T.Y. B.Sc. Geology **Course: SGEO05AC**
Title: Remote Sensing and Image Interpretation

PRE-REQUESITES: Courses S.Geo.1.0 and S.Geo.2.0
Additional Requirements: Personal laptop Computer.

Learning Objectives:
Gathering data about various earth surface features through space and air borne sensors has been effectively used for understanding and analyzing various phenomenon ranging from vegetation , agriculture, natural resources mapping and exploitation to environment monitoring. Remote sensing is today an integral part of any study that needs inputs in the form of spatial and spectral reflectance of earth's surface characteristics. This course, aimed at all learners with a background in the earth sciences, will develop skills in understanding how the satellite image date is acquired and interpreted. The use of printed satellite imageries as well as data in digital form will result in the learner also developing the necessary competence in automated classification of satellite image data.

Number of lectures: 60

Unit 1 **(15 lectures)**
Concepts of Remote Sensing
Concepts and Foundations of Remote Sensing
Definition of Remote Sensing.
Energy Sources and Radiation Principles.
Energy interactions in the Atmosphere: Scattering, Absorption.
Energy interactions with earth surface features: Spectral Reflectance of Vegetation, Soil and Water, Spectral response patterns, Atmospheric Influences on Spectral Response Patterns.
Brief history of Remote Sensing from the advent of photography till today's aerial and space-based remote sensing systems.
The concept of resolution: Spatial, Spectral, Temporal and Radiometric.

Unit 2 **(15 lectures)**
Satellite Sensors and Data
Space Borne Imaging Systems- The Landsat, IRS, SPOT and High resolution Land Satellites (the characteristics of these satellites- their orbits, their sensors, and their resolutions)
Multispectral, Thermal and Hyper spectral Sensing
Across track scanning.
Along track scanning.
Operating principles of Across track Multispectral Scanners.
Across track Thermal scanning.
Thermal Radiation principles.

Unit 3 **(15 lectures)**
Introduction to Digital Image Processing and Classification
Introduction.
Image Rectification and Restoration.
Image Enhancement.
Contrast Manipulation.
Spatial Feature Manipulation.

Multi-Image Manipulation.
Image Classification: Supervised Classification: Minimum-Distance to Means Classifier, Parallelepiped Classifier, Gaussian Maximum Likelihood Classifier.

Unit 4 **(15 lectures)**

Digital Imaging classification
Unsupervised Classification.
Classification Accuracy Assessment.
Applictions of Remote Sensing:
Recognising Rock types, geological structures
Mapping vegetation.

List Of Recommended Reference Books

1. Drury S.A., (1993), Image Interpretation in Geology, 2nd ed., Chapman and Hall, London.
2. Jensen John R. (2000), Remote Sensing of the Environment – An Earth Resource perspective, Pearson Education Series, Low Price Edition.
3. Lillesand T. M., Ralph W. Kiefer and Jonathan W. Chapman (2004), Remote Sensing and Image Interpretation, 5th ed, Wiley.
4. Mather Paul M., (2004), Computer Processing of Remotely Sensed Images- An Introduction, 3rd ed., John Wiley.
5. Narayan L.R.A. (1999), Remote Sensing and its Applications., Universities Press.
6. Prost G. L., (2014), Remote Sensing for Geoscientists – Image Analysis and Integration. 3rd ed., CRC Press.
7. Ramasamy S.M., (2005), Remote Sensing in Geomorphology, New India Publishing Agency.
8. Schowengerdt Robert A., (2006), Remote Sensing – Models and Methods for Image Processing, 2nd ed., Elsevier (Academic Press).

Practical Course:
Remote Sensing and Image Processing

- Interpretation of Satellite Imagery for – landforms, geological structures, rock and soil types, man made structures.
- Data Products and Meta data
- Digital Image Processing (using number matrix): enhancement, manipulation and classification.
- Digital image processing on Computer (using QGIS)
  - Display of various types of image formats
  - Pallets and Display elements
  - Georeferencing
  - Image enhancement
  - Image classification
  - Vegetation Indexing - NDVI

Evaluation: Applied Component – Remote Sensing and Image Interpretation
(Theory) Total marks 100.
CIA- 40 marks
CIA 1: Written test -20 marks
CIA 2: Assignment /MCQ/Test -20 marks
End Semester Examination – 60 marks
One question from each unit for 15 marks, with internal choice. Total marks per question with choice -20 to 22.

(Practicals) Total 50 marks.
CIA : 20 marks : Lab viva on performed experiment and Journal.
End Semester Practical Examination – 30 marks.
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Template for S.Geo.5.AC courses - End Semester examination

UNITS	KNOWLEDGE	UNDERSTANDING	APPLICATION and ANALYSES	TOTAL MARKS- Per unit
1	08	04	03	15
2	08	04	03	15
3	08	04	03	15
4	08	04	03	15
-TOTAL - Per objective	32	16	12	**60**
% WEIGHTAGE	53	27	20	**100%**

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