

# **ENVH 440 and 545: Water, Wastewater, and Health**

Fall Quarter, 2017

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

Room: HSB T435

**INSTRUCTORS:** John Scott Meschke  
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**OFFICE HOURS:** By Appointment

## **COURSE DESCRIPTION:**

This course will review the various aspects of water and wastewater 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 explain the major applicable laws and regulations of the United States pertaining to water and wastewater.
2. Recognize, characterize, and categorize waterborne contaminants, their sources, and health effects.
3. Summarize and discuss major conventional treatment classes 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:**

The recommended text for this course is *Water and Wastewater Technology*, 7<sup>th</sup> ed. by Mark J. Hammer and Mark J. Hammer, Jr. Additional reading assignments and course materials will be provided as handouts or are available on the web. The following texts are also recommended references for this course:

Books (may be borrowed from instructor)-

Disinfection, Sterilization and Preservation, 5<sup>th</sup> edition, LWW  
Metcalf and Eddy's Wastewater Engineering: Treatment and Reuse, McGraw-Hill  
Water Quality and Treatment, 5<sup>th</sup> edition, AWWA  
Water Technology, 3<sup>rd</sup> Edition, IWA Publishing

Journals (available online through UW libraries)-

Journal of American Water Works Association  
Water Science and Technology  
Water Research  
Environmental Science and Technology

**CLASS PARTICIPATION:**

Although class attendance is not expressly required, students will be expected to participate in classroom discussion and in-class group activities. Students will not have the opportunity to earn class participation credit for course periods during which they are absent.

**COURSE FORMAT:**

The course will be divided primarily into 3 modules: Waterborne Contaminants, Water Treatment, and Wastewater Treatment. Additional material will be presented on Water Law and Regulation, and Recreational Water. Modules will consist of lectures, group discussions, and learning activities on related topics.

**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.

**Graduate Students (545):**

Points will be available according to the following percentage breakdown:

Curriculum Vitae (5%): Each student is required to provide a 1-2 page CV describing the student's background and interests. CVs will be due by the third class period.

Homework (20%): Students will have the opportunity to complete 2 homework assignments, totaling 20% 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 (20%): The midterm exam will be given on the 2<sup>nd</sup> of November. It will consist primarily of short answer questions, but may include multiple choice and fill-in the blank questions as well. Exam will be open book and open note.

Class Participation (10%): Students will be expected to participate in group discussion and learning activities. Participation in group activities will be evaluated by peer evaluation.

Applied Scenario Project (25%): Graduate students will work in teams of two to develop an annotated bibliography, critical review of the relevant literature, and a brief presentation on solutions to a specific scenario in which health has been impacted by waterborne contaminants. Graduate students will present their findings to the class in the last week of class.

Final Exam (20%): The final exam will be offered at the formally scheduled time, **December 13<sup>th</sup> 2:30-4:20**. 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.

### **Undergraduate Students (440):**

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 third class period.

Homework (30%): Students will have the opportunity to complete 2 homework assignments, each worth 15 % of the overall grade. 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%): The midterm exam will be given on the 2<sup>nd</sup> of November. It will consist primarily of short answer questions, but may include multiple choice and fill-in the blank questions as well. Exam will be open book and open note.

Class Participation (15%): Students may earn class participation credits by participating in classroom discussions (asking and answering questions) and answering extra-credit questions (via email).

Final Exam (25%): Final exam will be offered at the formally scheduled time, **December 13<sup>th</sup> 2:30-4:20**. 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.

### **Academic Integrity (<http://sph.washington.edu/students/academicintegrity/>)**

*Students at the University of Washington (UW) are expected to maintain the highest standards of academic conduct, professional honesty, and personal integrity.*

*The UW School of Public Health (SPH) is committed to upholding standards of academic integrity consistent with the academic and professional communities of which it is a part. Plagiarism, cheating, and other misconduct are serious violations of the University of Washington **Student Conduct Code** (WAC 478-120). We expect you to know and follow the university's policies on cheating and plagiarism, and the **SPH Academic Integrity Policy**. Any suspected cases of academic misconduct will be handled*

according to University of Washington regulations. For more information, see the University of Washington **Community Standards and Student Conduct** website.

**Access and Accommodation** (<http://depts.washington.edu/uwdrs/faculty-resources/syllabus-statement/>):

*Your experience in this class is important to me. If you have already established accommodations with Disability Resources for Students (DRS), please communicate your approved accommodations to me at your earliest convenience so we can discuss your needs 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), you are welcome to contact DRS at 206-543-8924 or uwdrs@uw.edu or disability.uw.edu. DRS offers resources and coordinates reasonable accommodations for students with disabilities and/or temporary health conditions. Reasonable accommodations are established through an interactive process between you, your instructor(s) and DRS. It is the policy and practice of the University of Washington to create inclusive and accessible learning environments consistent with federal and state law.*

#### COURSE RULES

1. Come to class; please 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, but ASK QUESTIONS
8. Try to remain awake (at least no snoring please)
9. Let me know how I am doing (if I am moving too fast, not being clear, or otherwise ot getting the message across, I need to know.)

Date	Day	Lecture Topic	Lecturer	Homework Assignment
27-Sep	W	Introduction/History of Water and Waste Treatment	Meschke	
29-Sep	F	Water law and Regulation/Water Rights	Meschke	
<b>Waterborne Contaminants Module</b>				
2-Oct	M	Water Microbiology/Microbial Contaminants I	Meschke	CV Due
4-Oct	W	Microbial Contaminants II	Meschke	HW#1 Available
6-Oct	F	Group Discussion: Microbial Contamination Sources	Meschke	
9-Oct	M	Water Chemistry/Chemical Contaminants I	Meschke	
11-Oct	W	Chemical Contaminants II	Meschke	
13-Oct	F	Group Discussion: Flooding impacts on Water Quality and Health		
<b>Water Treatment Module</b>				
16-Oct	M	Conventional Municipal Drinking Water Treatment	Zhou (?)	
18-Oct	W	Groundwater	Meschke	
20-Oct	F	Wells-Introduction/Types/Components	Meschke	
23-Oct	M	Drinking Water Disinfection	Meschke	HW#1 Due
25-Oct	W	Advanced Drinking Water Treatment Processes/Distribution Systems	Meschke	
27-Oct	F	Group Discussion: Bottled Water		
30-Oct	M	Group Discussion: Drinking Water in Developing Countries		
1-Nov	W	Midterm		
3-Nov	F	Cross Connection Issues/Contamination of Drinking Water	Easterberg (?)	
<b>Wastewater Treatment Module</b>				
6-Nov	M	Introduction to Wastewater Treatment/Collection Systems/Combined Sewer Overflow	Meschke	
8-Nov	W	Conventional Municipal Waste Treatment	Meschke	
10-Nov	F	NO CLASS-Veteran's Day		
13-Nov	M	On-Site Waste Disposal Systems I	Meschke	
15-Nov	W	On-Site Waste Disposal Systems II	Meschke	
17-Nov	F	Industrial Waste Treatment	Meschke	
20-Nov	M	Disposal and Treatment of Biosolids/Septage	Meschke	HW#2 Available
22-Nov	W	Graywater and Water Reuse	Meschke	
24-Nov	F	NO CLASS-Thanksgiving Holiday		
26-Nov	M	Group Discussion: Aging Infrastructure		
29-Nov	W	Group Discussion: Sanitation in the Developing World		
1-Dec	F	Shellfish and Recreational Water: Natural Waters	Meschke	HW#2 Due
4-Dec	M	Recreational Water: Pools and Hot Tubs (Meet at IMA)	Easterberg (?)	
6-Dec	W	Graduate Student Presentations		
8-Dec	F	Graduate Student Presentations		
<b>13-Dec</b>	<b>W</b>	<b>FINAL EXAM 2:30-4:20</b>		