CVLE 480 (434)
ADVANCED SANITARY ENGINEERING
SPRING 2007

INSTRUCTOR: Dr. Richard F. McCormick

OFFICE: GH 3G

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OFFICE HOURS: 9 - 11 MWF; 11 – 12 MWF; other hours as posted, or by appointment

TEXT: ***Water Supply and Pollution Control***; 7th Edition; Viessman and Hammer; Pearson/Prentice Hall; 2005.

REFERENCES: 1. ***Wastewater Engineering: Treatment and Reuse***; 4th edition; Metcalf & Eddy, Inc; McGraw-Hill, 2003.

2. ***Unit Operations and Processes in Environmental Engineering***; Reynolds & Richards; PWS; 2nd Edition; 1996.

OBJECTIVE: To provide the civil engineering student with an in-depth education in the wastewater treatment area with particular attention being paid to biological waste treatment.

OUTCOMES: With the successful completion of the course, the student should be able to

(a) Analyze and design sedimentation processes such as grit chambers, primary clarifiers, and secondary clarifiers.
(b) Analyze and design suspended growth biological treatment systems such as activated sludge basins, aerated lagoons, and oxidation ditches.
(c) Analyze and design attached growth biological treatment systems such as trickling filters and rotating biological contactors.
(d) Analyze and design waste stabilization ponds.
(e) Analyze and design sludge treatment facilities such as thickeners, digesters, and dewatering processes.

GRADING BASIS:

3 Hourly Exams at 20%	60%
Homework (including term papers)	20%
Final Exam	20%
Total	100%

TEST SCHEDULE:

Hourly Exam #1	February 12, 2007
Hourly Exam #2	March 12, 2007
Hourly Exam #3	April 16, 2007
Final Exam	April 30, 2007

With the exception of the final exam, there will be a lecture given before each exam. The exam will begin around 6:00 p. m. on the date listed, and each student may leave as they finish the exam.

PAPER TOPICS:	DUE DATE
1. Hazardous Wastes	March 5, 2007
2. Water Reuse	April 23, 2007

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COURSE OUTLINE
SPRING 2007

LECTURE #	SUBJECT
	Introduction and class policies
1	Wastewater quality and quantity
2	Treatment operations and efficiencies
3	Sedimentation
4	Discrete settling
5	Grit chamber design
6	Flocculent settling and tank design
7	Final clarification
8	Aquatic biology
9	Growth and decomposition
10	Enzyme kinetics
11	Kinetics of biomass growth
12	Treatment kinetics
13	Development of process design relationships
14	Trickling filters
15	Trickling filter design
16	Biological disks, packed biological towers
17	Activated sludge reactor types
18	Activated sludge
19	Activated sludge processes
20	Pure oxygen activated sludge, oxidation ditches, aerated lagoons
21	Waste stabilization ponds
22	Sludge volume and concentration
23	Anaerobic digestion
24	Digester design
25	Sludge dewatering/vacuum filtration
26	Sludge dewatering/drying beds & centrifuges
27	Sludge drying/composting
28	Sludge incineration theory/pyrolysis
29	Sludge incineration processes
30	Final sludge disposal
31	Classification of advanced treatment processes
32	Role of nitrogen and phosphorus in pollution control
33	Nitrification
34	Nitrification-denitrification

NOTE: This course outline is designed for a class which meets on Mondays, Wednesdays and Fridays. A class such as this would normally have about 45 class meetings. Some of these listed lectures take more than one 50 minute class meeting to

cover, and three class meetings are reserved for testing. A class that meets once or twice per week would cover the equivalent of three 50 minute lectures per week.