

## **ENV H 440 and 545: Water, Wastewater, and Health**

Fall Quarter, 2011

Monday, Wednesday, & Friday, 11:00-12:20

Room: HSB T531

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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, students will be able to:

1. Name and describe the role of the major water laws and regulations that control the quality of water, including drinking water, wastewater and natural water bodies
2. Understand the relationships between the various water laws and regulations
3. Describe the carbonate system in natural water sources and define its relationship to alkalinity
4. Understand the factors that affect the persistence, fate and mobility of human pathogens in water
5. Name the major chemical and microbial contaminant groups found in drinking water and describe their associated health effects
6. Describe the term watershed, recognize how water can become contaminated and explain the general concepts associated with watershed protection to minimize contaminants
7. Identify and describe the major components of drinking water treatment and understand their primary purpose in the overall treatment of drinking water
8. Explain the role of a water distribution system and describe how water in the distribution system can become contaminated and the techniques used to minimize contamination

9. Identify and describe the basic components of a water well, associated equipment such as pumps, the basic types of aquifers that supply water to wells, and how wells are constructed to minimize contamination
10. Describe how drinking water is disinfected using chemical compounds and ultraviolet irradiation
11. Name and understand the meaning and role of the basic measurements used to define the quality of municipal wastewater
12. Identify and describe the major components of municipal wastewater treatment and understand their primary purpose in the overall treatment of wastewater
13. Understand how municipalities control the discharge of industrial wastewater into the municipal system and how the basic regulations for industrial wastewater treatment
14. Name and describe the purpose of the basic components of a typical on-site wastewater disposal system
15. Understand the basic properties of soil and groundwater that affect the treatment of wastewater by onsite disposal systems
16. Describe the similarities between the basic components of an on-site wastewater disposal system and a municipal wastewater treatment facility
17. Describe the meaning of biosolids, know and understand the basic methods for treatment of biosolids, and be able to discuss the regulations controlling biosolids treatment, reuse and disposal
18. Describe the potential contaminants in recreational water, how recreational water quality is monitored and what techniques are used to treat water in pools and spas

#### TEXTS AND REFERENCES:

The required text for this course is Water and Wastewater Technology, 6<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

#### 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:

Class periods on Monday and Wednesday will be an interactive lecture format. Fridays will be largely dedicated to student-led discussion, and graduate student presentations.

## 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 3 homework assignments, totaling 20 % 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 (20%): The take home midterm exam will be handed out in class on the 9<sup>th</sup> of November. It will be due on the 14<sup>th</sup>. 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. Fridays will largely be reserved for group discussion of student chosen journal articles on a specific topic and group presentations. Participation in group projects will be evaluated by peer evaluation.

Papers/Presentations (20%): Students will be expected to prepare two short power-point presentations (15-20 minutes) on relevant topics to water, wastewater and health. A written summary of the presented material (~5 pages) must be turned in at the time of presentation. Students may expand upon topics already covered in lecture material or may choose a novel topic relevant to water, wastewater and health. Topics must be approved by instructor. It is recommended that topics be chosen and approved early in the quarter.

Final Exam (25%): Final exam will be offered at the formally scheduled time, December 14<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. Also one week prior to exam students may check with instructor to find out their grade going in to the exam.

### **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 3 homework assignments, each worth 10 % 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 take home midterm exam will be handed out in class on the 9<sup>th</sup> of November. It will be due on the 14<sup>th</sup>. 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 may earn class participation credits by participating in classroom discussions (asking and answering questions) and answering extra-credit questions (via email).

Final Exam (30%): Final exam will be offered at the formally scheduled time, December 14<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. Also one week prior to exam students may check with instructor to find out their grade going in to the exam.

**ACADEMIC ACCOMODATIONS:** To request academic accommodations due to disability, please contact Disabled Student Services, 448 Schmitz, (206) 543-8924 (V/TTY). If you have a letter from Disabled Student Services indicating that you have a disability that requires academic accommodations, please present the letter to me so we can discuss the accommodations you might need in this class.

### **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 not getting the message across, I need to know.)