

Approval: 8th Senate Meeting

Course Name : Remote Sensing

Course Number : CE 501

Credits : 2-0-2-3

Students intended for: UG 4th year/PG

Distribution : Elective

Semester : Odd/Even

Pre-requisite : This course is intended for B. Tech 4th year onwards students who are interested in gaining the knowledge in the field of remote sensing.

Course Preamble: Now days remote-sensing techniques are extensively used in any site selection/ construction of projects. It has become absolutely necessary in the prediction and planning of engineering projects (forest roads, dams, etc.) and various other projects pertaining to exploration and exploitation themes. The application of these techniques is enhanced with the free availability of various satellite data, including elevation, gravity, precipitation data and so on multi spatial, spectral and temporal resolutions covering almost every corner of the globe. Hence this course is designed at an introductory level where a student gets to know and understand the process of satellite data collection, its processing and finally interpretation. Though the time frame is very limited, hence focus is being given mainly on Satellite Image Processing and the application on software. In industries, ERDAS Imagine is extensively used; hence students will be given hands-on practice on this software which is compulsory for understanding the theoretical components. That's why this course is designed for 2-0-1 format where one lab of minimum 2 hours is required to practice the things learnt in theoretical class.

Course Objective: Remote sensing is an emerging field which gives an understanding about the satellite data and its interpretation. This course will give an introduction about these systems and various techniques used in the interpretation. It will give knowledge and hands-on practice on ERDAS imagine image processing software extensively used in the field of digital remote sensing.

Course Modules:

Sl. No.	Contents	Lectures
1	<ul style="list-style-type: none">➤ Introduction, principles and types of remote sensing Energy source and radiation principle.➤ Interaction of EMR (electromagnetic radiation) with atmosphere-absorption, scattering, Atmospheric windows, Interaction of EMR with Earth Surface-Spectral reflectance curves	5
2	<ul style="list-style-type: none">➤ Platforms and Sensors: Geostationary and sun-synchronous orbits, Active and passive sensors, Spectral, spatial, temporal and radiometric resolutions.➤ Salient features of LANDSAT, SPOT, IRS satellites.	5

3	<ul style="list-style-type: none"> ➤ Elements of Image interpretation, Visual analysis of data in VNIR (Visible and Infra-red). ➤ Image formats, data histogram and image info. 	4
4	<ul style="list-style-type: none"> ➤ Digital Image processing: atmospheric, radiometric & geometric corrections. ➤ Image enhancement, contrast stretching-linear and non-linear, filtering, image ratios or indices, image transformations- PCA (principal component analysis) 	6
5	<ul style="list-style-type: none"> ➤ Classification: Supervised and Unsupervised Classification ➤ Accuracy assessment and Kappa statistics 	5
6	<ul style="list-style-type: none"> ➤ Application of digital image processing to various problems. 	3
TOTAL		28

Texts/ Reference Books:

1. J. R. Jensen, *Remote Sensing of the Environment an Earth Resource Perspective*, Pearson Education. Delhi, 2003.
2. T.M. Lillesand and R.W. Kiefer, *Remote Sensing and Image Interpretation*, John Wiley & Sons, New York, 6th Ed., 1994.
3. J.B. Campbell, *Introduction to Remote Sensing*, Taylor & Francis, London, 1996.
4. F.F. Sabins, *Remote Sensing: Principles and Interpretation*, W.H. Freeman and Company, New York, 1997.
5. J. R. Jensen, *Introductory Digital Image Processing*, Prentice Hall, 3rd Ed., 2006.
6. G. Joseph, *Fundamentals of Remote Sensing*, Universities Press, New Delhi, 2003.
7. A.K. Keshari, *Satellite Remote Sensing*, Wiley, 2015.