

<b>7<sup>th</sup> Semester</b>	<b>RCS7D005</b>	<b>Computer Vision</b>	<b>L-T-P 3-0-0</b>	<b>3 Credits</b>
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**Module I: (8 Hrs)**

**Image formation and camera calibration:** Introduction to computer vision, geometric camera models, orthographic and perspective projections, weak perspective projection, intrinsic and extrinsic camera parameters, linear and nonlinear approaches of camera calibration.

**Module II: (6 Hrs)**

**Feature detection and matching:** Edge detection, interest points and corners, local image features, feature matching and Hough transform, model fitting and RANSAC, scale invariant feature matching.

**Module III: (12 Hrs)**

**Stereo Vision:** Stereo camera geometry and epipolar constraints, essential and fundamental matrix, image rectification, local methods for stereo matching: correlation and multi-scale approaches, global methods for stereo matching: order constraints and dynamic programming, smoothness and graph-based energy minimization, optical flow.

**Module IV: (10 Hrs)**

**Shape from Shading:** Modeling pixel brightness, reflection at surfaces, the Lambertian and specular model, area sources, photometric stereo: shape from multiple shaded images, modeling inter-reflection, shape from one shaded image.

**Module V: (6 Hrs)**

**Structure from motion:** Camera self-calibration, Euclidean structure and motion from two images, Euclidean structure and motion from multiple images, structure and motion from weak-perspective and multiple cameras.

**Books:**

1. Forsyth, D. A. and Ponce, J., "Computer Vision: A Modern Approach", Prentice Hall, 2nd Ed.
2. Szeliski, R., "Computer Vision: Algorithms and Applications", Springer.
3. Hartley, R. and Zisserman, A., "Multiple View Geometry in Computer Vision", Cambridge University Press.