Environmental Engineering III (CE 443)

This course provides an insight on different techniques of wastewater management for both rural and urban settings. The major focus will be on basic design and management techniques of different wastewater management elements that are most suitable in warm and humid climates.

About Course

Course Code: CE443

Course Title: Environmental Engineering III

Credit Hours: 3.0

Prerequisite: none

Course Outcomes

1. To learn the basics theories on the different treatment/ management techniques of sanitary sewage, sludge, storm water as well as industrial wastewater as depicted in the course description.
2. To be able to select the proper sanitation option and to design appropriate low cost safe sanitation options for rural and urban localities.
3. To be able to illustrate, evaluate and design the basic wastewater transportation system.
4. To be able to explain the basic concepts of physical and microbial treatment of organic wastewater.
5. To be able to design basic wastewater treatment system.

Assessment Plan

Type	Marks
Attendance:	7
Class Test:	15
Presentation:	8
Assignment:	5
Mid Term:	25
Final:	40

Grading scale	Letter Grade
80 - 100	A+
75 - 79	A
70 - 74	A-
65 - 69	B+
60 - 64	B
55 - 59	B-
50 - 54	C+
45 - 49	C
40 - 44	D
0 - 39	F
Incomplete	I

Course Outline

Contents:

Wastewater Engineering: introduction, estimation of wastewater; wastewater collection systems; hydraulics of sewage; design, construction and managements of sanitary sewer and storm drainage system; sewer appurtenances; plumbing system

Microbiology of wastewater, wastewater characteristics; wastewater treatment and disposal; treatment and disposal of industrial effluents; sludge treatment and disposal; sanitation and health; low cost sanitation technology; septic tank system.

Sustainability of water and sanitation services; participatory development approach in water and sanitation sector; community management of water and sanitation services.

Schedule:

Module	Active Hrs	Topics	Resources / Remarks
-	1.0	Introduction to the course	BLC, pdf, video
1	3.0	Sanitation and health; Low cost sanitation technology - on-site sanitation systems for rural communities;	Ahmed & Rahman: Ch. 8, Ch. 9, pdf, video lecture, online-book
		Quiz #1	Online MCQ
2-1	3.0	Design and construction of septic tanks	Ahmed & Rahman: Ch. 9 pdf, video lecture, weblinks
2-2	1.0	Design and construction of soak wells and subsurface drain fields	Ahmed & Rahman: Ch. 9 pdf, video lecture
3-1	3.0	Plumbing system;	Pdf notes/slides, video lecture
		Assignment#1	
4-1	4.0	Estimation of wastewater; wastewater collection systems; hydraulics of sewage; design,	Ahmed & Rahman: Ch. 10 pdf, video lecture
4-2	1.0	Construction and managements of sanitary sewer and storm drainage system; sewer appurtenances;	Ahmed & Rahman: Ch. 10 pdf, video lecture
4-3	1.0	Small bore sewer system (SBS)	Ahmed & Rahman: Ch. 10.3
		Mid term Exam	
5-1	1.0	Microbiology of sewage and waste water; Wastewater characteristics;	Ahmed & Rahman: Ch. 12.2, 12.4, 12.5; Peavy 5.1, 5.2, 5.3
5-2	1.0	Biogas	Ahmed & Rahman: Ch. 12.6, Video lecture
		Quiz #2	Online MCQ
6-1	1.0	Preparatory, primary treatment methods and disposal;	Ahmed & Rahman: Ch. 12.7 Video lecture
6-2	1.0	Preparatory, primary treatment methods and disposal: Screening	Pdf note/slide, Peavy: Ch. 5.4, video lecture
6-3	1.0	Preparatory, primary treatment methods and disposal: Grit removal	Pdf note/slide, video lecture, Peavy: Ch. 5.6
6-4	1.0	Preparatory, primary treatment methods and disposal: Equalization Tank	Pdf note/slide, video lecture
		Assignment#2	
7-1	3.0	Secondary treatment methods and disposal treatment and disposal of industrial effluents: Waste stabilization Ponds	Ahmed & Rahman: Ch. 12.8
7-2	2.0	Secondary treatment methods and disposal treatment and disposal of industrial effluents: Duckweed based treatment system	Ahmed & Rahman: Ch. 12.9
		Quiz #3	Online MCQ
8	1.0	Sludge treatment and disposal;	Pdf note/slide, video lecture
		Presentation	
9	1.0	Sustainability of water and sanitation services; participatory development approach in water and sanitation sector; community management of water and sanitation services.	Ahmed & Rahman: Ch. 1~7, 11
		Final Exam**	
** Different Assessment technique might be followed in the situations when offline exam is not possible. Each module will have its Assignment.			

Reference Books

1. Water Supply & Sanitation, by - M. Feroze Ahmed and Md. Mujibur Rahman, ITN-Bangladesh, June 2007, and ISBN No. 984-31-0936-8
2. Wastewater Engineering, 3rd Ed., by - Metcalf & Eddy, TATA McGRAW-Hill Edition, 1995, and ISBN No 0-07-462247-1
3. Environmental Engineering, International Edition, by - Howard S. PEAVY, Donald R. Rowe and George Tchobanoglous, McGraw-Hill, 1985 and ISBN No 0-07-100231-6
4. Environmental Engineering, International Ed. 1998, Gerard Kiely, TATA McGraw-Hill, and ISBN No. 0-07-709127-2