University of Macau

Undergraduate Civil Engineering Programme

Coordinating Unit:	Department of Civil and Environmental Engineering, Faculty of Science and Technology		
Supporting Unit(s):	Nil		
Course Code:	CIVL490	Year of Study:	4
Course Title:	Wastewater Treatment Engineering		
Compulsory/Elective:	Elective		
Course Prerequisites:	None		
Prerequisite Knowledge:	None		
Duration:	One semester	Credit Units:	3
Class/Laboratory Schedule:	Three hours of lecture per week and laboratory work/project throughout semester.		
Laboratory/Software Usage:	Use of Environmental Engineering/Biotechnology Laboratory		
Course Description:	This course nourishes students with engineering knowledge of the comprehensive management for the collection and transport, and the treatment and disposal of sewage/wastewater.		
Course Objectives:	1. To focus on the wastewater transport system and the theory and design technique for the wastewater treatment process.		
Learning Outcomes (LO):	Upon completion of this course, students should be able to: 1. Learn the physical/chemical/biological characteristics of and the evaluation technique for sewage; 2. Learn the theory, engineering application, and design technique for the wastewater treatment unit process.		
Texts & References: *(* recommended textbook(s))*	1. Metcalf & Eddy, Inc. (1981)*, Wastewater Engineering: Collection and Pumping of Wastewater, McGraw-Hill. 2. Metcalf & Eddy, Inc. (1991), Wastewater Engineering: Treatment, Disposal, and Reuse, McGraw-Hill. 3. Peavy, H.S., Rowe, D.R., and Tchobanoglous, G. (1985), Environmental Engineering, McGraw-Hill.		
Student Assessment:	• Three tests (midterm and two homework assignments): 55%; • One final examination (student's oral presentation and written report on individual/group project): 45%		
Learning Outcome Assessment:	• Tests and final examination. • Course evaluation		
Pedagogical Methods:	x Lecture ☐ Guest speakers ☐ Case study ☐ Role playing x Student presentation x Project	☐ Service learning ☐ Internship ☐ Field study ☐ Company visits ☐ e-learning x Independent study	

	☐ Simulation game Others:_ ___ x Exercises and problems

Major Assessment Methods: For each Major Assessment Method below, please indicate the specific pedagogical methods involved (by putting a ✓ in the relevant box(es) on the right-hand side).	Case Study	Role Playing	Student Presentation	Individual project/paper	Group project/paper	Simulation Game	Exercises & problems	Service learning	Internship	Field Study	Company visits	Written examination	Oral examination	Others (please specify)
Class Participation/ Discussion (0%)														
Assignment(s) (20%)							✓							
Test(s) (35%)												✓		
Examination (45%)			✓	✓	✓									
Others *(please specify)* Laboratory work_____ (0 %)														
Course Web: (if any)	Course materials are available in UMMoodle (http://webcourse.umac.mo/).													

Course Content: (topic outline)

Week no.	Topics	Assignment no.	LO no.
1	**Course Overview: Introduction** **Wastewater Transport System: Collection and Pumping**	--	1
2	**Basic Applied Hydraulics; Water Usage; Wastewater Generation and Design Flux**	--	1
3	**Wastewater Flows and Measurement**	--	1
4	**Scheme for Wastewater Collection and Transport Systems; Sewer System Network**	1	1
5	**Design of Sanitary Sewers**	--	1,2
6	**Design of Storm Water Sewers**	--	1,2
7	**Sewer Appurtenances**	--	1,2
8	**Infiltration/Inflow**	--	1,2
9	**Pre-Treatment of Wastewater; Unit Treatment Processes**	--	2
10	**Primary Treatment Processes**	--	2
11	**Secondary Treatment Processes**	2	2
12	**Advanced (Tertiary) Wastewater Treatment Processes**	--	2
13	**Biological Wastewater Treatment Processes; Reuse of Effluent**	--	2
14	**Sludge Treatment and Disposal: Overview**	--	2

Percentage Content of:							
	Math	Basic Science	Engineering Science	Engineering Design and Synthesis	Complementary Studies	Computer Studies	Total
	25	20	40	15	---	---	100

Timetabled work in hours per week:						
	Lecture	Tutorial	Laboratory	Other		Total
	3	---	--- (Work for individual/group project throughout semester)	---		3

Contribution to Program Outcomes:

Program Outcomes	Contribution to POs[#] 5 ----------> 1 Significant Least				
	5	4	3	2	1
(a) apply knowledge of mathematics, science, and engineering	✓				
(b) design and conduct experiments, and analyze data					
(c) design components, systems or processes in presence of constraints	✓				
(d) Function in a multi-disciplinary team		✓			
(e) Engineering problem solving	✓				
(f) Understand professional and ethical responsibility		✓			
(g) Communicate effectively		✓			
(h) Understand the impact of engineering solutions to the society		✓			
(i) Recognize the need and have the ability for lifelong learning		✓			
(j) Have knowledge of contemporary issues	✓				
(k) Apply the skills, techniques, modern engineering tools		✓			
(l) Use the computer/IT tools relevant to the discipline		✓			
# Note 5: Significant contribution; 4: Supporting contribution; 3: Moderate contribution; 2: Marginal support; 1: Least support					

Course Instructor(s):	Prof. Hojae Shim