

PUBHEHS/FDSCTE 6320 – GLOBAL HEALTH AND ENVIRONMENTAL MICROBIOLOGY

3 credits – Autumn 2025

Online, Asynchronous

Course Instructors

Jiyoung Lee, PhD, Environmental Health Sciences, The University of Michigan, 1997

Office Location: 402 Cunz Hall

Phone Number: 614-292-5546

Email address: lee.3598@osu.edu (preferred contact method)

Instructor's Office Hours

Monday 2-3 PM (In-person, Zoom), or by appointment

Faculty Feedback & Response Time:

The following gives you an idea of our intended availability during the course:

- **Grading:** You can generally expect feedback within 7 days.
- **E-mail:** We will reply to e-mails within 24 hours on school days.
- **Discussion board:** Either the TA or the instructor will check and reply to messages in the discussion boards every 24 hours on school days.

Graduate Teaching Assistant (GTA)

Anthony Akande, akande.16@buckeyemail.osu.edu, office hours (by appointment)

GTA Responsibilities

The GTA assigned to the course will hold regular office hours and monitor discussion board. The TA may assist with scoring assignments; however, final grades will be assigned by the professor. **Any questions regarding grading should be directed to the professor and not the TA.**

Course Description

Water contamination affects our health and daily life. Water contaminants include biological infectious agents, chemical and physical pollutants, and other toxic agents that are transmitted primarily via water, but also through air, soil, food, and human activities. Lectures will cover emerging and fundamental issues, sources of contamination, pathways of transport and exposure, public health impacts, and interventions.

Prerequisites

Undergraduate-level microbiology or permission from the instructor.

Course Learning Objectives

Upon successful completion of this course, students will be better prepared to:

- Summarize an overview of the impact of microbial contamination in environments on human health
- List current and emerging issues of infectious diseases in global settings
- Summarize the basic principles about infectious disease etiology, epidemiology, treatment, intervention and critical control points.

- List the common indicator organisms and federal guidelines about drinking water quality and recreational water quality
- Explain pathways of microbial transmission via water, air, soil, surfaces and food under various scenarios
- Explain techniques and other emerging tools for studying microbial pathogens and microbiome
- Discuss key aspects of the beneficial use of microbes, such as energy production and probiotics
- Summarize emerging issues and future research needs concerning major infectious diseases and how to protect human and ecosystem health

Competencies:

Foundational Public Health Knowledge Competencies

1. Explain the critical importance of evidence in advancing public health knowledge
2. Explain effects of environmental factors on a population's health
3. Explain the ecological perspective on the connections among human, animal and ecosystem health

Applicable MPH-EHS Specialization Competencies

Upon completion of the course, MPH degree students with specialization in environmental health sciences should be able to:

1. Outline the health challenges that natural and anthropogenic contaminants in the environment can pose to population health
2. Explain the physiological factors that influence human exposure and the uptake of chemical and biological environmental agents
3. Describe federal and state regulatory programs, guidelines, and authorities relevant to environmental and occupational health

Applicable MS-ES-EPH Competencies

Upon completion of the course, MS students with EPH specialization should be able to:

1. Communicate in writing and orally the research project's methods, results, limitations, conclusions, and public health relevance
2. Apply the environmental health paradigm (i.e., EHS model) to characterizing hazardous physical, chemical, and biological agents relative to sources, categories, exposure matrices/pathways, distribution, human exposures, responses, societal/regulatory actions, and technological controls

Applicable PhD-EPH Competencies

Upon completion of the course, PhD students with EPH specialization should also be able to:

1. Communicate in writing and orally a research project's purpose, methods, results, limitations, conclusions, and public health relevance to both informed and lay audiences
2. Apply the environmental health paradigm (i.e., EHS model) to characterizing hazardous physical, chemical, and biological agents relative to sources, categories, exposure matrices/pathways, distribution, human exposures, responses, societal/regulatory actions, and technological controls

Text/Readings:

This course does not require a specific textbook, but there is a highly recommended textbook (see below). Assigned supplemental readings, such as journal articles, digital video clips, and website contents/links, are required in most of the modules.

Recommended (available at OSU library and online)

Pepper, I.L., Gerba, C.P., Gentry, T.J. 2015. Environmental Microbiology, 3rd edition, Academic Press, San Diego, CA.

Carmen

There is a Carmen site for this course: <https://carmen.osu.edu>. All course materials are available via Carmen.

You will need to use BuckeyePass (buckeyepass.osu.edu) multi-factor authentication to access your courses in Carmen. To ensure that you are able to connect to Carmen at all times, it is recommended that you take the following steps:

- Register multiple devices in case something happens to your primary device. Visit the BuckeyePass - Adding a Device help article for step-by-step instructions (<https://admin.resources.osu.edu/buckeyepass/adding-a-device>)
- Request passcodes to keep as a backup authentication option. When you see the Duo login screen on your computer, click **Enter a Passcode** and then click the **Text me new codes** button that appears. This will text you ten passcodes good for 365 days that can each be used once.
- Download the Duo Mobile application (<https://admin.resources.osu.edu/buckeyepass/installing-the-duo-mobile-application>) to all of your registered devices for the ability to generate one-time codes in the event that you lose cell, data, or Wi-Fi service

If none of these options will meet the needs of your situation, you can contact the IT Service Desk at 614-688-4357(HELP) and IT support staff will work out a solution with you.

Class Format: How this course works

- **Mode of delivery:** This course is 100% online delivery via asynchronous Distance Learning (DL) mode. The course is hosted on OSU's Carmen learning course management system (<https://carmen.osu.edu/>). There will be one arranged and required meeting at the beginning of the semester **and the last two classes for term paper presentation**. This mandatory session will occur in Zoom. Otherwise, there are no required sessions when you must be logged in at a scheduled time.
- **Pace of online activities:** This course is divided into weekly modules that are released every Monday and due the following Sunday at 11:59PM. Students are expected to keep pace with weekly deadlines but may schedule their efforts freely within that time frame.
- **Credit hours and work expectations:** This is a **3-credit-hour course**. According to Ohio State policy (go.osu.edu/credithours), students should expect around 3 hours per week of time spent on direct instruction (e.g., instructor content and Carmen activities) in addition to 6 hours of homework/active learning activities (e.g., reading and assignment preparation) to receive a grade of (C) average.
- **Attendance and participation requirements:** Because this is an online course, your attendance is based on your online activity and participation. The following is a summary of students' expected participation:
 - **Attendance:** In case of a serious emergency situation that prevents a student from attending the required synchronous session, the student must contact the instructor before the event (or arrange for someone to do so) or as soon as possible. Students must show evidence that they are physically unable to participate, such as a clear and specific doctor's note mentioning the date and reason. Generally speaking, no make-ups will be granted for personal reasons, such as travel, personal hardship, leisure, or to ease test week schedules, and no student will be permitted to take a quiz or an exam beyond the scheduled time period. Exceptions may be made at the instructor's discretion in case of emergency/illness with appropriate documentation.
 - **Participating in online activities for attendance:** AT LEAST ONCE PER WEEK. You are expected to log in to the course in Carmen every week. (During most weeks you will

probably log in many times.) If you have a situation that might cause you to miss an entire week of class, discuss it with me and the TA as soon as possible.

- **Participating in questions & discussion forums:** As part of your participation, you must respond to the prompt questions posted by the instructor/TA in the discussion board. Discussion board will be used and a guide for creating quality discussion posts can be found in Carmen. You are encouraged to post your question early in the module, but it is understood that this may not always be possible. In addition to posting, you are required to respond to one or more of your classmates' posts. You are required to post your original reply first before seeing the posts of others. Everyone is expected to follow the discussion throughout the course.

Course Technology

Technology skills needed for this course

- Basic computer and web-browsing skills
- Navigating Carmen (go.osu.edu/canvasstudent)
- CarmenZoom virtual meetings (go.osu.edu/zoom-meetings)

Required equipment

- **Computer:** current Mac (Mac OSX) or PC (Windows 10+) with high-speed internet connection
- **Webcam:** built-in or external webcam, fully installed and tested
- **Microphone:** built-in laptop or tablet mic or external microphone
- **Other:** a mobile device (smartphone or tablet) to use for BuckeyePass authentication

Required software

- **Microsoft 365 Copilot (formerly Office 365)**
All Ohio State students are now eligible for free Microsoft 365 Copilot (formerly Office 365). Full instructions can be found at go.osu.edu/office365help.

Technology support

For help with your password, university email, Carmen, or any other technology issues, questions, or requests, contact the Ohio State IT Service Desk. Standard support hours are available at and support for urgent issues is available 24/7.

- **Self-Service and Chat support:** <http://it.osu.edu/help>
- **Phone:** 614-688-4357(HELP)
- **Email:** servicedesk@osu.edu

Assignments/Assessments

Quizzes: 33%

Description: For each topic taught in this course, you will be required to view a pre-recorded lecture, slides, or video clip. To assess your level of understanding of the lecture contents, you will then be required to complete a self-check quiz. Each quiz may contain multiple choice, short answer, and other question forms. Each quiz will be open on Monday and must be done by the end of the week 11:59pm. Each quiz is timed, and students will have 60 minutes to complete once they start.

Academic integrity and collaboration: Quizzes are open-book and open-notes. Textbooks, lecture notes, journal articles and own notes can be used. Students must do their own work in completing the quizzes. Make-up quizzes will not be given except in case of a serious emergency situation since some flexibility has already been provided to the students. See Attendance policy for details.

Question & Discussion Participation: 22%

Description: You must respond to the prompt questions posted by the instructor in the discussion board each week (see the due date in the course schedule). You are also required to respond to one or more of your classmates' posts. The discussion boards are checked on a regular basis.

Academic integrity and collaboration: You must participate in the discussion board to receive these points. Posts must represent the student's own work.

Term Paper (presentation): 5%

Description: The term paper presentation is an extension of the term paper. Students can work individually or in a team. The grade on the presentation is based upon showing full understanding about the chosen topic, critical and logical thinking, answering questions, and effective presenting skills. PowerPoint slides are required for 10 min presentation + 10 min Q & A. Each person in the team should contribute equally if the work is done by a team and each person's role in contributing to the project should be clearly mentioned during the presentation. Presentation will be given peer-review evaluations and feedback. Students are highly encouraged to incorporate the comments from their peers obtained during the term paper presentation, review, and discussion section when they finalize their term paper in order to improve the quality of their term paper. PowerPoint slide submission is due by the presentation date (**12/1/2025 or 12/8/2025, 12:00 pm**). One submission per team, if working as a team, is needed.

Academic integrity and collaboration: Your presentations must be your own original work. You must include citations throughout your slides.

Term Paper (written): 20%

Description: Students can work individually or in a team for the term paper. Topics should be about environmental microbiology (bacteria, viruses, protozoa, microbial metabolites) related to 'global health' impact. The format is a student research competition proposal (e.g. NSF graduate fellowship, NIH Individual research fellowship F32, CFAES Internal Grant Program for graduate students), but in a simpler form. The term paper should start with a cover page that has the title of the project, the student's name, email address, and department. In 150 words or less, provide an abstract describing your project. An example of a term paper is listed on CarmenCanvas.

For the main contents, the project description should contain the following components: 1) introduction that clearly introduces the topic of the project and why this work is important and how it will improve human health. Rationale and significance that clearly states the justification behind the project, clarify the knowledge gap; 2) Outline the goals and objectives of the project and the expected outcome; 3) research methods that define problems and research questions, and describe approach and study design. One figure is required in your main text that captures your study design and the significance of your proposed study in a graphical abstract form. The proposal must include literature review and accurate citations. Pitfalls or limitations of the proposed research should be mentioned.

The paper must have 1-inch margins in Microsoft Word and 12-point font size. It has a 5-page limit, including the cover page and figures. Reference section is not included in the page limit. Each person's CV should be attached (1-page limit). The CV is not counted toward the 5-page limit. Everything should be combined **in one file** in Word or PDF.

Term paper (written) is due by 12/12/2025.

Academic integrity and collaboration: Your written assignments must be your own original work. In formal assignments, you should follow APA style to cite the ideas and words of your research sources. You are encouraged to ask a trusted person to proofread your assignments before you turn them in but no one else should revise or rewrite your work.

Grading

Assignment category	Points
Lecture self-checks quizzes (11 quizzes, 3 points each)	33
Question & discussion participation (11 discussion participation, 2 points each)	22
Homework	5
Term paper (written)	20
Term paper (presentation)	5
Total	100

Grading Scale

A	93 to 100	Outstanding work that reflects mastery of the material and the ability to apply it
A-	90 to <93	Excellent work that reflects mastery of the material
B+	87 to <90	Good work that reflects mastery of most of the material
B	83 to <87	Good work that reflects mastery of some of the material
B-	80 to <83	Good work that reflects mastery of a few aspects of the material
C+	77 to <80	Mediocre work that reflects familiarity with, but not mastery of the material
C	73 to <77	Mediocre work that reflects familiarity with most of the material
C-	70 to <73	Mediocre work that reflects little familiarity with the material
D+	67 to <70	
D	60 to <67	
E	Below 60	

Class Policies

Discussion and communication guidelines

The following are my expectations for how we should communicate as a class. Above all, please remember to be respectful and thoughtful.

- **Writing style:** While you were writing a research paper, you should remember to write using good grammar, spelling, and punctuation. A more conversational tone is fine for non-academic topics.
- **Tone and civility:** Let's maintain a supportive learning community where everyone feels safe and where people can disagree amicably. Remember that sarcasm does not always come across online.
- **Citing your sources:** When we have academic discussions, please cite your sources to back up what you say. For the textbook or other course materials, list at least the title and page numbers. For online sources, include a link.
- **Backing up your work:** Consider composing your academic posts in a word processor, where you can save your work, and then copying into the Carmen discussion.

Copyright Statement

This syllabus and all course materials (e.g., homework assignments, solution keys, course materials) are under copyright by the instructor and cannot be posted elsewhere without written permission.

Generative AI Policy

Given that the learning goals of this class are to develop foundational knowledge in water contamination and critically discuss topics, the use of generative artificial intelligence (GenAI) tools, such as ChatGPT, are not permitted in this course for any assignments. Any use of GenAI tools in this class may therefore be considered a violation of Ohio State's [Academic Integrity\(opens in new window\)](#) policy and [Code of Student Conduct\(opens in new window\)](#) because the work is not your own. If you are suspected using GenAI on an assignment for this course, you should explain your process for completing the assignment in question. The unauthorized use of GenAI tools will result in referral to the [Committee on Academic Misconduct\(opens in new window\)](#).

Office of Student Life: Disability Services

The university strives to maintain a healthy and accessible environment to support student learning in and out of the classroom. If you anticipate or experience academic barriers based on your disability (including mental health, chronic, or temporary medical conditions), please let me know immediately so that we can privately discuss options. To establish reasonable accommodations, I may request that you register with Student Life Disability Services. After registration, make arrangements with me as soon as possible to discuss your accommodations so that they may be implemented in a timely fashion.

If you are ill and need to miss class, including if you are staying home and away from others while experiencing symptoms of a viral infection or fever, please let me know immediately. In cases where illness interacts with an underlying medical condition, please consult with Student Life Disability Services to request reasonable accommodations. You can connect with them at slds@osu.edu; 614-292-3307; or slds.osu.edu.

Mental Health Services

As a student you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance or reduce a student's ability to participate in daily activities. The Ohio State University offers services to assist you with addressing these and other concerns you may be experiencing. If you or someone you know are suffering from any of the aforementioned conditions, you can learn more about the broad range of confidential mental health services available on campus via the Office of Student Life's Counseling and Consultation Service (CCS) by visiting ccs.osu.edu or calling [614-292-5766](tel:614-292-5766). CCS is located on the 4th Floor of the Younkin Success Center and 10th Floor of Lincoln Tower. You can reach an on call counselor when CCS is closed at [614-292-5766](tel:614-292-5766) and 24 hour emergency help is also available 24/7 by dialing 988 to reach the Suicide and Crisis Lifeline.

Religious Beliefs or Practices Accommodations

Ohio State has had a longstanding practice of making reasonable academic accommodations for students' religious beliefs and practices in accordance with applicable law. In 2023, Ohio State updated its practice to align with new state legislation. Under this new provision, students must be in early communication with their instructors regarding any known accommodation requests for religious beliefs and practices, providing notice of specific dates for which they request alternative accommodations within 14 days after the first instructional day of the course. Instructors in turn shall not question the sincerity of a student's religious or spiritual belief system in reviewing such requests and shall keep requests for accommodations confidential.

With sufficient notice, instructors will provide students with reasonable alternative accommodations with regard to examinations and other academic requirements with respect to students' sincerely held religious beliefs and practices by allowing up to three absences each semester for the student to attend or participate in religious activities. Examples of religious accommodations can include, but are not limited to, rescheduling an exam, altering the time of a student's presentation, allowing make-up assignments to substitute for missed class work, or flexibility in due dates or research responsibilities. If concerns arise about a requested accommodation, instructors are to consult their tenure initiating unit head for assistance.

A student's request for time off shall be provided if the student's sincerely held religious belief or practice severely affects the student's ability to take an exam or meet an academic requirement and the student has notified their instructor, in writing during the first 14 days after the course begins, of the date of each absence. Although students are required to provide notice within the first 14 days after a course begins, instructors are strongly encouraged to work with the student to provide a reasonable accommodation if a request is made outside the notice period. A student may not be penalized for an absence approved under this policy.

If students have questions or disputes related to academic accommodations, they should contact their course instructor, and then their department or college office. For questions or to report discrimination or harassment based on religion, individuals should contact the [Civil Rights Compliance Office](#). (Policy: [Religious Holidays, Holy Days and Observances](#))

Academic Misconduct

It is the responsibility of the Committee on Academic Misconduct to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. The term "academic misconduct" includes all forms of student academic misconduct wherever committed; illustrated by, but not limited to, cases of plagiarism and dishonest practices in connection with examinations. Instructors shall report all instances of alleged academic misconduct to the committee ([Faculty Rule 3335-5-48.7 \(B\)](#)). For additional information, see the [Code of Student Conduct](#).

Intellectual Diversity

Ohio State is committed to fostering a culture of open inquiry and intellectual diversity within the classroom. This course will cover a range of information and may include discussions or debates about controversial issues, beliefs, or policies. Any such discussions and debates are intended to support understanding of the approved curriculum and relevant course objectives rather than promote any specific point of view. Students will be assessed on principles applicable to the field of study and the content covered in the course. Preparing students for citizenship includes helping them develop critical thinking skills that will allow them to reach their own conclusions regarding complex or controversial matters.

Grievances and Solving Problems

A student who encounters a problem related to his/her educational program has a variety of avenues available to seek resolution. According to University Policies, if you have a problem with this class, you should seek to resolve the grievance concerning a grade or academic practice by speaking first with the instructor or professor. Then, if necessary, you may take your case to the department chairperson. Specific procedures are outlined in [Faculty Rule 3335-8-23](#), the [CPH Graduate Student Handbook](#), and the [CPH Undergraduate Student Handbook](#). Grievances against graduate, research, and teaching assistants should be submitted first to the supervising instructor, then to the chairperson of the assistant's department.

Creating an Environment Free from Harassment, Discrimination, and Sexual Misconduct

The Ohio State University is committed to building and maintaining a community to reflect diversity and to improve opportunities for all. All Buckeyes have the right to be free from harassment, discrimination, and sexual misconduct. Ohio State does not discriminate on the basis of age, ancestry, color, disability, ethnicity, gender, gender identity or expression, genetic information, HIV/AIDS status, military status, national origin, pregnancy (childbirth, false pregnancy, termination of pregnancy, or recovery therefrom), race, religion, sex, sexual orientation, or protected veteran status, or any other bases under the law, in its activities, academic programs, admission, and employment. Members of the university community also have the right to be free from all forms of sexual misconduct: sexual harassment, sexual assault, relationship violence, stalking, and sexual exploitation.

To report harassment, discrimination, sexual misconduct, or retaliation and/or seek confidential and non-confidential resources and supportive measures, contact the Civil Rights Compliance Office:

Online reporting form at <http://civilrights.osu.edu/>,
Call 614-247-5838 or TTY 614-688-8605,
Or Email civilrights@osu.edu

The university is committed to stopping sexual misconduct, preventing its recurrence, eliminating any hostile environment, and remedying its discriminatory effects. All university employees have reporting responsibilities to the Civil Rights Compliance Office to ensure the university can take appropriate action:

- All university employees, except those exempted by legal privilege of confidentiality or expressly identified as a confidential reporter, have an obligation to report incidents of sexual assault immediately.
- The following employees have an obligation to report all other forms of sexual misconduct as soon as practicable but at most within five workdays of becoming aware of such information: 1. Any human resource professional (HRP); 2. Anyone who supervises faculty, staff, students, or volunteers; 3. Chair/director; and 4. Faculty member.

Course Outline

Refer to the Carmen course for up-to-date assignment due dates in the announcement section. **Each weekly module starts on Monday.** Assignments are due by the following Sunday at 11:59PM.

Week	Dates	Topics, Readings, Assignments & Deadlines
1	Synchronous Session (9/8, 2:15 -3:15 pm on Zoom)	Module 1: Overview of the course and Introduction of Environmental Health Microbiology <u>Readings:</u> Pepper et al. 2015. Environmental Microbiology, Chapter 1 -2 <u>Assignments:</u> Carmen discussion participation and lecture self-check (due by 9/14)
2	9/15	Module 2: Environmental transmission of pathogens <u>Readings:</u> Pepper et al. 2015. Environmental Microbiology, Chapter 22 Benedict, K. M., et al. (2017). Surveillance for Waterborne Disease Outbreaks Associated with Drinking Water — United States, 2013–2014. <i>MMWR</i> 66:1216-1221. DOI: http://dx.doi.org/10.15585/mmwr.mm6644a3 Holst, M. M., et al. (2025). Contributing factors of foodborne illness outbreaks—National Outbreak Reporting System, United States, 2014–2022. <i>MMWR Surveillance Summaries</i> , 74(1), 1–12. DOI: 10.15585/mmwr.ss7206a1 <u>Assignments:</u> Carmen discussion participation and lecture self-check (due by 9/21)
3	9/22	Module 3: Indicator organisms <u>Readings:</u> Pepper et al. 2015. Environmental Microbiology, Chapter 23 Grout, L. et al. (2024). Severe weather events and cryptosporidiosis in Aotearoa New Zealand: A case series of space–time clusters. <i>Epidemiology & Infection</i> , 152, e64. DOI: https://doi.org/10.1017/S095026882400058X O'Reilly, C.E. et al. (2007). A waterborne outbreak of gastroenteritis with multiple etiologies among resort island visitors and residents: Ohio, 2004. <i>Clinical Infectious Diseases</i> . 44:5-6-512. DOI: 10.1086/511043 <u>Assignments:</u> Carmen discussion participation and lecture self-check (due by 9/28)
4	9/29	Module 4: Wastewater treatment, wastewater reuse & public health issues

Week	Dates	Topics, Readings, Assignments & Deadlines
		<u>Readings:</u> Pepper et al. 2015. Environmental Microbiology, Chapter 25 – 27 Macri, M. et al. (2024). Antibiotic resistance and pathogen spreading in a wastewater treatment plant designed for wastewater reuse. Environmental Pollution, 363, 125051. https://doi.org/10.1016/j.envpol.2024.125051 Park, E, Mancl, K, Tuovinen, O, Bisesi, M, Lee, J. (2016). Ensuring safe reuse of residential wastewater: Reduction of microbes and genes using peat biofilter and batch chlorination in an on-site treatment system. <i>Journal of Applied Microbiology</i>. 121(6):17777-1788. DOI: 10.1111/jam.13288 <u>Assignments:</u> Carmen discussion participation and lecture self-check (due by 10/5)
5	10/6	Module 5: Drinking water treatment and disinfection <u>Readings:</u> Pepper et al. 2015. Environmental Microbiology, Chapter 28-29 [OSU Library e-book] <u>Assignments:</u> Carmen discussion participation and lecture self-check (due by 10/12)
6	10/13	Module 6: Foodborne illness & food safety of farm to fork food chain <u>Readings:</u> Scallan et al. (2025). <i>Foodborne Illness Acquired in the United States—Major Pathogens, 2019. Emerging Infectious Diseases</i>, 31(4), 669–677. US Government Accountability Office. (2025). Food Safety: Status of Foodborne Illness in the U.S, GAO-25-107606 Q&A Report to Congressional Addressees February 3, 2025. Assignments: Carmen discussion participation and lecture self-check_(due by 10/19)
7	10/20	Module 7: Microbial source tracking <u>Readings:</u> Pepper et al. 2015. Environmental Microbiology, Chapter 14 Lancaster, E., Winston, R., Martin, J., & Lee, J. (2024). Urban stormwater green infrastructure: Evaluating the public health service role of bioretention using microbial source tracking and bacterial community analyses. <i>Water Research</i>, 259, 121818.

Week	Dates	Topics, Readings, Assignments & Deadlines
		https://doi.org/10.1016/j.watres.2024.121818 <u>Assignments:</u> Carmen discussion participation and lecture self-check (due by 10/26)
8	10/27	Module 8: Antibiotic resistance – A slow motion catastrophe <u>Readings:</u> Mills, M., Mollenkopf, D., Wittum, T., Sullivan, M. P., & Lee, J. (2024). One Health threat of treated wastewater discharge in urban ohio rivers: implications for surface water and fish gut microbiome and resistome. <i>Environmental Science & Technology</i> , 58(30), 13402-13414. https://doi.org/10.1021/acs.est.3c09070 Fey, PD. et al. 2000. Ceftriaxone-resistant Salmonella infection acquired by a child from cattle. <i>New England Journal of Medicine</i> , 342(17):1242-1249. DOI: 10.1056/NEJM200004273421703 Taubes G. The Bacteria Fight Back. <i>Science</i> , Vol. 321, No. 5887 (Jul. 18, 2008), pp. 356-36. DOI: 10.1126/science.321.5887.356 <u>Assignments:</u> Carmen discussion participation and lecture self-check (due by 11/2)
9	11/3	Module 9: Climate impact on infectious diseases <u>Readings:</u> Pepper et al. 2014. Environmental Microbiology, Chapter 31 Mora, C. et al. (2022). Over half of known human pathogenic diseases can be aggravated by climate change. <i>Nature Climate Change</i> , 12(9), 869-875. Semenza, J. C., & Ko, A. I. (2023). Waterborne diseases that are sensitive to climate variability and climate change. <i>New England Journal of Medicine</i> , 389(23), 2175-2187. https://www.nejm.org/doi/full/10.1056/NEJMra2300794#sec-1 Tirado, M.C. et al. 2010. Climate change and food safety: A review. <i>Food Res Int.</i> 43:1745-1765. https://doi.org/10.1016/j.foodres.2010.07.003 <u>Assignments:</u> Carmen discussion participation and lecture self-check (due by 11/9)
10	11/10	Module 10: Microbiome in environments and hosts & its linkage to human health

Week	Dates	Topics, Readings, Assignments & Deadlines
		Readings: Mills, M,.. Lee, J. (2022). Comparison of Environmental Microbiomes in an Antibiotic Resistance-Polluted Urban River Highlights Periphyton and Fish Gut Communities as Reservoirs of Concern. <i>Science of the Total Environment</i>. 851(1):158042. https://doi.org/10.1016/j.scitotenv.2022.158042 Hoisington, AJ et al. (2015). The microbiome of the built environment and mental health. <i>Microbiome</i>, 3(1), 60. https://doi.org/10.1186/s40168-015-0127-0 Lee, J-Y. et al.. (2024). The human gut microbiome in health and disease: time for a new chapter?. <i>Infection and Immunity</i>, 92(11), e00302-24. https://doi.org/10.1128/iai.00302-24 Assignments: Carmen discussion participation and lecture self-check (due by 11/16)
11	11/17	Module 11: Energy produced by microbes: Best options for maximizing sustainability and resilience for US and other countries Watch: Electrifying Wastewater: Using Microbial Fuel Cells to Generate Electricity by The American Chemical Society Energy 101: Algae-to-Fuels by U.S. Department of Energy Bioenergy: America's Energy Future by U.S. Department of Energy <u>Readings:</u> Agarwal, P. et al. (2022). Cyanobacteria as a Promising Alternative for Sustainable Environment: Synthesis of Biofuel and Biodegradable Plastics. <i>Frontiers in Microbiology</i>. 13, 939347. https://doi.org/10.3389/fmicb.2022.939347 Saikia, S., & Jha, A. N. (2025). Microbial system: an emerging application in bioenergy production. <i>Genetic and Genome-Wide Microbial Insights: Bioenergy</i>, 111-128. https://doi.org/10.1016/B978-0-443-31556-5.00008-6 Kougias, P. G., & Angelidaki, I. (2018). Biogas and its opportunities—A review. <i>Frontiers of Environmental Science & Engineering</i>, 12(3), 14. https://doi.org/10.1007/s11783-018-1037-8 <u>Assignments:</u> Submit 1 page of homework, which has two components: a summary of your reading and watching about microbe-based energy (1/2 page) and your opinion and

Week	Dates	Topics, Readings, Assignments & Deadlines
		criticism about the sustainable energy in the US or another country (1/2 page). Choose one country or region. (due by 11/23)
12	11/24	Module 12: Pandemics: Previous pandemics, COVID-19 and future preparedness <u>Readings:</u> Andersen, K. G. et al. (2020). The proximal origin of SARS-CoV-2. <i>Nature medicine</i>, 26(4), 450-452. https://doi.org/10.1038/s41591-020-0820-9 Ai, Y., Davis, A.... & Lee, J. (2021). Wastewater SARS-CoV-2 monitoring as a community-level COVID-19 trend tracker and variants in Ohio, United States. <i>Science of The Total Environment</i>, 149757. https://doi.org/10.1016/j.scitotenv.2021.149757 Lu, E., Ai, Y., Davis, A., ... & Lee, J. (2022). Wastewater surveillance of SARS-CoV-2 in dormitories as a part of comprehensive university campus COVID-19 monitoring. <i>Environmental research</i>, 212, 113580. https://doi.org/10.1016/j.envres.2022.113580 <u>Spanish Flu: a Warning from History</u> by Cambridge University <u>Coronavirus variants: What you need to Know</u> by Nature <u>Past pandemics</u> by CDC <u>Assignments:</u> Carmen discussion participation and lecture self-check (Due by 11/30)
14	Synchronous Session (12/1, 2:15 – 4:15pm)	Term paper presentation, peer review and discussion Q & A for each presentation, provide peer evaluation and constructive comments via Qualtrics for finalizing term paper
15	Synchronous Session (12/8 2:15-4:15pm)	Term paper presentation, peer review and discussion Q & A for each presentation, provide peer evaluation and constructive comments via Qualtrics for finalizing term paper

Alignment of Competencies with Assessments

Competencies	Question & Discussion participation	Lecture self-checks quizzes	Term Paper (presentation)	Term Paper (written)
Foundational Public Health Knowledge Competencies				
6.Explain the critical importance of evidence in advancing public health knowledge	X			X
7.Explain effects of environmental factors on a population's health	X	X	X	X
12. Explain the ecological perspective on the connections among human, animal and ecosystem health (e.g., One Health)	X	X		
Applicable MPH-EHS Specialization Competencies				
1.Outline the health challenges that natural and anthropogenic contaminants in the environment can pose to population health	X	X	X	X
2.Explain the physiological factors that influence human exposure and the uptake of chemical and biological environmental agents	X	X	X	X
3.Describe federal and state regulatory programs, guidelines, and authorities relevant to environmental and occupational health	X	X	X	X
Applicable MS-ES-EPH Competencies				
5.Communicate in writing and orally the research project's methods, results, limitations, conclusions, and public health relevance			X	X
7.Apply the environmental health paradigm (i.e., EHS model) to characterizing hazardous physical, chemical, and biological agents relative to sources, categories, exposure matrices/pathways, distribution, human exposures, responses, societal/regulatory actions, and technological controls	X	X	X	X
Applicable PhD-EPH Competencies				
6.Communicate in writing and orally the research project's purpose, methods, results, limitations, conclusions, and public health relevance to both informed and lay audiences			X	X
8.Apply the environmental health paradigm (i.e., EHS model) to characterizing hazardous physical, chemical, and biological agents relative to sources, categories, exposure matrices/pathways, distribution, human exposures, responses, societal/regulatory actions, and technological controls	X	X	X	X