

GUJARAT TECHNOLOGICAL UNIVERSITY

ENVIRONMENTAL MANAGEMENT (18)

ENVIRONMENTAL MODELING

SUBJECT CODE: 2721801

SEMESTER: II

Type of course: Applied Mathematics

Prerequisite: Fundamentals of Environmental Systems

Rationale: To understand the dynamics of environmental system and control the parameters causing deterioration of environment system

Teaching and Examination Scheme:

Teaching Scheme			Credits C	Examination Marks						Total Marks
L	T	P		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	Introduction: Scope of Environmental Modeling, Mass balances, Basic concepts of transport phenomena, Chemical reaction kinetics, equilibrium, chemical modeling.	6	14.3
2	Environmental Modeling: Eutrophication of lakes, stoichiometry, phosphorus as a limiting nutrient, mass balance on total phosphorus in lakes ,dynamic ecosystem, Models for Eutrophication Assessments	8	19.05
3	Conventional pollutants in rivers: Introduction, mass balance equation, plugs flow systems, Streeter-Phelps equation, modifications to Streeter Phelps equation, Dissolved oxygen in rivers & estuaries.	10	23.8
4	Ground water contamination: Introduction, Darcy's law, flow equations, Contaminant solute transport equation, Bio transformations.	8	19.05
5	Air Quality Modeling: Types of modeling techniques, Modeling for nonreactive pollutants, single source, multi source and area source models, fixed box models, diffusion models, dispersion models, receptor and source oriented models	10	23.8
6	Applications: Software based applications- Air quality and water quality modeling	-	

Reference Books:

1. Environmental modelling: Fate & transport of pollutants in Water, Air and Soil by Jerald L Schnoor.
2. Environmental Modelling by John Wainwright & Mark Mulligan
3. Modelling the Eutrophication Process by M W Lorenzen

Course Outcome:

After learning the course the students should be able to:

1. Understand the fate and transport of pollutant which is discharge into environmental sinks like river, lake and atmosphere.
2. Predict the ground water contamination.

List of Experiments: Term work will comprise of assignment and exercises based on mass balances, Basic concepts of transport phenomena, chemical modeling, Eutrophication of lakes, Conventional pollutants in rivers, ground water contamination, climate and climate system modeling.

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.