

THE PENNSYLVANIA STATE UNIVERSITY
Department of Civil & Environmental Engineering

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Office: 231N Sackett Building

Grad Asst: TBA

CE 371: WATER AND WASTEWATER TREATMENT

14 Henderson Building

Lecture Hours: Tuesday, Thursday 11:15 -12:30 p.m.

Office Hours: Tuesday, Thursday, 2:30 – 4:00 p.m.

Review Class: TBA

Required Text: Viessman, W., Jr., Hammer, M.J. *Water Supply and Pollution Control*, 7th ed., , 2005.

GOALS

This course is designed to offer civil and environmental engineering students the tools to analyze and design potable water and wastewater treatment plants. The course also introduces applications of water chemistry, and decentralized options for water quality management.

PREREQUISITES

It is assumed that all students enrolled in this course will be familiar with the unit processes of water and wastewater treatment and the hydraulic aspects of water flow in pressure conduits and open channels. Normally fluid mechanics (CE 360) Introduction to Environmental Engineering (CE 370) will provide this preparation. These are enforced prerequisites.

HOMEWORK STUDY TEAMS

The solution of numerous problems will be required during the term. In all engineering problems, neatness and clear organization, as well as the format (given, find, and assumptions) and the correct answer, are an essential part of a good solution. Please do these problems on “CE Graph Paper”, and ***box in your answers***. It is expected that the reading assignment will be completed before the period for which it is assigned. Students are encouraged to form homework-study groups, but each individual must turn in his or her own homework assignment (which lists the members of the study group).

COURSE GRADE

25% Homework

20% Exam #1

20% Exam #2

30% Final Exam

5% Class Participation

100% Total

Late Homework: Students are responsible for delivering late homework directly to the Grader; 15% reduction in credit.

Exams will be closed book, but students can refer to a one-page crib sheet (8 ½" x 11", both sides) for the first exam, two pages (both sides) for the second exam, and three pages (both sides) for the final exam. Additionally, students can bring in a one-page (both sides) conversion table, although important conversion factors will be included on the tests.

**CE 371
Course Outline**

The time allotted for all scheduled subject areas may be revised to improve my meeting the course objectives. Homework assignments are due the class session following the topic presentation in class.

<u>Date</u>	<u>Subject</u>	<u>Homework</u>	<u>Assigned Text</u>
1/17	Introduction	CE 360 and CE 370	324-347
	Urban Water & Wastewater Flow Estimation of Population	4: 1, 3, 5, 9, 16*	70-89, 108-111 Browse 90-96
	Water Hydraulics	5.5*, 6*, 14	Browse 119-158
	Water, Sewer Hydraulics	6.2*, 3	
	Flow Measuring, in class field trip to Lewistown WTP	10.1, 2, 3, 4	348-350
	Reactor Characteristics, Reaction Rates		
	Sedimentation Theory		366-371
	Sedimentation – WTP	10:9, 10, 11, 12*	375-377
	Filtration Traditional		384-391
	Water Softening(2 classes)	11.1, 2, 4	Review CE 370
	EXAM Review		
2/22	EXAM 1 ; covers Flow Estimates and Hydraulics, Reactor Characteristics, Sedimentation		
	Chlorination of Potable Water		455-474

	Chlorination and Disinfection of Wastewater	11:10, 35, 40, 41	
	In class field trip to University WWTP and exam review		
3/08	EXAM 2; Covers Filtration, Water Chemistry, Chlorination		
	Wastewater, Microbes and Growth Kinetics	12.1, 12.4	515-527
	Biological Growth in Waste Water Treatment, Wastewater Characteristics	12:6	528-542
	Trickling Filters	12.36, 37	542-548, 553-563
	Activated Sludge		565-581
	Activated Sludge	12:45, 46, 47	583-588
	Activated Sludge Process Design	12.48, 56, 57	592-595
	Oxygen Requirements		596-606
	Implications of Individual On-site Wastewater Disposal as “Sustainability issue”		617-619
	Review		
4/26	Exam 3; Comprehensive, emphasis on Wastewater and Microbes Characteristics, Trickling Filters (Plastic Media), Activated Sludge, Oxygen Requirements, elements of sustainability issues.		

*** Problem Revision, as listed below**

***Problem Revisions**

4.16: Use 43 MGD average day capacity. Use maximum day/average day peaking factor of 2.7.

5.5: Use Manning, Hazen Williams, and Darcy-Weisbach Equations.

5.6: Use Manning, Hazen Williams, and Darcy-Weisbach Equations.

6.2: The minimum flow is 1/12 that of when the pipe is flowing full.

10.12: Use an overflow rate of 6 ft/40 min., not 6.0/5.0 fpm.