COURSE CODE	**GIE-204**
COURSE NAME	**PHOTOGRAMMETRY**
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:

After this course, student will be able effectively plan and execute photogrammetric projects, and will be able to carry out photogrammetric analysis, such as measuring distances, areas and elevation to generate Ortho-photos and digital elevation model for use in different earth resource applications.

COURSE OBJECTIVES:

This course aims at providing basic knowledge of key elements analytical / digital Photogrammetry, photogrammetric procedure, techniques and instruments. It further includes description of techniques used for measurements from aerial photographs, and stereo-photogrammetry and its applications.

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:

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

No.	CLO	Domain	Taxonomy Level	PLO
1	Comprehend the basic elements and principles of photogrammetry	Cognitive	2	1
2	Understand the use of aerial photographs to generate maps and other survey data	Cognitive	2	1
3	Practice stereoscopy to generate elevation data from stereopairs.	Psychomotor	3	4

TOPICS COVERED:

Theory:

Week	Topics
1	Introduction of photogrammetry: Overview, History
2	Principles of Photogrammetry-optics, Illuminance, Aperture, Photographic Films
3	Filters, Photogrammetric Cameras, and other imaging devices, Single lens camera, Frame aerial cameras
4-5	Metric camera, Digital imaging devices, Camera calibration, Imaging geometry, Image motion compensation
6	Image Measurements and Refinement: Coordinate Systems for measurements
7	Methods of measuring photo coordinates, Refinement of measured photo

	coordinates, Distortions and Corrections
8	Types and Characteristics of Aerial Photographs: Vertical / Tilted Aerial Photographs, Oblique Aerial Photograph, Mosaics.
9	Perspective Projections
	Scale of photographs at flat and variable terrain
10	Ground Coordinates from photographs
11	Relief displacement and heights of objects, Error evaluation
12	Stereoscopy and Parallax: Stereoscopic depth perception, Stereoscopes and their use, Parallax, and parallax measurement
13	Vertical exaggeration in stereo viewing, Stereoscopic Plotting Instruments, DEM Generation, Ortho-photography/Ortho-image
14	Modern programming tools for photogrammetry, Image processing in Python, OpenCV and Scikit-Learn
15	Ground Control for Aerial Photogrammetry- Number and location of photo control, Planning control survey, Methods for establishing control, Project Planning -Aerial photography
16	Stereo Imaging using Python
17-18	**ESE**

Practical:

No.	Topics
1	Familiarization with the frame and strips Aerial Photos (vertical, /oblique)
2	Analogue to digital image conversion (Scanning)
3	Measuring/Making Scales for vertical and oblique aerial photos
4	Geo-referencing/ rectification of aerial photos using maps
5	Geo-referencing of aerial photos using ortho- photos
6	Aerial photo mosaicking
7	Preparation of aerial photo maps
8	Object identification in aerial photos using Open CV
9	Familiarization with aerial imaging cameras (frame and digital)

10	Stereoscopic depth perception and height visualization using python and open CV
11	Aerial photo project planning
12	Preparation of aerial photo flight plan

TEXT AND MATERIAL:

Textbook (s):

a. Elements of Photogrammetry, (3rdEdition) by Paul R.Wolf& Bon A.Dewitt,2004, McGraw Hill, ISBN: 007-133689-9

References Material:

a. Introduction to Modern Photography, (1st Edition) byEdward M. Mikhail, James S. Bathel, J. ChirsMcGlone, 2001, John Wiley and Sons Inc,ISBN: 9780471309246
b. Manual of Remote Sensing (2ndEdition) in 2 volumes by Colwell, R.N, 1983, American Society of Photogrammetry.
c. Digital Photogrammetry,Tony Schenk ,1999, Terra Science USA, ISBN: 0-9677635 0-7
d. Manual of Photographic Interpretation (2nd Edition), Philipson, W.R 1997, American Society for Photogrammetry and Remote Sensing.

ASSESMENT SYSTEM:

1. CLOs Assessment

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

2. Relative Grading

Theoretical / Instruction			67%
	Assignments 10%		

	Quizzes 10%		
	Mid Exams 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%**