Course title: Photogrammetry

Course code: NRG 170	**No. of credits:** 3	**L-T-P:** 26-2-28	**Learning hours:** 42

Pre-requisite course code and title (if any): NRG 178 Principles of remote sensing, NRG 176 Principles of GIS and GPS

Department: Natural Resources

Course coordinator(s): Dr Anu Rani Sharma	**Course instructor(s):** Dr Anu Rani Sharma

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Course type: Core	**Course offered in:** Semester 2

Course Description

This course introduces photogrammetry as a data acquisition tool and provides a general overview of its theory and working principles. This course covers the factors that influence the formation of the photographs, and the process of reconstructing the three-dimensional model for the real world. Students will gain the ability to extract data from aerial photography.

Course objectives

1. To develop understanding about basic concepts of image geometry and measurement of aerial photograph.
2. To get acquainted with image interpretation and information extraction

Course content

Module	**Topic**	**L**	**T**	**P**
1	**Introduction to Photogrammetry** • History of Aerial Photographs • Fundamentals of Aerial photographs • Basic concepts of Perspective projection and Orthographic projection	2		
2	**Aerial cameras and Photographs** (Types, acquisition, scanning)	2		
3	**Photogrammetric project planning** • Planning Aerial Photography • Elements of aerial photograph	4	2	
4	**Stereoscopy** • Stereoscopic photographs • Parallax	4		
5	**Geometry of Aerial Photograph** • Basic of Optics: Reflection, refraction and lens distortion • Photographic scale; Object height and Length	2 2		
6	**Introduction to Ortho-photos and DEM/contour extraction** • Photo mosaic and Ortho photo • Photograph co-ordinate and ground coordinate of Vertical photograph • Digital Photogrammetry: Block adjustment, Ortho-rectification • Digital Terrain Model and Terrain editing, • Satellite Photogrammetry	2 2 2		
7	Aerial Photo Interpretation techniques and tools	2		
8	Applications and limitation of Aerial Photography	2		

	PRACTICALS			
1	Interpreting an Aerial photograph			2
2	Stereovision exercise and 3D model perception in stereoscope			4
3	Photo and Image coordinate calculation for vertical photographs			2
4	Parallax bar operation and height calculation			4
5	Introduction to Leica Photogrammetry suite (LPS)			2
6	Orthorectification of aerial photographs / satellite datasets			8
7	DEM generation using ortho images			4
8	Introduction to Stereoanalyst			2
	Total			**28**

Evaluation criteria

- Test1: 10% [End of module 1, 2 and 3] (Learning outcome 1)
- Test2: 10% [End of module 3, 4,5,6] (Learning outcome 2)
- Practical (Lab exercise and viva): 30% (Practical is conducted at the end of the semester and includes evaluation of the lab exercises student carry out throughout the semester: (All the learning outcomes)
- Test 3: 50% (Test 3 is conducted after completion of the course, at the end of the semester) (All the learning outcomes)

Learning outcomes

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

1. Extract data from aerial photography
2. Understand the process of reconstructing three-dimensional model for the real world

Pedagogical approach

The course will be delivered through class lectures, lab exercise and tutorials.

Course Reading Materials (* = compulsory readings)

Module 1 – 8 will be covered through following reading material.

1. *Moffitt F.H. (1980) Photogrammetry, 3rd Ed, Harper & Row, NY.
2. Campbell J.B. (2002) Introduction to Remote Sensing, 3rd ed., The Guilford Press.
3. *Paine D. P., Kiser J. D. (2012) Aerial Photography and Image Interpretation, John Wiley & Sons, Inc.
4. *Wolf P.R. (1983) Elements of Photgrammetry, McGraw-Hill, NY
5. Joseph, G. and Jeganathan, C. (2018) Fundamentals of Remote Sensing. By. Universities Press (India) Private Limited, Hyderabad, India. ISBN 978-93-86235-46-6.

Advanced reading.

1. George J. (2005) Fundamentals of Remote Sensing Universities Press India
2. Lillesand T.M., Kiefer R.W. and Chipman J.W. (2003) Remote Sensing and Image Interpretation, 5th ed., Wiley.
3. Floyd F.S. (2007) Remote Sensing: Principles and Interpretation New York, WH Freeman and Company.
4. Zorn H.C. (1980) Introductory Course in Photogrammetry, 6th Ed. ITC, Netherlands.

Journals

1. Asian Journal of Geoinformatics
2. International Journal of Remote Sensing
3. ISPRS Journal of Photogrammetry and Remote Sensing

Additional information (if any)

Magazines 1. Coordinates 2. Geospatial today 3. GIM International 4. GIS World 5. GIS development 6. GPS World
Student responsibilities Attendance, feedback, discipline, guest faculty etc.

Course Reviewer:

- Prof. J. K. Garg, Indraprastha University, Dwarka
- Dr. P.L.N. Raju, NESAC, Shillong