19CSE435	COMPUTER VISION	L-T-P-C: 3-0-0-3

Course Objectives

- This course introduces the geometry of image formation and its use for 3D reconstruction and calibration.
- It introduces the analysis of patterns in visual images that are used to reconstruct and understand the objects and scenes.

Course Outcomes

CO1: Understand image formation and camera calibration.
CO2: Analyze and select image features and apply for image matching.
CO3: Understand recognition algorithms through case studies.
CO4: Understand the basics of stereo vision.

CO-PO Mapping

PO/PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2		2	2	1	1	1				3	2
CO2	3	3	2	3	3	3	2	1	2	1			3	2
CO3	3	3	3	3	3	3	2	3	3	3			3	2
CO4	3	3	1	2	3	2	1	1	1	1			3	2

Syllabus

Unit 1
Introduction, Image Formation – geometric primitives and transformations, photometric image formation, digital camera, Camera calibration.

Unit 2
Feature Detection and Matching – points and patches, edges, lines, Feature-Based Alignment - 2D, 3D feature-based alignment, pose estimation, Image Stitching, Dense motion estimation – Optical flow - layered motion, parametric motion, Structure from Motion.

Unit 3
Recognition – object detection, face recognition, instance recognition, category recognition, Stereo Correspondence – Epipolar geometry, 3D reconstruction.

Text Book(s)
Szeliski R. Computer Vision: Algorithms and Applications Springer. New York. 2010.

Reference(s)
Shapiro LG, Stockman GC. Computer Vision: Theory and Applications. 2001.
Forsyth DA, Ponce J. Computer Vision: a modern approach;2012.
Davies ER. Machine vision: theory, algorithms, practicalities. Elsevier; 2004 Dec 22.
Jain R, Kasturi R, Schunck BG. Machine vision. New York: McGraw-Hill; 1995 Mar 1.

Evaluation Pattern

Assessment	Internal	External
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

*CA – Can be Quizzes, Assignment, Projects, and Reports.