

Fall 2019
WATER AND WASTEWATER TREATMENT

Course Instructor:	Paul McGinley
Course Number:	WATR & WSTE 382
Course Title:	Water and Wastewater Treatment
Textbook:	<i>"Water and Wastewater Technology"</i> , Hammer & Hammer, Pearson, 7th Ed., 2012 (available at the bookstore rental).
Class Schedule:	Two lectures per week, T R (8:00 – 8:50)
Lecture:	TNR 359
Lab:	Section 1, R (12:00 – 13:50); Section 2, R (14:00-15:50); WEC 110
Telephone:	346-4501
Email:	pmcginle@uwsp.edu
Office Hours:	Monday & Tuesday 9 to 11 AM CNR 224F
Online Resource:	This course will use the University's <i>Canvas</i> web-based course management system.

Catalog Description

Water and Wastewater Treatment. 3 cr. Theory, practice and regulatory framework of water and wastewater treatment with a focus on control and design of physical, chemical and biological treatment processes.

Introduction to the Course

This is a course about the management of water quality. We explore the composition of water and the water quality requirements for drinking, aquatic life and industrial uses. We examine the composition of wastewater, how it can impact the ecology of receiving waters, and how water quality requirements dictate treatment needs. Finally, we will explore and apply the fundamentals of treatment processes for meeting treatment objectives.

Course Objectives

In this course, we will seek to understand:

- a. water and wastewater composition
- b. water quality standards or criteria.
- c. mass balance techniques for solving water and wastewater problems.
- d. hydraulics and hydrology applied to water and wastewater treatment.
- e. the fundamental principles behind the techniques, operation and design of treatment methods.
- f. routine water quality and treatment measurements

The targeted outcomes for this course

- I. Apply knowledge of mathematics, science and engineering in operation and design of water and wastewater advanced treatment
- II. A knowledge of contemporary issues related to water resources, pollution control and water quality
- III. Design of physical, chemical and biological processes of wastewater to meet desired need^c within realistic constraints such as economic, environmental, social, political, ethical, health^{1.1} and safety, and sustainability

We will achieve these outcomes by

1. Classroom discussion; reading assignments; on-line articles; handouts; problem-solving assignments.
2. PowerPoint presentations on contemporary issues pertinent to water resources planning and management, water technologies, pollution control, and water quality.
3. Field trips to a water treatment and a wastewater treatment facility.

Course Organization

There will be two fifty minutes lectures each week at 8 AM on Tuesday and Thursday. The lab will be held on Thursday at 12 noon- 2 PM (Section 1) or at 2 PM- 4 PM (Section 2). There will be in-class exercises, homework problem sets, and two field trips. *Homework assignments should be handwritten, well organized and legible.* Reports for the laboratories will be due two weeks after we complete the laboratory. Laboratory reports should be typed (Laboratory Report guidelines will be provided at the first laboratory), saved as an electronic copy and then submitted to our online course site. Of course, make sure you save another copy of your laboratory report so that you can resubmit if necessary.

Evaluation of Outcomes

Course grades will be based on a combination of participation (3%), exams (67%), homework/laboratories (30%). The participation portion is easy – just attend class and lab, ask questions, and participate in discussions. The course includes two in-class exams and a final exam that will include a third hourly exam and a one hour cumulative final. Those will include material from both lecture and laboratory. Grading guidelines:

Overall %	Grade
>93	A
>83	B
>73	C

A Note on Collaboration

Many of the assignments will require some collaboration in the laboratory and it is acceptable and encouraged that you discuss assignments and study with others, however, the portions of the assignment that you submit must be your own work. This extends to spreadsheets and other computational tools. Assignments that contain text, graphs or tables identical to those of other students will not receive credit. To assure that there is no confusion on the originality of your work, annotate all graphs created in spreadsheets with your name and other distinguishing features (e.g., do not use the default symbols).

Attendance/Late Assignment Policy

It is the students' responsibility to attend and be punctual to all classes. Late assignments are downgraded 10% for each day late.

If you need course adaptations or accommodations because of a disability, if you have medical and/or safety concerns to share with us, or if you need special arrangement in case the building must be evacuated, please make an appointment with the instructors as soon as possible.

Tentative Outline of WATR/WSTE 382 Fall 2019

Week	Topics	Textbook Chapters (Chapter.Section)	Laboratory / Discussion
1	Composition of Water & The Water Cycle Hardness & Iron	1, 2.1-2.5, 3.1-3.8	Introduction to Mass Analysis, Reactors and Rates
2	Introduction to Treatment: Oxidation and Ion Exchange	7	Coagulation / Flocculation
	Safe Drinking Water Act, Drinking Water Standards	1,5	
3	Coagulation / Sedimentation / Filtration	7	
		3, 7	
4	Membrane Treatment	7	Water Treatment Facility Trip
	Disinfection	7	
5		7	
	Hydraulics - Flow / Energy	4	
6	Exam 1		Hydraulics and Pump Analysis
	Hydraulics of Treatment and Distribution: Pumps, Pipes & Channels	4	
7		4	
	Clean Water Act	4	
8	Discharge Permits and TMDLS	5, 2-6	Oxygen Transfer
		5	
9	Wastewater Treatment Activated Sludge	11	
		11	
10		11	
	Nutrient Removal	13	Biochemical Oxygen Demand and Suspended Solids
11	Exam 2		
		13	
12		13	
	BioSolids	11	Activated Sludge
13		11	
	Thanksgiving (no class on Thursday)		
14		13	
	Water Reuse	13	Wastewater Facility Trip
15		14	
	Exam 3 and Final		