

Course Type	Course Code	Name of Course	L	T	P	Credit
DE	NGPD508	Satellite Image Processing and Geographic Information System	3	0	0	3

Course Objective

- To provide exposure to students in gaining knowledge on concepts and applications leading to modeling of earth resources management using Remote Sensing.
- To acquire skills in storing, managing digital data for planning and development.
- To acquire skills in advance techniques such as hyper spectral, thermal scanning for mapping, modeling and monitoring.

Learning Outcomes

- Fully equipped with concepts, methodologies and applications of Remote Sensing Technology. Prepare the students for National and Global Employability.
- Acquire skills in handling instruments, tools, techniques and modelling. It empowers the students with confidence and leadership qualities.

Sl. No	Description of Lectures	Lecture Hrs.	Outcome
1.	Structure of Remote Sensing Images, Data format and Type of Data Product. Characteristics of digital image, pixel, digital number, resolution, Bands/layers.	7	Understanding raw satellite data
2.	Image Processing technique as applied to Satellite image data restoration, Pre-processing, Atmospheric corrections, image registration/ geo-referencing/ geometric correction, re-sampling, projection system, image-reduction /magnification, radiometric calibration, estimation of thermal image using Plank's law, contrast enhancement (linear and non-linear), histogram equalization, rationing, filtering in spatial and frequency domain and edge enhancement, convolution filtering : low-pass, high-pass filtering: mean, mode, zero-sum kernel: Pewitt, Sobel, Laplacian, user defined kernels etc.	12	Corrections applied to satellite image data and image enhancement
3.	Special transformation, principle component analysis and vegetation indices. Principle of thematic information extraction and image classification processes, supervised and unsupervised classification, principle of change detection, and image differencing. Hyper-spectral image analysis, Image Fusion.	10	Satellite digital image analysis

4.	Fundamentals of Geographic Information System (GIS): GIS-definition, terminology, functional elements of GIS, map projection, data structure, composition of raster and vector data model. Data acquisition, data input, data processing, data management system, product and report generation.	7	Detail concept of GIS
5.	Interpretation and application of remote sensing and GIS in mineral, ground water, hydrocarbon and environmental management. Key elements of visual interpretation. Fundamental of geological interpretation of satellite imagery based on terrain and image elements. Identification and mapping of rock types including mapping of faults/folds and joints and other curvilinear and circular features as applicable for mineral and oil exploration. Photo linear, curvilinear and circular features and their significance, geological guides for mineral and oil exploration including surface alteration. Remote sensing applications in water resources and environmental impact assessment studies.	6	Different applications of RS and GIS
	Total Classes	42	

Text Books

1. B. Bhatta., 2021, 3rd Edition, Remote Sensing and GIS, OUP India.
2. Lillesand TM and Kiefer R W, 2011, 6th Edition, Remote Sensing and Image Interpretation, John Wiley Publication

Reference Books

1. Seigel, B S and Gillespie, 1980, Alan, Remote Sensing in Geology, John Wiley Publication.
2. George Joseph, 2018, 3rd Edition, Fundamentals of Remote Sensing, The Orient Blackswan.
3. M. Anji Reddy, 2012, 4th Edition, Remote Sensing and Geographical Information systems, BS Publication.
4. Rafael C. Gonzalez, Richard E. Woods and Steven L. Eddins, 2006, 1st Edition, Digital Image Processing Using Matlab, Dorling Kindersley Pvt Ltd.
5. Floyd F. Sabins, Remote sensing: principles and interpretation
6. Jensen, J.R. 2007. *Remote Sensing of the Environment - an Earth Resource Perspective*.
7. Rao, D.P. Remote Sensing for Earth Resources, AEG Publication