COURSE CODE: **GIE-104**

COURSE NAME: **INTRODUCTION TO REMOTE SENSING**

CREDIT HOURS:

Theory	= 02
Practical	= 01
Total	= 03

CONTACT HOURS:

Theory	= 32
Practical	= 48
Total	= 80

PREREQUISITES: Nil **(It is a Pre-requisite course for GIE-203 DMIP)**

MODE OF TEACHING:

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

COURSE DESCRIPTION:

This course provides an introduction to remote sensing by focusing on topics such as history of remote sensing, the principles and characteristics of remotely sensed imagery, electromagnetic spectrum, various remote sensing systems, the methods by which remote sensing data are collected, platforms and sensors, satellites orbits and earth observation satellites' scanning mechanism, data storage formats, resolutions, image interpretation, spectral response curves, and applications of remote sensing.

The course is divided into two units i.e., lectures and laboratory work. Topics covered in lecture include the principles of electromagnetic radiation, airborne and satellite remote sensing systems, the methods by which remote sensing data are collected and analyzed along with various applications of remote sensing.

Laboratory sessions involve, introduction to interface of various RS softwares (ERDAS Imagine, ENVI etc.), necessary parameters for RS data, visual interpretation of satellite data, satellite data download portals, and basic satellite image processing.

COURSE OBJECTIVES:

The course develops the understanding of basic concepts of remote sensing Systems and Technology including image acquisition from different platforms, image pre-processing and interpretation, and its applications for effective management of various Earth resource.

RELEVANT PROGRAM LEARNING OUTCOMES (PLOs):

The course is designed so that students achieve following PLOs:

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

COURSE LEARNING OUTCOMES (CLOs):

Upon successful completion of the course, the student will be able to:

No.	CLO	Domain	Taxonomy Level	PLO
1	Define basic concepts of remote sensing technology and characteristics of different operational satellite systems	Cognitive	1	1
2	Describe the role of EMR, its interaction with various earth surface features and representation on a digital image	Cognitive	2	1
3	Apply various image pre-processing techniques to improve image quality.	Cognitive	3	5

PRACTICAL APPLICATIONS:

Remote Sensing is relatively emerging field in developing countries like Pakistan. It provides an alternate way to acquire data over large area which is not only cost effective but also take less time relative to other techniques. Knowledge gained from this course can be used to map land use land cover dynamics of study area by applying various image processing techniques.

TOPICS COVERED:

Theory:

Week	Topics
1	Introduction and an overview of Remote Sensing, and its history
2	Electromagnetic radiations, electromagnetic spectrum, and its utilization for remote sensing
3	Interaction EMR with atmosphere and Earth surface
4	Spectral reflectance / response, and reflectance profiles, Soil, Water, Snow
5-6	Spectral reflectance / response, and reflectance profiles, Vegetation, and roads
7	Types and characteristics of remote sensing platforms, remote sensing satellite orbits and swath
8	Remote sensing sensors, data acquisition and transmission
9	Digital Image, image resolutions, and data storage format
10	Earth observation satellites systems (Low, medium and high resolution)
11-12	Image histogram and descriptive Image Statistics
13-14	Digital image pre-processing and visualization
15	Introduction to Aerial and Thermal remote Sensing
16	Field Specific Applications of Remote Sensing Data
17-18	**ESE**

Practical:

No.	Topic
1	RS software - basic functionalities, import /export, display, magnification,
2	Overlay, flip, and rotate data
3	Subset, Dice images
4	Mosaic and layer stack images
5	Link and unlink viewers
6	Image statistics

7	Band Combinations
8	Spectral and Spatial Profile
9	Vector data processing and GIS analysis in RS Software
10	Image annotation tools and Map Composer
11	Compare imagery from various satellites
12	Image Enhancement,
13	Condition Modeler/ Model Maker
14	Models for different Applications
15	Models for different Applications
16	Visual Image Interpretation

TEXT AND MATERIAL:

Textbook (s)

a. Introduction to Remote Sensing, (5th edition), James B. Campbell, (London, Taylor & Francis)
b. Remote Sensing and Image Interpretation, (4th edition), Lillesand, T. and Kieffer, R.W. (London, John Wiley & Sons)

References Material:

a. Computer Processing of Remotely Sensed Images, An Introduction, 3rd edition, Paul, M Mather (2004), Wiley
b. Introductory Digital Image Processing: A Remote Sensing Perspective, Prentice Hall, Jensen, J. R. (2002), New York

ASSESMENT SYSTEM:

1. **CLOs Assessment**

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

2. **Relative Grading**

Theoretical / Instruction			67%
	Assignments 10%		
	Quizzes 10%		
	Mid Semester Exam 30%		
	End Semester Exam 50%		
Practical Work			33%
Laboratory Work		70%	
	Laboratory Attendance 20%		
	Laboratory Report 20%		
	Laboratory Quiz 30%		
Viva/Quiz		30%	
Total			**100%**