bioaerosols and Airborne Transmission						
6-Feb	M	Group Discussion: Aerosol versus Droplet Spread: Is SARS-CoV-2 airborne? Does it matter?	Aerobiology	Sources of Aerosols	Epidemiology of Airborne Infectious Disease	Submit News Article
8-Feb	W	Q&A\In The News	Exposure to Airborne Agents	Factors affecting Survival/Persistence of Airborne Agents	Factors Affecting Transport of Airborne Agents	Midterm
10-Feb	F	Group Discussion: Occupational Transmission of SARS-CoV-2	Occupational Infections	Occupational Exposure Pathways	Occupational as at Risk	
Surface Associated Transmission Module						
13-Feb	M	Group Discussion: Public Surfaces as Vehicles of Disease	Fomites as an Exposure Vehicle	Examples of Fomites		Submit News Article
15-Feb	W	Q&A\In the News	Sharps/BBP			Quiz
17-Feb	F	Group Discussion: Pandemic Era- Is it safe to travel?	Factors Affecting fate of Microbiological Agents on Surfaces			
Microbial Hazards in Food Module						
20-Feb	M	NO CLASS - Presidents' Day	N/A	N/A	N/A	
22-Feb	W	Group Discussion: Describe our food system	Epidemiology of Foodborne Disease	Types of foodborne infections	Food Poisoning	Quiz
24-Feb	F	Group Discussion: Famous food outbreaks - What went wrong?	Factors affecting fate of microbes in food	Sources of foodborne contamination	Food Recalls/ Outbreaks	
Microbial Communities Module						
27-Feb	M	Group Discussion: Microbial Source Tracking Uses	Indicator Organisms	Microbial Source Tracking	Metagenomic Approaches	Submit News Article
1-Mar	W	Group Discussion: Antimicrobial Resistance Surveillance in Wastewater	Classes of Antibiotics	Resistance Mechanisms	Examples of Antimicrobial Resistant Organisms	Quiz
3-Mar	F	Group Discussion: Vaccine Efficacy and Disinformation	Vaccines	Vaccine Preventable Diseases	Surveillance	
6-Mar	M	Group Discussion: Does the Environment shape your Microbiome?	Polymicrobial Diseases	Microbiomes	Pre-/Probiotics	Graduate PP Videos Due
8-Mar	W	Grad Student Pathogen Profile Panel 1	Graduate Student PP videos			
10-Mar	F	Grad Student Pathogen Profile Panel 2	Graduate Student PP videos			Undergraduate Pathogen Profiles Due
17-Mar	F	Final Exam Due				