FACULTY OF ENGINEERING & TECHNOLOGY

DEPARTMENT OF

CIVIL ENGINEERING

Marwadi University
Marwadi Chandarana Group

Remote Sensing

01CI0616

Objective of the Course:

- Disseminate basic concepts and applications of Electromagnetic Spectrum in Remote Sensing, Energy Balance and Data acquisition platforms, sensors and their characteristics
- Introduce students to digital image processing tools and techniques.
- To acquire skills in advance techniques such as microwave remote sensing mapping and monitoring.
- Apply the knowledge of remote sensing in various thematic studies

Credit Earned: 03

Student's learning outcomes:

After successful completion of the course, it is expected that students will be able to,

1. Explain remote sensing principles and analyze energy interactions.
2. Apply digital image processing and evaluate correction tests.
3. Analyze remote sensing techniques and implement them in various applications.
4. Design and execute remote sensing projects using combined techniques and assess their effectiveness in real-world problems.

Teaching and Examination Scheme

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial/ Practical Marks		Total Marks
Theory	Tutorial	Practical		ESE (E)	IA (M)	CSE (I)	Viva (V)	Term Work (TW)	
03	00	00	03	50	30	20	25	25	150

Detailed Syllabus

Sr. No.	Title of the unit	Number of Hours
1	**Fundamental of Remote Sensing**	**15**
	1.1 **Introduction:** Remote sensing history, Development, Definition, Concept & Principle.	03
	1.2 **Basic Concepts:** Active and Passive Sensor, Different types of platforms, Electro Magnetic Spectrum, Electromagnetic radiation and Its characteristics and Atmospheric Window.	06
	1.3 **Remote Sensing Art or Science Process:** Energy: Sources of energy, Energy radiation principle. Energy interaction in the atmosphere, Energy interactions with earth surface feature, Recording energy by sensor transmission, Reception processing, Interpretation & Analysis. Remote Sensing Data Products	06
2	**Digital Image Processing & Interpretation**	**15**
	2.1 **Basic Concept:** Introduction of Digital Image and Imaging Sensors, Data formats of Digital Image, Display of Digital Image, Digital Image Processing components and functions	04
	2.2 **Digital Image Processing -Image Restoration:** Radiometric correctios and Random noise correction, Atmospheric correction, Geometric errors and corrections, Distortion evaluated from tracking data, distortion evaluated from ground control Image correction	04
	2.3 **Digital Image Processing -Image Enhancement:** Image Reduction & Magnification, colour compositing, Image filtering, Contrast Enhancement	03
	2.4 **Digital Image Processing -Image Transformation:** Image Arithmetic Transformation, Principal Component Transformation, Tasselled Cap Transformation, Fourier transformation, Image Fusion.	03
	2.5 **Digital Image Processing -Image Classification:** Supervised and Unsupervised classification of Image	01
3	**Microwave Remote Sensing & Application of Remote sensing**	**12**
	3.1 Introduction, Passive Microwave remote sensing, Active Microwave Remote sensing, Radar Imaging, Airborne Versus Space borne Radar.	06
	3.2 **Application of Remote Sensing:** Introduction, Land cover and Land Use, Agriculture, Forestrt, Geology, Urban application, Hydrology, Mapping, Oceans and Coastal Monitoring, Monitoring of Atmospheric Constituents	06
	Total	**42**

Suggested Theory Distribution

The suggested theory distribution as per Bloom's taxonomy is as per follows. This distribution serves as guidelines for teachers and students to achieve an effective teaching-learning process

Distribution of Theory for course delivery and evaluation					
Remember	Understand	Apply	Analyze	Evaluate	Create
5%	10%	35%	30%	15%	5%

Instructional Method and Pedagogy:

1. At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.
2. Lectures will be taken in class room with the use of multi-media presentations, white board– mix of both.
3. Attendance is compulsory in lectures and laboratory which carries a 5% component of the overall evaluation.
4. Minimum two internal exams will be conducted and average of two will be considered as a part of 15% overall evaluation
5. Assignments based on course content will be given to the students at the end of each unit/topic and will be evaluated at regular interval. It carries a weightage of 5%.
6. Surprise tests/Quizzes will be conducted which carries 5% component of the overall evaluation.

Recommended Study Material

1. Joseph,George and Jeganathan, C. (2017). "Fundamentals of Remote Sensing", 3rd Edition, Universities press (India) Pvt. Ltd., Hyderabad.
2. Bhatta B., Remote Sensing and GIS, Oxford University Press, New Delhi, 2008.
3. A.M. Chandra and S.K. Ghosh,Remote Sensing and Geographical information System, Narosa Publishing House, New Delhi, 2006.
4. Lilliesand T.M. and Kiefer R.W., Remote Sensing and image Interpretation, John Wiley and Sons, New York, 2004.
5. Jensen, J.R. (1996). Introductory Digital Image Processing A remote sensing perspective. Prentice Hall Seies in GIS , USA.
6. Manual of Remote Sensing Vol. I&II, 2nd Edition, American Society of Photogrammetry.
7. Floyd, F. Sabins, Jr: (1978) Remote Sensing Principles and Interpretation, Freeman and Co.,San Franscisco.