Course-Plan

School of Engineering
Department of Civil Engineering
Course Code: CE324
Course Name: Environmental Engineering I

Instructor
Dr K U Ahamad
Email: kahamad@tezu.ernet.in

1. ABSTRACT

Environmental engineering is the application of science and engineering principles to improve the natural environment (air, water, and/or land resources), to provide healthy water, air, and land for human habitation (house or home) and for other organisms, and to remediate polluted sites. It involves waste water management and air pollution control, recycling, waste disposal, radiation protection, industrial hygiene, environmental sustainability, and public health issues as well as a knowledge of environmental engineering law. It also includes studies on the environmental impact of proposed construction projects.

2. OBJECTIVE

The Course will try to introduce the concept of environmental engineering that emphasizes the relationship between the principles observed in natural systems and those employed in engineered processes. The objectives of the course are:

1. Identify and understand the various water and wastewater quality parameters.
2. To understand and analyze the water supply and distribution system.
3. Identify and apply chemistry and microbiology to wastewater treatment methodology
4. Analyze and evaluate the Water Purification Processes in Natural Systems
5. To understand, plan and design the wastewater flow

3. PREREQUISITES OF THE COURSE: None

4. COURSE SYLLABUS

Introduction, Population Forecasting and Water Demand, Physical, Chemical and Biological Characteristics of Water and Wastewater, Wastewater Flow, Basic Microbiology: cells, classification and characteristics of living organisms. Metabolic Processes, Microorganisms in Natural Water Systems, Biological Oxidation of Organic Matter. Introduction to Environmental Chemistry, Stoichiometry and Kinetics of Chemical Reactions, Equilibrium Constant and Solubility Products, pH and Alkalinity. Development of Oxygen Sag Model. Flow sheets for Water and Wastewater Treatment, Sewer Design, Introduction to Solid Waste, Air Pollution and Noise Pollution.

5. COURSE OUTLINE AND TENTATIVE SCHEDULE

Module No.	Lecture Topic	Lectures
M 1	**Water and Wastewater Quantity Estimation** Population forecast Water demand for various purposes Estimation of wastewater quantity Variation in quantity of water and wastewater	**4**
M 2	**Water Supply/Distribution Systems**	**2**
M3	**Wastewater Collection Systems**	**2**
M 4	**Water Quality** Physical Characteristics Chemical Characteristics Bacteriological Characteristics Water Quality Requirements	**6**
M 5	**Introduction to Microbiology** Microbial ecology and Growth kinetics Types of microorganisms Classification and characteristics of living organisms Metabolic Processes	**6**

	Microorganisms in Natural Water Systems Biological Oxidation of Organic Matter Aerobic vs. anaerobic processes	
M 6	**Introduction to Environmental Chemistry** Stoichiometry and Kinetics of Chemical Reactions Equilibrium Constant and Solubility Products pH and Alkalinity	**4**
M7	**Water Purification Processes in Natural Systems** Physical Processes Chemical Processes Biochemical Processes Response of streams to biodegradable organic waste	**5**
M 8	**Dissolved oxygen Model**	**3**
M 9	**Introduction to Water and Wastewater Treatment** Basic Definitions Treatment Flowcharts	**2**
M10	**Sewer Design**	**3**
M 11	**Introduction to Solid Waste, Air Pollution and Noise Pollution: Definitions, Characteristics and Perspectives**	**4**
Total Number of Lectures		**40**

6. GRADING POLICY

The assessment of is based on revised guidelines on continuous evaluation with relative grading. The break-up of the scheme is as follows

Sl.	Mode of assessment	Type	Marks	Duration (min.)	Syllabus
1	Test 1	Written	25	45	*From beginning*
2	Test 2 Mid Term	Written	40	75	*From beginning*
3	Test 3	*objective type, assignment, Quiz, Seminar, Field visit etc*	25	45	*From Test-2 till Test-3*
4	Test 4 End Term	Written	60	120	*From Test-2 till Test 4 and the course instructor may include some units of the syllabus covered under Test-1 and Test-2*
Grand total			**150 marks**		

7. REFERENCE BOOK

1. S.K. Garg, Water Supply Engineering (Vol-I & II), Khanna Publishers
2. Terence J McGhee, "Water Supply and Sewerage", McGraw-Hill, Inc., 1991.
3. Mackenzie L Davis & David A Cornwell, "Introduction to Environmental Engineering", McGraw-Hill, Inc.,1991.
4. Metcalf & Eddy, "Wastewater Engineering- Treatment and Reuse," Tata McGraw Hill, 4th Edn., 2003.
5. Clair N Sawyer & Perry L McCarty, G. F. Parkin, "Chemistry for Environmental Engineers", McGraw Hill, 1994.
6. B.C. Punmia, Environmental Engineering (Vol-I & II), Laxmi Publishers.

8. PEDAGOGY

Teaching-learning methods to be used
Lecture and Discussion
Presentations
Quiz

9. COURSE LEARNING OUTCOMES

On successful completion of the course students will be able to

			High (1)	Medium (2)	Low (3)
CO 1	:	Apply knowledge of science, mathematics and engineering principles to analyze and solve problems of environmental engineering.	PO1	PO12	PO10
CO 2	:	Identify, formulate, and analyse the complex environmental engineering problems. Recognize the standards and criteria for water quality and how they relate to public health.	PO2	PO7	PO8
CO3	:	Design and conduct various experiments for water and wastewater with proper understanding and research-based knowledge of environmental engineering.	PO3	PO9	PO12
CO4	:	Select and apply the latest tools and techniques in civil engineering to model and predict the complexities in water and wastewater treatment technologies and understand its limitations.	PO5	PO11	PO12