

# GUJARAT TECHNOLOGICAL UNIVERSITY

## ENVIRONMENTAL ENGINEERING (13)

ECOLOGY & REMOTE SENSING

SUBJECT CODE:2141305

B.E. 4th SEMESTER

**Type of course:** Basic sciences

**Prerequisite:** None

**Rationale:** To impart the knowledge of applications of Remote sensing in Environmental Engg field

**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)		
				PA	ALA	ESE	OEP			
3	2	0	5	70	20	10	30	0	20	150

**Content:**

Sr. No.	Content	Total Hrs	% Weightage
<b>A</b>	<b>ECOLOGY</b>		
1	Limiting factors and Tolerance Levels : Shalfords and Liebigs laws, Climagraphs, Tolerance levels and pollution, Indicator organisms, Alien organisms.	06	13
2	Structure and Dynamics of Single Spices Population and Population, Growth: Population Sizes and estimates, Spatial distribution, Population and Patterns of population growth: Malthusian growth and Logistic growth.	04	10
3	Social Behavior and Population Dynamics: Territorialism and Dominance Hierarchies, Social behavior in population regulation.	04	10
4	Inter specific population like: Communalism, Mutualism, Predication, Parasitism, Competition, Amensalism and antibiosis.	06	13
<b>B</b>	<b>REMOTE SENSING</b>		
1	Concept of remote sensing Definition of remote sensing, remote sensing process, source of energy, energy interaction in atmosphere , energy interaction with earth surface, interpretation and analysis, analog (visual) image interpretation, digital image processing , process of remote sensing data analysis.	02	04
2	Photograph and image Types of film, difference between photograph and image,scale of the photograph, stereoscopic 3D VIEWING .	04	10

3	Ground truth data and GPS ( Global positioning system) Introduction, requirements of ground truth data, instruments for ground truthing, parameters of ground truthing, factors of spectral measurement, working principle of GPS.	04	10
4	Visual image interpretation Information extraction by human and computer, its comparison, remote sensing data products, image interpretation, elements of visual interpretation, thermal image interpretation.	04	10
5	Application of remote sensing Land cover and land use , agriculture application, forestry application, hydrology, oceans and coastal monitoring, environmental impact assessment	04	10
6	GIS Definition of GIS, key components of GIS, function of GIS, advantages of GIS	04	10

**Suggested Specification table with Marks (Theory):**

Distribution of Theory Marks				
R Level	U Level	A Level	N Level	E Level
<b>20</b>	<b>20</b>	<b>10</b>	<b>10</b>	<b>10</b>

**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. Ecology by Charles Southwick
2. Remote sensing and GIS by B Bhatia, Oxford University Press.

**Course Outcome:**

After learning the course the students should be able to:

1. Correlate the complexities of ecology and its relevance / importance in maintain biodiversity of the planet.
2. Make the differences in the structure and functions of different types of ecosystem.
3. Use remote sensing tools for interpretation of data and monitoring for Solid, Water, Air , Land, Crops etc.
4. Utilize GIS and GPS in Environmental Engineering field

**List of Tutorials:**

1. Study of photograph and image
2. Stereoscopic viewing

3. Application of remote sensing case study
4. Application of GPS
5. Assignment on GIS
6. Identification of species of flora and fauna.

**Major Equipment:**

1. Stereoscope

**Active Learning Assignments (ALA) :** Preparation of power-point slides: which may include videos, animations, pictures, graphics for better understanding of theory and practical work. The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus can 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 faculty and the department.