GUJARAT TECHNOLOGICAL UNIVERSITY

Environmental Engineering (17)

ENVIRONMENTAL MONITORING
SUBJECT CODE: 2721712
M.E. 2nd SEMESTER

Type of course: Applied Science

Prerequisite: Basic knowledge of various pollutions, pollutants, and sources of pollutants.

Rationale: Different methods and models used for Environmental Monitoring

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks						Total Marks
L	T/P	P	C	Theory Marks		Tutorial/ Practical Marks				
				ESE (E)	PA (M)	ESE (V)		PA (I)		
						ESE	OEP	PA	RP	
3	2	2	5	70	30	20	10	10	10	150

L- Lectures; T- Tutorial/Teacher Guided Student Activity; P- Practical; C- Credit; ESE- End Semester Examination; PA- Progressive Assessment; OEP-Open Ended problem; AL-Active learning;

Learning Objectives:

- To educate the students on the various instrumental methods of monitoring the air, water and soil

Content:

Sr. No.	Content	Total Hrs	% Weightage
1	**Environmental Monitoring:** Purpose of monitoring, Scales of observation, Environmental characteristics, Representative units, Sampling Location, Types of environmental monitoring, Sampling plan, Analytical data quality requirements: Precision and Accuracy, Detection limits, Reporting data	4	10
2	**Water Quality Monitoring** Sampling techniques, Preservation of water sample, Physical Properties of water & its monitoring: Temperature, Conductivity, Turbidity etc., Chemical Properties of water & its monitoring. 1.Electrometric method: pH 2.Colorimetric method 3.Spectroscopy method, Standardization & calibration of monitoring instruments.	6	15
3	**Air Quality Monitoring** Type of Air Quality monitoring - Ambient Air Quality monitoring , Source Air Quality monitoring, Ambient Air Quality Monitoring- Selection of monitoring sites , Sampling time, Frequency & mode of sampling, Source Air Quality Monitoring – Type of Monitoring procedure.	6	15
4	**Environmental Microbial Properties & Processes**	6	15

	Benefits of environmental microbes, Microorganism in soil, Sampling procedure for microbial characterization, Methods for characterizing microorganisms & microbial properties in water & soil.		
5	**Map, GIS & Remote Sensing in Environmental Monitoring** Maps:- Principals of mapping, Location and Land – Partitioning systems, topographic maps, Global positioning systems, Geographic Information System(GIS)**:-** GIS and Geographic Information Systems Data, Remote Sensing: Physical Principles of Remote Sensing, optical properties of earth surface materials, remote sensing at landscape scale, applications of remote sensing in environmental health & toxicology	6	15
6	**Physical, Chemical and Microbial contaminants** Physical contaminants – Naturally occurring particulates, Human made particulates, Mechanisms and control of particulate, Chemical contaminant: - Type of contaminants, Sources of Contaminants, contaminant transport and fate, Microbial contaminants:- Environmentally transmitted pathogens, concept of indicator organisms, sample processing and storage.	6	15
7	**Surface Water and Ground Water Monitoring** Surface Water Monitoring:-Water Quality parameters, sampling the waters, Water sampling equipments, Ground Water Monitoring: - Objectives, Location of monitor wells, well construction, Design and Execution of ground water sampling programs.	6	15

Reference Books:

1. Environmental monitoring and characterization by Janick F Artiola, Ian L Pepper, Mark Brusseau
2. Environmental Chemistry by Sawyer & McCarty

Course Outcome: After successful completion of the course the students shall be able to

- impart knowledge regarding sampling procedures for water and wastewater and air pollution monitoring
- to impart knowledge regarding concept and application of GIS in environmental engineering

List of Experiments:

Term work will comprise of assignments on the questions related to environmental characteristics, sampling locations, types of environmental monitoring, detection limits, numerical on statistics in environmental monitoring, water quality monitoring, Air quality monitoring, map, GIS, and Remote Sensing in Environmental Monitoring, physical, chemical and microbial contaminants, surface water monitoring and ground water monitoring.

Design based Problems (DP)/Open Ended Problem: --
Practical G I S in Environmental Engineering

Major Equipments: GPS and various GIS softwares should be available

List of Open Source Software/learning website:

- http://elearning.vtu.ac.in/
- www.nptel.iitm.ac.in/courses/