GUJARAT TECHNOLOGICAL UNIVERSITY

ENVIRONMENTAL MANAGEMENT (18)

ENVIRONMENTAL MONITORING AND STATISTICS

SUBJECT CODE: 2721805

SEMESTER: II

Type of course: Applied Science

Prerequisite: Environmental Sciences and analytical laboratory techniques.

Rationale: Knowledge of monitoring and sampling techniques is necessary for Env Engineers practicing in field.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks						Total Marks
L	T	P	C	Theory Marks		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

Content:

Sr. No.	COURSE 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	9.52
2	**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	6	14.3
3	**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.	8	19.04
4	**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.	8	19.04
5	**Environmental Microbial Properties & Processes** Benefits of environmental microbes, Microorganism in soil,	6	14.3

	Sampling procedure for microbial characterization, Methods for characterizing microorganisms & microbial properties in water & soil.		
6	**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	4	9.52
7	**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.	4	9.52
8	**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.	4	9.52

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 student shall be able to:

1. Carry out the sampling of water and waste water samples as per the standard procedure.
2. Carry out and monitor air sampling and analysis procedure.
3. Apply knowledge of statistical methods to the data collected.
4. Carryout microbial analysis of water, soil etc.
5. Make use of GIS techniques in environmental monitoring, understand and interpret the maps.
6. Carryout surface and ground water monitoring.

Term Work:

Term work will comprise of assignments on the questions related to environmental characteristics, sampling locations, types of environmental monitoring, detection limits, numericals 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.

List of Experiments:

Open Ended Problems:

Review Presentation (RP): The concerned faculty member shall provide the list of peer reviewed Journals and Tier-I and Tier-II Conferences relating to the subject (or relating to the area of thesis for seminar) to the students in the beginning of the semester. The same list will be uploaded on GTU website during the first two weeks of the start of the semester. Every student or a group of students shall critically study 2 papers, integrate the details and make presentation in the last two weeks of the semester. The GTU marks entry portal will allow entry of marks only after uploading of the best 3 presentations. A unique id number will be generated only after uploading the presentations. Thereafter the entry of marks will be allowed. The best 3 presentations of each college will be uploaded on GTU website.