

ENVH 440 and 545: Water, Wastewater, and Health

Fall Quarter, 2021

Monday, Wednesday, & Friday, 11:30-12:20

Room: HSB T739

INSTRUCTORS: Karen Levy (klevyx@uw.edu)

Office: 261 Hans Rosling Building

John Scott Meschke (jmeschke@uw.edu)

Office: Suite 2338, 4225 Roosevelt Way NE

TA: Becky Kann (rkann@uw.edu)

OFFICE HOURS: By Appointment

COURSE DESCRIPTION

This course will review the various aspects of domestic and global water and wastewater systems as they relate to human health. Topics covered will include source water, basic treatment technologies for water and waste, chemical contaminants, microbial contaminants, and recreational water. This course will be of use for public health professionals, microbiologists, civil and environmental engineers, and environmental scientists.

COURSE OBJECTIVES

On completion of this course, all students should be able to:

1. Identify and describe regulatory frameworks pertaining to water and wastewater.
2. Recognize, characterize, and categorize waterborne contaminants, their sources, and health effects.
3. Summarize and discuss centralized treatment approaches for water and wastewater.
4. Identify and describe decentralized alternatives for water and wastewater treatment.
5. Demonstrate and discuss the impacts of water on personal and community health.

Additionally, graduate students should be able to:

1. Critically review the scientific and gray literature on water and wastewater issues,
2. Compare and contrast alternative solutions to water and wastewater problem scenarios, and
3. Outline, recommend, and justify available solutions.

TEXTS AND REFERENCES

There is no required text for this course. Reading assignments and course materials will be provided through Canvas.

COVID-RELATED EXPECTATIONS

Per UW policy, this class will be conducted in person. Therefore, unless you meet the criteria for an accommodation from Disability Resources for Students (DRS) or a special arrangement approved by the SPH Office of the Dean that allows you to take the course remotely [[see student communications here](#) (Links to an external site.)] you should only register for this class if you can attend in-person.

- Please contact UW Disability Resources for Students (DRS) directly if you feel you may be eligible for an accommodation based on your status as an immunocompromised individual or based on other diagnosed physical or mental health conditions that might prevent you from being able to take classes in-person.
- If you are a student enrolled in a program in SPH, and you are either living with an individual who is immunocompromised, OR you are unable to obtain a visa to travel to the US, you may be eligible for a “special arrangement” that will allow you to take this course remotely. Requests for special arrangements to take the class remotely should have been submitted to and approved by the Students and Academic Services team in the Office of the Dean before the beginning of the quarter. If you have questions about this type of arrangement, please reach out to Student and Academic Services by email at sphas@uw.edu.

All UW students are expected to complete their [vaccine attestation](#) (Links to an external site.) before arriving on campus and to follow the campus-wide face-covering policy at all times. You are expected to follow state, local, and UW COVID-19 policies and recommendations. If you feel ill or exhibit possible COVID symptoms, you should not come to class. If you need to temporarily quarantine or isolate per CDC guidance and/or [campus policy](#) (Links to an external site.), you are responsible for notifying your instructors as soon as possible by email. **If you receive a positive COVID-19 test result, you must report to campus Environmental Health & Safety (EH&S) by emailing covidehc@uw.edu or calling 206-626-3344.**

Food is not allowed in the classroom. Drinks may be sipped with lifting or removal of your facemask for a brief moment, and immediate re-masking after drinking.

Please check your email daily BEFORE coming to class. If we need to conduct class remotely because the instructor or a guest speaker is complying with UW policies and unable to attend in person, we will send all registered students an email with a Zoom link for remote instruction. Thank you for your patience and support as we all transition together back to in-person learning!

ACCESS AND ACCOMMODATIONS

Your experience in this class is important to us. 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 (Links to an external site.).

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](#) (Links to an external site). Accommodations must be requested within the first two weeks of this course using the [Religious Accommodations Request form](#) (Links to an external site).

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](#) (Links to an external site.)(WAC 478-120). We expect you to know and follow the university's policies on cheating and plagiarism, and [the SPH Academic Integrity Policy](#) (Links to an external site.). 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.

SPH LAND ACKNOWLEDGMENT

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.

CLASSROOM CLIMATE

The UW School of Public Health seeks to ensure all students are fully included in each course. We strive to create an environment that reflects community and mutual caring. We encourage students with concerns about classroom climate to talk to your instructor, your faculty or academic advisor, or a member of the departmental or SPH Diversity Committee. Victoria Gardner (vg@uw.edu), SPH Assistant Dean for Equity, Diversity & Inclusion, is also a resource for students with concerns related to equity, diversity, and inclusion.

EQUITY, DIVERSITY AND INCLUSION

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

BIAS CONCERNS

The Office of the Dean has a [student concern policy](#) (Links to an external site.), 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 at this link <https://sph.washington.edu/about/diversity/bias-concerns> (Links to an external site.). 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.

PERSONAL PRONOUNS

According to the UW First Year Programs, being an ally is not just about intention, it's also about behavior. 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. Faculty training and consultation on pronoun use is available for SPH faculty from the Assistant Dean for EDI. Including pronouns on syllabi is optional as we work to develop and provide further training to all teaching faculty.

GRADING:

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.

Points will be available according to the following percentage breakdown:

Item	#	440 (undergrad)		545 (graduate)		Notes
		Points	% of Grade	Points	% of Grade	
Intro assignment	1	3	3%	3	1%	Video introduction – who you are, why you are taking the course, and where your water comes from now or when you were growing up
Quizzes	8	4 pts each	32%	3 pts each	24%	Quiz assignments will cover lectures, reading, and pre-recorded lectures. Late quizzes will be penalized 10% of point value for each class period that they are late.
Midterm	1	25 pts	20%	20 pts	20%	The midterm exam will consist of short answer and multiple choice questions. Exam will be given online and will be open book and open note, but students should not consult with any other people while answering the questions.
Group Discussions	5	3 pts each	15%	2 pts each	10%	Students are expected to participate in group discussion and learning activities. There will be options each week for participating in discussions through a) in-person discussions during scheduled classtime; b) online synchronous discussions during scheduled classtime; c) online asynchronous discussion boards.
Questions for guest lecturers	5	1 pt each	5%	1 pt each	5%	Students are expected to submit questions for the speaker in advance of each of the guest lectures.
Applied scenario project	1	5 pts	5%	20 pts	20%	440 students: Undergraduates are expected to watch graduate student presentations and formulate 5 questions for the speaker. 545 students: Graduate students will develop short presentation (5-7 minutes) that includes a critical review of the relevant literature and potential solutions to a specific scenario (of their choosing), in which health has been impacted by waterborne contaminants. Presentations will be made in person unless other arrangements are needed for an online presentation. Graduate students will present and respond to questions on their presentation during the last 2 weeks of class.
Final Exam			20%		20%	The final exam will be offered during finals week. The final exam will be a similar format to the midterm exam, and will be comprehensive of all material covered in the course, weighted more heavily to material covered since the midterm. Exam will be given online and will be open book and open note, but students should not consult with any other people while answering the questions.

COURSE SCHEDULE

Day of Week	Date	Topic	Speaker/Lead	Homework
Course Introduction				
Weds	9/29	Introduction/Welcome/Overview of Syllabus + Expectations	Levy / Meschke / Kann [in-person]	<ul style="list-style-type: none"> • Video: introduction + where does your water come from? • Register for UNC Water + Health
Fri	10/1	Lecture: Overview of Waterborne disease epidemiology Readings: GBD Diarrhea ; MMWR Waterborne disease outbreaks	Levy [in-person] (Dr. Meschke out)	<ul style="list-style-type: none"> • Readings for 10/4 + 10/6
Module 1: Waterborne Microbial Contaminants + Regulation				
Mon	10/4	Lecture: Microbial contaminants Topics: Viruses, bacteria, protozoa, helminths, algae, indicator organisms Reading: Microbial aspects.pdf	Meschke [in-person]	<ul style="list-style-type: none"> • Quiz 1 on 10/1 material (online)
Weds	10/6	Lecture: Water Regulation Topics: Safe Drinking Water Act, Clean Water Act, other regulations Reading: https://www.epa.gov/sdwa ; https://www.epa.gov/npdes	Meschke [in-person]	<ul style="list-style-type: none"> • Attend session of UNC conference (10/4-10/6) and report back
Fri	10/8	Discussion 1: UNC report-back pair + share	Levy [Zoom]	<ul style="list-style-type: none"> • Readings for 10/11 + 10/13
Module 2: Waterborne Chemical Contaminants				
Mon	10/11	Lecture: Water Chemistry and Chemical Contaminants Topics: Water chemistry basics, equilibrium/equivalency, inorganics/metals, organics contaminants, disinfectant byproducts Reading: https://www.epa.gov/ground-water-and-drinking-water/basic-information-about-lead-drinking-water	Meschke [in-person]	<ul style="list-style-type: none"> • Quiz 2 on 10/4 + 10/6 material (online) • Questions for guest lecturer
Weds	10/13	Guest Lecture: Kessie Alexandre/ Water + Environmental Justice Reading: TBD	Alexandre [TBD]	<ul style="list-style-type: none"> • In the news selection
Fri	10/15	Discussion 2: In the News	Levy [Zoom]	<ul style="list-style-type: none"> • Readings for 10/18 + 10/20
Module 3: Water treatment systems – high income settings				

Mon	10/18	Lecture: Water Sources and Access Topics: water cycle, groundwater, wells, surface water, inlets, treatment overview Reading: TBD	Meschke [in-person]	<ul style="list-style-type: none"> Quiz 3 on 10/11 + 10/13 material (online) Questions for guest lecturer
Weds	10/20	Panel Discussion on QMRA/Mary Schoen and Jade Mitchell Reading: Petterson and Ashbolt. 2016. QMRA and water safety management: review of application in drinking water systems. Journal of Water & Health.	Schoen + Mitchell [Zoom]	<ul style="list-style-type: none"> Prep for Group Discussion 1
Fri	10/22	Discussion 3: Group Journal Club	Kann [Zoom] (Dr. Levy out)	<ul style="list-style-type: none"> Readings for 10/25 + 10/27
Mon	10/25	Lecture: Water Treatment Processes Topics: Screening, oxidation, Coagulation/Flocculation, Filtration, Disinfection, Advanced Treatment Reading: TBD	Meschke [in-person] (Dr. Levy out)	<ul style="list-style-type: none"> Quiz 4 on 10/18 + 10/20 material (online)
Weds	10/27	Lecture: Distribution Systems and Cross connections Topics: Components of Distribution system, biofilms, premise plumbing, corrosion, cross connection, backflow prevention Reading: TBD	Meschke [in-person]	n/a
Fri	10/29	Midterm review session	Kann [Zoom]	<ul style="list-style-type: none"> Readings for 11/1 + 11/3
Module 4: Water treatment systems – low income settings				
Mon	11/1	Lecture: Global water quality Topics: Water safety plans, point of use treatment, treatment effectiveness, hand hygiene, gender and water Reading: TBD	Levy [in-person]	<ul style="list-style-type: none"> Questions for guest lecturer
Weds	11/3	Guest Lecture: Mia Mattioli/wastewater epidemiology Reading: TBD	Mattioli [Zoom]	<ul style="list-style-type: none"> Prep for midterm
Fri	11/5	MIDTERM (will cover material through 11/1)	Levy / Meschke / Kann [Online]	<ul style="list-style-type: none"> Readings for 11/8 + 11/10
Module 5: Wastewater Treatment – high income settings				
Mon	11/8	Lecture: Centralized Wastewater Treatment Topics: composition of wastewater, conveyance systems, preliminary treatment, primary treatment, secondary treatment,	Meschke [in-person]	<ul style="list-style-type: none"> Quiz 5 on 11/1 + 11/3

		disinfection, nutrient removal, industrial pretreatment, biosolids, water reuse Reading: TBD		material (online)
Weds	11/10	Lecture: Decentralized Treatment Topics: on-site system design, siting, operation and maintenance, failure Reading: TBD	Meschke [in-person]	n/a
Fri	11/12	Q&A/midterm post-mortem	Levy / Meschke / Kann [Zoom]	<ul style="list-style-type: none"> Readings for 11/15 + 11/17
Module 6: Wastewater Treatment – low income settings				
Mon	11/15	Lecture: Global Sanitation Topics: Global sanitation access, open defecation, animal wastes, menstrual hygiene management Reading: TBD	Levy [in-person]	<ul style="list-style-type: none"> Quiz 6 on 11/8 + 11/10 material (online) Questions for guest lecturer
Weds	11/17	Guest Lecture: EcoSan/Sasha Kramer Reading: https://www.globalcitizen.org/en/content/turning-poop-into-compost-haiti-soil/	Kramer [Zoom]	<ul style="list-style-type: none"> Prep for Group Discussion 2
Fri	11/19	Discussion 4: Group Journal Club	Kann [Zoom] (Dr. Levy out)	<ul style="list-style-type: none"> Readings for 11/22 + 11/24
Module 7: Non-drinking water				
Mon	11/22	Lecture: Rec water and Shellfish Topics: drowning and injury, microbial exposures, chemical exposures, standards, shellfish, HABs Readings: TBD	Meschke [in-person] (Dr. Levy out)	<ul style="list-style-type: none"> Quiz 7 on 11/15 + 11/17 material (online) Questions for guest lecturer + handout
Weds	11/24	Guest Lecture: Pools & Hot tubs/ Charles Easterberg Reading: Swimming pool + spa handout	Easterberg [in-person at IMA] (Dr. Levy out)	<ul style="list-style-type: none"> Readings for 11/29
Fri	11/26	THANKSGIVING HOLIDAY	n/a	

Mon	11/29	Lecture: Agricultural Water Reading: https://www.pewtrusts.org/~media/Assets/2009/PSPWaterSuslow1pdf.pdf	Levy [TBD, depending on conditions, given Thanksgiving travel] (Dr. Meschke out)	<ul style="list-style-type: none"> Quiz 8 on 11/22 + 11/24 material (online) Questions for guest lecturer
Weds	12/1	Guest Lecture: Paulina Lopez/Duwamish Superfund cleanup Reading: https://www.duwamishcleanup.org/superfund	Lopez [TBD] (Dr. Meschke out)	<ul style="list-style-type: none"> In the news selection
Fri	12/3	Discussion 5: In the News	Levy [Zoom] (Dr. Meschke out)	<ul style="list-style-type: none"> Readings for 12/6
Module 8: Wrapping it all up / The Future of Water & Wastewater				
Mon	12/6	Lecture: Water & Energy Nexus Reading: TBD	Levy [in-person]	n/a
Weds	12/8	Grad Student Presentations	Grad students [in-person if possible]	<ul style="list-style-type: none"> Questions on grad student presentations
Fri	12/10	Grad Student Presentations	Grad students [in-person if possible]	<ul style="list-style-type: none"> Questions on grad student presentations
Open 12/13-12/15		FINAL EXAM		