

MGS 455: REMOTE SENSING AND PHOTOGRAMMETRY

Skills, employability and entrepreneurship: These are advanced as well applied subjects in terms of studying the entire earth by using the computer and allied systems by making use of huge data collected from artificial satellites launched to the space and aircrafts. Data collected by the satellites are useful to monitor the entire world at different spatio-temporal scales. There is good scope of this subject in terms of employability in different organizations and MNCs. Students can start their entrepreneurship.

REMOTE SENSING

Unit 1	Fundamentals of Remote Sensing: History, basic concepts: Data acquisition and data analysis. Electromagnetic spectrum. Energy sources and radiation principles, energy interactions in the atmosphere, energy interactions with the earth surface features, spectral reflectance curves, spectral reflectance of various natural earth surface features like vegetation, soil and water.	5 hrs
Unit 2	Earth Resource Satellites: Introduction, early history of space imaging, POES and GOES series of satellites, platforms (ground, aerial and space) and sensors. Important earth observation satellites like Landsat, SPOT, NOAA, SEASAT, IKONOS, Quick bird, Orb view etc. Spatial, spectral, temporal and radiometric resolutions. Indian Remote sensing programs: IRS satellite missions and their capabilities, INSAT series. Advantages of satellite remote sensing.	5 hrs
Unit 3	Principles of Thermal and Microwave Remote Sensing: Introduction, Black body radiation, Temperature Radiations from the earth's surface, Applications of thermal remote sensing. Basic concepts of microwave remote sensing, Real Aperture Radars and Synthetic Aperture Radars, Microwave sensors, Interferometry. Applications of Microwave Remote Sensing. Visual and digital image analysis techniques.	5 hrs
Unit 4	Remote Sensing Applications: In Earth Sciences – Geological interpretation-identification and mapping of litho-units, structural mapping, geohydrological mapping and engineering projects, geomorphologic mapping, geoenvironmental studies, mineral exploration, land use and land cover classification. In Oceanography - monitoring littoral processes, suspended sediments and shoreline change detection studies. In weather forecasting, meteorological and climatic studies such as cloud drift, precipitation, temperature, tropical cyclone and in understanding earth's radiation budget. Case studies with examples from India. Vertical exaggeration and slopes. Factors affecting vertical exaggeration and slopes. Interactive sessions of teaching to enhance students-teacher interactions through hands-on demonstrations and exercises in the recent advancement of the subject related to the curriculum.	5 hrs

Photogrammetry

Unit 5	Fundamentals of aerial photography and photogrammetry : History, aerial cameras, aerial films and processing. Types of aerial photos . Fundamentals and geometry of aerial photographs, Scale, Advantages and disadvantages of small-scale and large-scale aerial photographs, relief and tilt displacements, mosaics and types of mosaics, stereoscopic vision and stereoscopes, image displacement due to relief, concepts of stereo-photogrammetry, normal vision, depth perception and vertical exaggeration.	5 hrs
Unit 6	Planning for aerial photographs, flight procedures, planning and execution of photographic flights, radiometric characteristics. Elements of aerial photo interpretation : tone, colour, texture, pattern, shape, size and associated features, geotechnical analysis and convergence of evidence.	5 hrs
Unit 7	Principles and Applications of Aerial Photography : Aerial photo interpretation in resource evaluation – geology, delineation of geological structures, mineral exploration and geomorphology.	5 hrs
Unit 8	Digital photogrammetry and interpretation techniques: definition, creation of digital images, automatic measurements and surface modeling, aerial triangulations, digital photogrammetric workstation. Interactive sessions of teaching to enhance students-teacher interactions through hands-on demonstrations and exercises in the recent advancement of the subject related to the curriculum.	5 hrs

List of References:

1. Manual of Photo Interpretation – American Society of Photogrammetry.
2. Remote Sensing and Image Interpretation – T. M. Lillesand and R. W. Kiefer – John Wiley and Sons.
3. Fundamentals of Photogeology, Geomorphology – Verstappen – TTC Holland.
4. Remote Sensing and Photogrammetry, vol. 1 and vol. 2 – M. L. Jhanwar and T. S. Chouhan – VignanPrakasan, Jaipur.
5. Applied Remote Sensing and Photo Interpretation – T. S. Chouhan and K. N. Joshi – VignanPrakasan, Jaipur.
6. Remote Sensing in Geology – P. S. Siegal and A. R. Gillespie – John Wiley.
7. Remote Sensing and its applications to Geology - Drury, John Wiley and Sons.
8. Remote Sensing – Sabins, John Wiley and Sons.
9. Manual of Remote Sensing; American Association of Photogrammetry and Remote Sensing.
10. Photo geology and Image Interpretation – Shiv N. Pandey – Wiley Eastern, New Delhi.