



REMOTE SENSING AND DIGITAL IMAGE PROCESSING OF SATELLITE DATA

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IIT Roorkee

TYPE OF COURSE : Rerun | Elective | UG/PG

COURSE DURATION : 8 weeks (26 Aug'19 - 18 Oct'19)

EXAM DATE : 16 Nov 2019

INTENDED AUDIENCE : B.E/B.Tech,M.Sc,PhD,

PRE-REQUISITES : Current students of engineering students and current post graduate science students

INDUSTRIES APPLICABLE TO : Remote Sensing / Geoinformatics companies, e.g NIIT, ESRI India, Leica Geoinformatics, MapmyIndia etc.

COURSE OUTLINE :

The proposed course provides basic understanding about satellite based Remote Sensing and Digital Image Processing technologies. Presently, remote sensing datasets available from various earth orbiting satellites are being used extensively in various domains including in civil engineering, water resources, earth sciences, transportation engineering, navigation etc. Google Earth has further made access to high spatial resolution remote sensing data available to non-experts with great ease. Knowledge of Digital Image Processing of satellite data allows to process raw satellite images for various applications.

ABOUT INSTRUCTOR :

Dr. Arun K. Saraf is Ph. D. (Remote Sensing) from University of Dundee, United Kingdom. Presently he is working as Professor in the Department of Earth Sciences, Indian Institute of Technology, Roorkee, and teaches courses on Remote Sensing, Digital Image Processing, Geographic Information Systems (GIS), Advanced GIS, Geomorphology, Geohydrology etc. to under- and post-graduate students of Geological Technology and Applied Geology. He was also Head of Department of Earth Sciences between Jan. 2012 – Feb. 2015. He was first in the country to introduce GIS course to post-graduate students in the year 1990. In 1986, he was awarded "National Fellowship to Study Abroad" by Govt. of India for his doctoral degree.

COURSE PLAN :

- Week 01** : What is Geographic Information Systems?, Different components of GIS, Different types of vector data, Raster data models and their types, TIN data model.
- Week 02** : Advantages and disadvantages associated with vector, raster and TIN, Non-spatial data (attributes) and their type, Raster data compression techniques, Different raster data file formats, Spatial database systems and their types.
- Week 03** : Pre-processing of spatial datasets, Different map projections, Spatial interpolation techniques, Different types of resolutions, Digital Elevation Model (DEM).
- Week 04** : Quality assessment of freely available DEMs, GIS analysis-1, GIS analysis-2 and applications, Errors in GIS, Key elements of maps.
- Week 05** : What is a remote sensing image and how it is represented?, Different techniques of Image acquisition, Why is digital image processing important?, Image characteristics and different resolutions in Remote Sensing, EM spectrum, solar reflection and thermal emission remote sensing.
- Week 06** : Colour representations and transforms, Image Histograms and statistics, Geometric transformations /Georeferencing Technique, Image enhancement techniques –I & II.
- Week 07** : Multispectral transforms: scatter plot, principal component analysis and decorrelation stretch, Spatial filtering techniques, Frequency domain - Fourier transformation, Basic Image Compression techniques and different image file formats, Image classification techniques.
- Week 08** : Principles of image interpretation, SAR Interferometry (InSAR) Technique, Image merging and mosaicking techniques, Applications of Image Analysis, Limitations and future of Digital Image Processing Technique.