**MINOR COURSE**

**GIF222N GEO-INFORMATICS (FUNDAMENTALS OF REMOTE SENSING)**

**(CREDIT HOURS: 4+2)**

*Course goals:*
- *Developing a basic understanding of science and applications of Remote Sensing.*
- *Interpretation of satellite images, and how to extract desirable information from images.*
- *Demonstrate the usefulness of remote sensing for earth and environmental science applications.*

**THEORY (04 CREDITS)**

**UNIT I: OVERVIEW OF REMOTE SENSING**

Remote sensing: Definition, history and scope. Types of remote sensing: Active and passive, Geostationary and Sun-synchronous. Types of platforms: air-borne, space borne and ground based.
**Tutorial:** Electromagnetic radiation (EMR) and Electromagnetic Spectrum (EMS); Interaction of EMR with atmosphere.
**Assignment:** Overview of remote sensing system and its components.

**UNIT II: SENSORS AND SATELLITE SYSTEMS**

Sensor resolution (spatial, spectral, radiometric and temporal) and its importance. Sensors: Multispectral and Hyperspectral.
**Tutorial:** Elements of visual image interpretation.
**Assignment:** Characteristics of important satellite systems: LANDSAT and IRS series of satellites.

**UNIT III: DIGITAL IMAGE PROCESSING**

Digital Image processing (DIP): Introduction to DIP. Digital data and data storage formats (BSQ, BIL, BIP), Data formats: IMAGE, SHP, TIFF, GEOTIFF, JPEG, TIGER.
**Tutorial:** Color composites: band combination, false color composite (FCC) and true color composites (TCC).
**Assignment:** Use of ancillary information for satellite data interpretation.

**UNIT IV: APPLICATIONS OF REMOTE SENSING**

Land use land cover mapping and monitoring.
**Tutorial:** Vegetation assessment (forest cover assessment and deforestation).
**Assignment:** Water resources assessment (water bodies, snow and glaciers).

**PRACTICALS (02 CREDITS)**

- Capabilities of open-source software (QGIS) in image processing.
- Hands-on exercises using satellite data.
- Basic image operations: Image stacking, rotate, subset and mosaic. Image visualization using False color composite (FCC) and True color composite (TCC).
- Satellite image interpretation for land cover mapping.

**BOOKS RECOMMENDED:**

- Lillesand, T., Kiefer, R.W., & Chipman, J. 2014. Remote sensing and image interpretation. John Wiley & Sons. • Jensen, J.R. 1996. Introductory digital image processing: a remote sensing perspective (Ed. 2). Prentice-Hall Inc.
- Reddy, A. 2012. Text Book of Remote Sensing and Geographical Information Systems. BS Publications.

**WEB REFERENCES:**

- Principles of Remote Sensing. Available at: https://crisp.nus.edu.sg/~research/tutorial/rsmain.htm • Tutorial:

Fundamental of Remote Sensing. Available at: http://www.nrcan.gc.ca/node/9309