

VALUE ADDED COURSES BY Dr. Binita Pathak

COURSE NAME: Physics of Remote sensing

Course Objectives:

The objectives of the course are to make students understand

- (i) the basics of remote sensing
- (ii) types and platforms of remote sensing and
- (iii) how satellites perform remote sensing observations
- (iv) the types of satellites and their applications

Student outcome:

The students are expected to be able to

- (i) familiarize themselves with the remote sensing techniques
- (ii) familiarize themselves with Remote sensing data product, sources, softwares
- (iii) analyze the remote sensing data and understand applications
- (iv) know about various earth observing satellite systems

Unit I

Introduction to remote sensing: Black body radiation, laws of radiation, Atmospheric windows, Interaction of EMR with atmosphere and earth's surface, EMR interaction with objects, Type of spectra and physics of spectral signature Active and passive remote sensing, Optical and Microwave remote sensing, Platform for remote sensing- ground, air borne and space borne., LIDAR, RADAR based remote sensing, Atmospheric remote sensing. , Concept of resolution – spatial, spectral, temporal, radiometric., Hyperspectral remote sensing. Basic principles, types, steps and elements of image interpretation, Remote sensing data product and sources. Software for remote sensing data analysis

Unit II

Satellite orbits: Launch vehicle, Satellite and payloads, Satellite Orbits, Satellites and their characteristics – Polar, geo-stationary and sun-synchronous satellites. Earth Observation Satellites -LANDSAT, SPOT, IRS, CARTOSAT, OCEANSAT IKONOS satellite series, Megha tropiques, MODIS etc., Meteorological satellites and communication satellite –

INSAT, METEOSAT, TRMM, GPM, RISAT, NOAA, GOES, IRNSS, GSAT, GPS, other GNSS. Sensors – types and their characteristics. Spectral bands for different sensors., Imaging and Non-imaging sensors, Sensors for remote sensing-LISS, PAN, WiFS, OCM, SAR, Multispectral, Hyper spectral.

Suggested Readings

1. Campbell, J.B. (1987) Introduction to Remote Sensing. The Guilford Press, New York.
2. Lillesand, T.M. and Kiefer, R.W. (1994) Remote Sensing and Image Interpretation. John Wiley and Sons Inc., New York.
3. Jensen, John R. (1986) Introductory Digital Image Processing. Prentice-Hall, New Jersey.
4. Russ, John C. (1995) The Image Processing Handbook. 2nd edition. CRC Press, Boca Raton.
5. Link: https://www.nrsc.gov.in/Knowledge_EBooks?language_content_entity=en
6. Link: https://naturalresources.canada.ca/sites/www.nrcan.gc.ca/files/earthsciences/pdf/resource/tutor/fundam/pdf/fundamentals_e.pdf