

Branch Name:	Environment Engineering
Program Code:	ET212
Subject Title:	Environmental Chemistry & Microbiology
Subject Code:	2ET2120103T
Pre-requisite Subject:	Basics of Chemistry and Microbiology

Course Objective:

- Student should acquire knowledge related to Chemistry and Microbiology
- Basics of environmental chemistry and microbiology and its applications in environmental engineering field
- Type of microorganisms in the environment and the role of microorganisms in the cycling of nutrients in an ecosystem.
- Role microbial metabolism in a wastewater treatment plant.

Teaching and Examination Scheme:

Credit	Teaching Scheme Hours per week				Evaluation Scheme (Marks)								
					Theory (Marks)				Practical (Marks)				Total (Marks)
	L	T	P	Total	SEE		CCA		SEE		CCA		
					Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
3	3	-	-	3	24	60	16	40	-	-	-	-	100

Subject Contents			
Sr. No	Topic	Total Hours	Weightage (%)
1	Significance of Environmental Chemistry in Environmental Engineering: Units of Measurement, Stoichiometry. Basic Concepts from General Chemistry, Physical Chemistry, Organic Chemistry, Equilibrium Chemistry, Colloidal Chemistry and nuclear Chemistry as applied to the Measurement of Pollution Parameters.	8	19
2	Methods of Chemical Analysis: Analysis applicable to water, waste water and Air quality principles of analysis of gravimetric, Volumetric, Colorimetric, photoelectric, Polarographic and Gas Chromatographic methods: Applications of above analysis methods for testing of Turbidity, colour , pH, acidity , alkalinity, Hardness, Dissolved Oxygen, Biochemical Oxygen Demand , Nitrogenous compounds, Sulphorous compounds, etc..	7	17
3	Principles of Optical Methods: such as Absorption, Spectrophotometry, Flame photometry, Fluorometry etc	6	14
4	Scope and Areas of Environmental: Microbiology, Cell and its Structure, Introduction to Enzyme and Metabolic Reactions, Aerobic and anaerobic respiration, Classification.	8	19
5	Microscopy and Micrometry: Observations, Measurements and Isolation of Microorganism, Different Cultures, Media and Techniques of Staining and Enumeration of microorganism.	6	14
6	Applied Microbiology: Soil, Air, Water and Biological Processes of Wastewater Treatments, Industrial Microbiology.	7	17

Reference Books:

1. Chemistry for Environmental Engineering and Science, C.N Sawyer, P.L McCarty and G.F Parkin, 5th ed., Tata McGraw-Hill, 2003
2. Standard Methods of Testing of Water and Wastewater Use by APHA, AWWA, AND WPCF (USA) – Latest Edition
3. Physico Chemical Examination of Water Sewage and Industrial Effluents, Pragati Prakashan, Meerut, India
4. Environmental Chemistry by Manahan, S.E., Eighth Edition, CRC press, 2005
5. Elements of Environmental Chemistry by Ronbald A. Hites, Wiley, 2007
6. Fundamental of environmental Chemistry by Stanley E. Mahajan – Lewis Publishers
7. Microbiology by Plezar, Chan, Krieg - McGraw Hill
8. Environmental Microbiology by E. Gaudy and Gaudy – McGraw Hill
9. Environmental Microbiology by Maier, R.M., I.L. Pepper and C.P. Gerba, Academic Press, New York, 1999

List of Open Source Software/learning website:

- <http://nptel.ac.in/>
- <http://elearning.vtu.ac.in/>

Course Learning Outcomes (CLO): On completion of this course, the students will be able to:

CLO	Description	Bloom's Taxonomy Level
CLO1	Basics of environmental chemistry and microbiology and its applications in environmental engineering field	L-3 and L-4
CLO2	Type of microorganisms in the environment and the role of microorganisms in the cycling of nutrients in an ecosystem.	L-2
CLO3	Role microbial metabolism in a wastewater treatment plant.	L-3
CLO4	Role of microorganisms in contaminated water and the diseases caused.	L-3

L1- Remember, L2- Understand, L3- Apply, L4- Analyze, L5- Evaluate, L6- Create

Mapping of CLOs with POs & PSOs

	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
Course Learning Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CLO1	M	M	M			M	M							M	M
CLO2	M	M	M	M		M	M							M	M
CLO3	M	M	M			M	M							M	M
CLO4	M	M	M	M			M								

H: High, M: Medium, L: Low