



GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Engineering

Level: Post Graduate

Branch: Environmental Management

Course/Subject Code: ME01018041

Course / Subject Name: Environmental Monitoring and Statistical Analysis

w.e.f. Academic Year:	2024-25
Semester:	1 st Semester
Category of the Course:	PEC

Prerequisite:	Knowledge of subjects Environmental chemistry and Air Pollution.
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.

Course Outcome:

After Completion of the Course, Student will able to:

No.	Course Outcomes
01	Prepare Environmental Monitoring Plan and identify sampling locations
02	Carry out Surface and Ground Water quality monitoring
03	Carry out Air Quality Sampling
04	Carry out statistical analysis of Environmental Monitoring data

Teaching and Examination Scheme:

Teaching Scheme(in Hours)			Total Credits L+T+(PR/2)	Assessment Pattern and Marks				Total Marks
L	T	PR		C	Theory		Tutorial/Practical	
			ESE (E)		PA/ CA (M)	PA/CA(I)	ESE (V)	
3	0	2	4	70	30	20	30	150



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Course Content:

Unit No.	Content	No. of Hours	% of 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	07	14
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.	08	18
3	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	08	18
4	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	08	18
5	Air Quality Monitoring :	08	18



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	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	Statistical analysis: Samples & Population : Random Sampling, Sample support, Frequency Distribution & Probability Density Function : Mean , Variance , Standard Deviation , Gaussian Variable, Sample size & Confidence interval, Covariance & Correlation, Liner Regression, Interpolation & Spatial Distribution	06	14
	Total	45	100

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
10	25	30	25	10	0

Where R:Remember; U:Understanding; A:Application, N:Analyze and E:Evaluate C:Create(as per Revised Bloom's Taxonomy)

References/Suggested Learning Resources:

(a) **Books:**

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

(b) **Open sources of software and website:** MOEF&CC, NPTEL

Suggested Course Practical List:

- (1) Prepare Environmental monitoring plan for surface water sampling.
- (2) Collection of surface water samples and carryout Water quality monitoring
- (3) Collection of ground water samples and its analysis
- (4) Identification of Sampling locations for Air quality monitoring.



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- (5) To carry out Air quality monitoring,
- (6) Numericals on statistics in environmental monitoring,

List of Laboratory/Learning Resources Required:

Hot air oven, BOD incubator, COD digester, DO meter, pH meter, Distillation apparatus, Respirable dust sampler and glass wares.
