COURSE CODE	**GIE-203**
COURSE NAME	**DIGITAL MAPPING AND IMAGE PROCESSSING**
CREDIT HOURS	Theory: 02 Practical: 01 Total: 03
CONTACT HOURS	Theory: 32 Practical: 48 Total: 80
PREREQUISITE	Nil

Mode of Teaching:

Instruction:	Two hours of lecture per week	67%
Practical:	Three hours of Lab work per week	33%

COURSE DESCRIPTION:

This course is designed to familiarize the students of Geoinformatics Engineering with the field of digital image processing based of satellite-based images. Students will acquire knowledge about the concepts and techniques of digital image processing and interpretation and develop skill to extract and map useful information from the remotely send images.

COURSE OBJECTIVES:

This course builds on the introductory Remote Sensing unit and provides mathematical concepts and practical application of digital image processing of remotely sensed data for analysis of earth resources.

RELEVANT PROGRAM LEARNING OUTCOMES (PLOs):

The course is designed so that students will achieve the PLOs:

1	Engineering Knowledge:	☑	7	Environment and Sustainability:	☐
2	Problem Analysis:	☐	8	Ethics:	☐
3	Design/Development of Solutions:	☐	9	Individual and Team Work:	☐
4	Investigation:	☑	10	Communication:	☐
5	Modern Tool Usage:	☐	11	Project Management:	☐
6	The Engineer and Society:	☐	12	Lifelong Learning:	☐

COURSE LEARNING OUTCOMES:

No.	CLO	Domain	Taxonomy Level	PLO
1	Describe different pre-processing methods of spatial and spectral enhancement to improve interpretation of satellite images.	Cognitive	2	1
2	Apply different image classification methods to extract information from	Cognitive	3	4

	satellite images.			
3	Utilize the extracted geospatial information from satellite images for various earth resource applications	Cognitive	3	4

TOPICS COVERED:

Theory:

Week	Topic
1	Digital data sources, procurement, and data formats
2	Image Sub setting, Enhancement and colour balancing
3	Radiometric and atmospheric corrections
4	Geometric errors, Rectification, Geo-referencing and Image registration
5-6	Image Enhancement (Band Ratios), Multiband Operations
7	Image Enhancement (Vegetation Indices)
8	Image Enhancement, Principal Components Analysis, Tasselled Cap
9	Image Enhancement (Spatial Filtering, Image Transformation)
10	Spatial Convolution Filtering (Low pass and high pass filters)
11-12	Image Classification-Unsupervised
13	Image Classification / Analysis- AI based Algorithms
14	Field data collection
15	Sampling techniques
16	Classification accuracy assessment
17-18	**ESE**

Practicals:

Week	Topic
1	Intro to lab and software
2	Image Management (Import/Export& Display).
3	Image Statistics
4	Spectral and spatial digitizing
5	Mosaicing and colour balancing
6	Atmospheric and radiometric corrections
7	Image rectification/ geo-referencing, Registration and Re-sampling
8	Band Ratio, Image arithmetic
9	Vegetation Indices
10	Vegetation Indices
11	Image Enhancement, PCA, TCT
12	Spatial Filtering
13-15	Supervised, Unsupervised and Hybrid classification, ISODATA, MDM, MLC,
16	Error Matrix Generation, Classification validation
17-18	**ESE**

PRACTICAL APPLICATION

Application of this course is to make an individual skillful enough to extract information from remotely sensed satellite data using different information extraction techniques.

This extracted informed can further be used in monitoring and managing different natural and manmade resources.

TEXT AND MATERIAL:

Textbook (s):

a. Mather, P (2004). Computer processing of remotely sensed images. Third Edition, J Wiley.
b. Jensen, J. R. (2002), Introductory Digital Image Processing: A Remote Sensing Perspective, Prentice Hall, and New York.

References Material:

a. Introduction to Remote Sensing, (5th Edition) by James B.Campbell, 2011, London, Taylor & Francis.
b. Remote Sensing, Models and Methods for Image Processing (3rd Edition) by Schowengerdt, R. A., 2007, Academic Press, ISBN 978-0-12-369407-2.
c. Digital Image Processing (3rd Edition) by Gonzalez (2008), Prentice Hall,
d. Remote Sensing Digital Image Analysis (5th Edition) by John A. Richards • XiupingJia (2006), Springer-Verlag, Berlin Heidelberg,

ASSESMENT SYSTEM:

1. **CLOs Assessment**

Cognitive	**Psychomotor**	**Affective**
Spreadsheet	-	-

2. **Relative Grading**

Theoretical/Instruction			67%
	Assignments10%		
	Quizzes10%		
	Mid Exams30%		
	End Semester Exam50%		
Practical Work			33%
Laboratory Work		*70%*	
	Laboratory Attendance20%		
	Laboratory Report20%		
	Laboratory Quiz30%		
Viva/Quiz		*30%*	
Total			100%