Digital Photogrammetry & Image Processing

01CI0816

Objective of the Course:

- Introduces students to the principles and techniques of digital photogrammetry. and image processing
- Introduces students to the principles and techniques of digital image processing
- Students will gain practical experience through hands-on exercises using standard software.
- To develop skills in image processing and analysis for various applications.

Credit Earned: 03

Prerequisite: Basics Knowledge of Remote Sensing

Student's learning outcomes:

After successful completion of the course, it is expected that students will be able to,

1. Understand the fundamentals of digital photogrammetry and image processing.
2. To learn various techniques for image acquisition and preprocessing.
3. Develop skills in image rectification and geometric modeling.
4. Understand different methods for photogrammetric reconstruction

Teaching and Examination Scheme

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial/ Practical Marks		Total Marks
Theory	Tutorial	Practical		ESE (E)	IA (M)	CSE (I)	Viva (V)	Term Work (TW)	
03	00	00	03	50	30	20	25	25	150

Detailed Syllabus

Sr. No	Topic name	Hours
1	**Introduction to Digital Photogrammetry**	**08**
	1.1 Types of foundation, Definition and principles of photogrammetry, Types of photogrammetry: aerial, close-range, satellite	4
	1.2 methods of Cameras and image acquisition techniques, Stereoscopic vision and depth perception	4

2	**Digital Image Processing Basics**	**08**
	2.1 Image enhancement techniques: contrast stretching, histogram equalization	4
	2.2 Filtering: spatial and frequency domain filtering, Noise reduction techniques	4
3	**Geometric Modeling and Camera**	**06**
	3.1 Geometric principles in photogrammetry, Camera models: pinhole, perspective, fisheye	3
	3.2 piles Intrinsic and extrinsic camera parameters, Camera calibration techniques	3
4	**Feature Extraction and Matching**	**06**
	4.1 Feature detection and description, Applications in image registration and stereo vision, Accuracy assessment of feature matching	6
5	**Advanced Topics and Applications**	**06**
	5.1 Multi-view geometry, Photogrammetric applications in various domains: archaeology, forestry, urban planning	4
	5.2 Emerging trends in photogrammetry and image processing	2
6.	**Project Work and Evaluation**	**08**
	6.1 Hands-on projects applying photogrammetric techniques, Data collection, processing, and analysis	4
	6.2 Presentation and evaluation of project results, Final assessment and review	4
	TOTAL	**42**

Suggested Theory Distribution

The suggested theory distribution as per Bloom's taxonomy is as per follows. This distribution serves as guidelines for teachers and students to achieve an effective teaching-learning process

Distribution of Theory for course delivery and evaluation					
Remember	Understand	Apply	Analyze	Evaluate	Create
5%	10%	30%	30%	15%	10%

Instructional Method and Pedagogy:

1 Prerequisite of the course and its pattern shall be discussed on the commencement of the course.
2 Lectures shall be conducted in class room using various teaching aids.
3 Presence in all academic sessions is mandatory which shall carry 5% marks of the total internal evaluation.

4 At the end of each unit/topic an assignment based on the course content shall be given to the students which shall carry 5% weightage for timely completion and submission of the assigned work.

Recommended Study Material

1. Introduction to Digital Image Processing" by Rafael C. Gonzalez and Richard E. Woods
2. Digital Photogrammetry: A Practical Course" by Wilfried Linder:
3. Manual of Photogrammetry" by American Society for Photogrammetry and Remote Sensing (ASPRS):
4. Digital Image Processing: Principles and Applications" by Gregory A. Baxes
5. Photogrammetry: Geometry from Images and Laser Scans" by Karl Kraus and Nicolas Haala:

Web Links

1. https://www.youtube.com/watch?v=2kvT93QlFto&list=PLX17kXRvcmbEYwA1ZGlqHDCMXhkYjR2Rk
2. https://www.youtube.com/watch?v=ZNKOWP8qAMY&list=PL8ZbncaV3f_anQs_DoyKUxmNDApxM0HT8
3. https://www.youtube.com/watch?v=vs4KSiwDO1M&list=PLpgQWSI_ty3YIvugFyVI4d8wl21pbETcb