LAWRENCE TECHNOLOGICAL UNIVERSITY

Department of Civil Engineering

Spring 2003 ECE4363 Environmental Engineering Design Dr. Yuen

E200 MW 8:35-9:50 PM Office: E25

Pre-requisite/Co-requisite: ECE4544 Hydraulic Engineering.

Course Description: Computer-aided design in environmental engineering systems including water resources and storm water management. Development of surface and groundwater sources. Design, construction and maintenance of water distribution systems and sanitary and storm water collection systems.

Text: a. Computer Applications in Hydraulic Engineering, Haestad Methods, Inc., 5th Ed. 2002.
b. Instructor's supplementary class notes.

Reference Texts:

a. Modern Sewer Design, American Iron and Steel Institute, 3rd Edition, 1995.
b. Concrete Pipe Handbook, American Concrete Pipe Association, 1988.
c. Gravity Sanitary Sewer Design and Construction, ASCE Manuals and Reports on Engineering Practice No. 60, 1982.
d. Design and Construction of Urban Stormwater Management Systems, ASCE Manuals and Reports on Engineering Practice No. 77, 1992.
e. Introduction to Environmental Engineering, Davis and Cornwell, 2nd Edition, McGraw-Hill, 1991.
f. Hydrology and Floodplain Analysis, Bedient and Huber, 2nd Edition, Addison-Wesley, 1992.
g. Mays, Water Resources Engineeringy, Wiley, 2001.
h. Hydraulic Design of Highways Culverts, Hydraulic Design Series No. 5 Report No. FHWA-IP-85-15, Sept. 1985.
i. US Army Corps of Engineers HEC-RAS User's Manual, Version 3.0 CPD-68, Jan. 2001.
j. US Army Corps of Engineers HEC-HMS User's Manual, Version 2.1 CPD-74A, Jan. 2001.
k. US EPA EPANET 2 User's Manual, EPA/600/R-00/057 Sept. 2000.
l. US EPA SWMM ver: 4.4 and EXTRAN Manuals
m. Young, Munson and Okiishi, A Brief Introduction to Fluid Mechanics, 2nd Ed., Wiley 2001.

Microcomputer Literacy: Competent in MS Windows in order to run software packages (HEC-RAS, EPANet, EPA SWMM), Mathcad and EXCEL spreadsheet.

Grading Scheme:

Exam 1	22.5 % (50 min.)
Exam 2	22.5 % (50 min.)
Final Exam	30.0 % (100 min.) Wed. May 7, 2003 (9:30-11:20 PM)
Oral Presentation	5.0 % (Paper topic)
Design Projects	20.0 % (Design problems, USEPA SWMM4.2/HEC-HMS, HEC-RAS, WaterCAD/EPANet Pipe network analysis)

Scoring (%):

A	96-100	B^+	86-90	C^+	71-75	D^+	57-60	F	0-49
A^-	91-95	B	81-85	C	66-70	D	53-56		
		B^-	76-80	C^-	61-65	D^-	50-52		

Makeup Exams: Makeup exams will not be given, except in cases of emergencies. In such cases, the student must contact me (248-204-2523) or the CE secretary (248-204-2545) prior to the exam date/time.

Week	Date	Topic Outline	References
1	Jan. 13	**I. STORM WATER AND SANITARY SEWERS:**	a, b, c & f
		Components of wastewater systems	a, b, c & f
		Hydraulics of flow in sewers	a, b, c & f
2	20	Hydraulic transients - minimum & maximum scour velocities	a, b, c & f
		Types of sewers; design periods	a, b, c & f
		Sewer pipe materials and factors for selection	a, b, c & f
3	27	Urban drainage hydrology	a, b, c, e & f
		Urban Hydrology:	a, b, c, e & f
		a. US EPA SWMM - RUNOFF block	b, f & g
4	Feb. 3	b. US EPA SWMM – EXTRAN block	b, f & g
		c. US EPA SWMM - EXTRAN block	b, f & g
		Floodplain analysis/HEC-RAS	b, d, f & h
5	10	Culvert Hydraulics/CulvertMaster	b, d, f & h
		Culvert design	b, d, f & h
		Exam 1	
6	17	Analysis & Design of Sanitary Sewers/SewerCAD	e & f
		Analysis of Combined Sewers	e & f
		Analysis & Design of Storm Sewers	b, e & f
7	24	StormCAD & EXRAN	b, e & f
		Sewer construction: External pressures	b, e & f
		Sewer construction: pipe laying & maintenance	b, e & f
8	Mar. 3	**II. WATER SUPPLY:**	a & f
		Components of water supply; Population forecast	a & f
		Factors influencing water use	a & f
9	17	Fluctuations in water consumption	a & f
		a. Development of surface water sources: river and lake intakes	f
		Design of intakes	f
10	24	Transport of water; pipe materials; stresses in pipes	c & f
		b. Development of groundwater source: well system	a & f
		Exam 2	a & f
11	31	Well design and construction	a & f
		Deep and shallow wells	c & f
		Water distribution system:	c & f
12	Apr. 7	a. Hydraulics of flow through pressure pipes	c & f
		b. Hydraulic transients - water hammer problems	c & f
		c. Pump analysis and selection	
13	14	d. Storage capacity of water supply reservoirs	c & f
		Design of water distribution system:	c & f
		a. Methods of pipe network analysis	c & f
14	21	b. Procedure for design of water distribution system	c & f
		c. Economical pipe sizes; pressure; accessories	c & f
		d. EPANet & WaterCAD	c & f
15	28	Computer Pipe Network Analysis - water distribution	c & f

		system	
		e. Construction and maintenance of water distribution system	c & f
		Review	b, e & f