**LESSON PLAN**

**BA(H) SEMESTER V**

**SESSION – JULY 20, 2022 – NOVEMBER 16, 2022**

Subject: **Remote Sensing and GIS (Practical)**

Taught individually or shared: Shared with individual groups

Faculty: Maansi Malik/Aakash Upadhyay/Md Arif Hussain

Number of classes per week: 6

**Course Objectives:**

1. The course aim is to give basic technical knowledge and practical experience in digital remote sensing.
2. Knowledge and practical experience in handling satellite images focusing on hands-on experience of image pre-processing, enhancement and classification;
3. Better understand the techniques for the study of land use land cover and urban study.

**Essential Readings:**

1. Bhatta, B. (2008). Remote Sensing and GIS. New Delhi, India: Oxford University Press.
2. Campbell J. B. (2007). Introduction to Remote Sensing. UK: Guildford Press
3. Jensen, J. R. (2005). Introductory Digital Image Processing: A Remote Sensing Perspective. USA: Pearson Prentice-Hall.
4. Lillesand T. M., Kiefer R. W. and Chipman J. W. (2004). Remote Sensing and Image Interpretation. USA: Wiley. (Wiley Student Edition). 49
5. Singh R. B. and Murai S. (1998). Space-informatics for Sustainable Development. UK: Oxford and IBH Pub.
6. Wolf P. R. and Dewitt B. A., 2000: Elements of Photogrammetry: With Applications in GIS, McGrawHill.

Name of Unit: **Remote Sensing and GIS: Definition and Components, Development and Types**

Topics to be covered:

* **Week 1:** Definition and Concept, Components and Process of Remote Sensing
* **Week 2:** History of Remote Sensing – Global, History of Remote Sensing in India in detail
* **Week 3**: Indian Remote Sensing Institutions, Satellites, Difference between Remote Sensing and GIS, Types of Remote Sensing, Application of Remote Sensing

**Additional Readings prescribed:**

1. Remote Sensing of the Environment: An Earth Resource Perspective. India: Pearson India Education Services, 2013.
2. Reddy, M. A. (2008). Textbook of Remote Sensing and Geographical Information Systems. India: BS Publications.

Number of classes required – 18 classes

Methodology for teaching: Use of ICT methods like PowerPoint Presentation, Videos and Detailed discussion

Name of Unit: **Aerial Photography and Satellite Remote Sensing: Principles, Types and Geometry of Aerial Photography; Principles of Remote Sensing, EMR Interaction with the Atmosphere and the Atmosphere and Earth Surface; Satellites (Landsat and IRS), Sensors**

Topics to be covered:

* **Week 4:** Electromagnetic spectrum, Radiation Laws, Nature of Electromagnetic Radiation, Atmospheric Window and EMR Interaction- Scattering, Absorption and Refraction
* **Week 5:** Photogrammetry and related principles, Characteristics of an Aerial Photograph, Geometry of an Aerial Photograph
* **Week 6:** USGS- Landsat satellite System and Sensors – TM, ETM OLI, Indian Remote Sensing Sensors – LISS, AWIFS, WIFS etc

**Additional Readings prescribed:**

1. Kiser, J. D., Paine, D. P. (2012). Aerial Photography and Image Interpretation. United Kingdom: Wiley.
2. Joseph, G. (2005). Fundamentals of Remote Sensing. India: Universities Press.

Number of classes required: 18 classes

Methodology: Use of ICT Methods like PowerPoint and Detailed discussion

Name of Unit: **GIS Data Structure: Types (Spatial and Non-spatial) and Raster and vector data structure.**

Topics to be covered:

* **Week 7:** Spatial and Non-spatial data, Raster and vector data structure

Reading prescribed:

1. Burrough P.A. and McDonnell R.A., 1998: Principles of Geographical Information Systems, Wiley.

Number of classes required: 6 classes

Methodology: Use of ICT Methods like PowerPoint and detailed discussion

Name of the unit: **Image Processing (Digital and Manual) and Data Analysis: Pre-processing (Radiometric and Geometric Correction), Enhancement (Filtering); Classification (Supervised and Unsupervised); Geo-referencing; Editing and Output, Overlays**

* **Week 8:** Introduction: Digital Image, Digital Image Processing, Process of DIP
* **Week 9 and 10:** Image Pre-processing – Radiometric and Geometric Correction, Image Rectification and Registration (Geo-Referencing), and Image Enhancement (Filtering), Image Classification (Supervised and Unsupervised),
* **Week 11, and 13:** Software Demonstration

**Note:** Week 12 is Mid-Semester Break

Readings prescribed:

1. Jensen J.R., 2004: Introductory Digital Image Processing: A Remote Sensing Perspective, Prentice Hall

Number of classes required: 36 classes

Methodology: Use of ICT Methods like PowerPoint and detailed discussion

Name of the unit**: Interpretation and Application of Remote Sensing and GIS: Land-use/ land Cover, Urban Sprawl Analysis, Forests Monitoring**

Topics to be covered:

* **Week 14:** Land- use/cover Analysis along with Practical Exercise
* **Week 15:** Urban Sprawl Analysis along with Practical Exercise
* **Week 16:** Forest Monitoring along with Practical Exercise
* **Week 17:** Software demonstration practice

Readings prescribed:

1. Remote Sensing of the Environment: An Earth Resource Perspective. India: Pearson India Education Services, 2013.
2. Reddy, M. A. (2008). Textbook of Remote Sensing and Geographical Information Systems. India: BS Publications.

Number of classes required: 20 classes

Methodology: Use of ICT methods like PowerPoint and detailed discussion

**Criteria of Assessment:**

* Class tests
* Assignment
* File work

Note: Mock Examination – A Mock Examination is conducted before the final practical examination to help students understand the nature of the examination so that students don’t feel nervous or experience anxiety during the examination.

Tentative Dates of Assessment:

* Assignment- Second week of October
* Class test – September 07, 2022 and Third week of October
* Mock Examination- Second week of November

Note: Practical demonstration and practice of software would be done simultaneously during class as and when required. File work will start in October and final bound files will be submitted in the department by November 7, 2022.