

GUJARAT TECHNOLOGICAL UNIVERSITY

BRANCH NAME: Environmental Engineering (13), Environmental Science & Engineering (37)

SUBJECT NAME: Environmental Monitoring & Statistics

SUBJECT CODE: 2171305

B.E. 7TH SEMESTER

Type of course: Analytical

Prerequisite: Knowledge of subjects Environmental Sciences I and II.

Rationale: Analysis of water, wastewater and air samples is the first step towards designing treatment technologies for water, waste water and air pollution control. Much information can be obtained by statistical analysis of the data on environmental parameters. This subject aims at equipping the student with methods of monitoring and managing the data generated.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks						Total Marks
L	T	P		C	Theory Marks			Practical Marks		
			ESE		PA (M)		PA (V)		PA	
			(E)		PA	ALA	ESE	OEP		(I)
4	2	0	6	70	20	10	30	0	20	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;

Content:

Sr. No.	Content	Total Hrs	% Weightage
1	<p>Environmental Monitoring:</p> <p>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</p>	08	14
2	<p>Water Quality Monitoring</p> <p>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.</p>	10	18

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.	10	18
4	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	10	18
5	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	10	18
6	Statistics in Environmental Monitoring Samples & Population : Random Sampling, Sample support, Frequency Distribution & Probability Density Function : Mean , Variance , Standard Deviation , Gaussian Variable, Sample size & Confidence interval, Co variance & Correlation, Liner Regression, Interpolation & Spatial Distribution	08	14

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks				
R Level	U Level	A Level	N Level	E Level
20	25	30	15	10

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate and above Levels (Revised Bloom's Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

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 learning the course the students should be able to:

1. Identify sampling locations for Environmental monitoring.
2. Carry out Air quality and Water quality Monitoring.
3. Carry out Micro biological analysis .

List of Experiments:

Term work will comprise of assignments on the questions related to

- (1) Environmental monitoring
- (2) Sampling locations :Air and water
- (3) Numericals on statistics in environmental monitoring,
- (4) Water quality monitoring,
- (5) Air quality monitoring,
- (6) Physical, chemical and microbial contaminants,
- (7) Surface water monitoring and
- (8) Ground water monitoring.

ACTIVE LEARNING ASSIGNMENTS: Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered. The power-point slides should be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty, Department and College on the first slide. The best three works should submit to GTU.