

## Computer Vision

<b>Course Code:</b>		<b>Year:</b>	III	<b>Semester:</b>	I
<b>Course Category:</b>	Honors	<b>Branch:</b>	CSE	<b>Course Type:</b>	Theory
<b>Credits:</b>	4	<b>L-T-P:</b>	4-0-0	<b>Prerequisites:</b>	Calculus & Linear Algebra, Probability Theory
<b>Continuous Internal Evaluation:</b>	30	<b>Semester End Evaluation:</b>	70	<b>Total Marks:</b>	100

### COURSE OUTCOMES

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

<b>CO1</b>	Understand the fundamental concepts of Computer Vision	<b>L2</b>
<b>CO2</b>	Apply Image transformation methods to view 2D and 3D images.	<b>L3</b>
<b>CO3</b>	Apply various Computer Vision techniques to develop applications	<b>L3</b>

### Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO1	PSO2
<b>CO1</b>	√													
<b>CO2</b>	√								√	√				√
<b>CO3</b>	√								√	√				√

### Course Contents

<b>UNIT-1</b>	Introduction: What is Computer Vision - Low-level, Mid-level, High-level, Overview of Diverse Computer Vision Applications: Optical character recognition (OCR), Machine inspection, 3D model building (photogrammetry), Medical imaging, Automotive safety, Motion capture, Surveillance, Fingerprint recognition and biometrics, Morphing, Video match move and stabilization, Face detection.	<b>CO1</b>
<b>UNIT-2</b>	Image Formation Models: Geometric primitives and transformations: The digital camera.	<b>CO1,CO2</b>
<b>UNIT-3</b>	Image Processing, Feature detection and matching: Points and patches, Edge detection, Edge linking, Lines. Regularization theory, Stereo vision, Structure from motion.	<b>CO1,CO3</b>
<b>UNIT-4</b>	Shape Representation and Segmentation: Snakes and active contours, Level set representations, Split and merge, Fourier, and wavelet, Mean shift and mode finding, Graph cut method.	<b>CO1,CO3</b>
<b>UNIT-5</b>	Object recognition: Hough transforms and other simple object recognition methods, Shape correspondence and shape matching, Principal component analysis, Shape priors for recognition	<b>CO1,CO3</b>

### Learning Resources

#### Text Books

1. Computer Vision: Algorithms and Applications, R. Szeliski, 2011, Springer.
2. Computer Vision: A Modern Approach, D. Forsyth and J. Ponce, 2nd ed, 2011, Prentice Hall.

#### Reference Books

1. *Computer & Machine Vision*, E. R. Davies, 2012, Academic Press.
2. *Computer Vision*, Dana H. Ballard, Christopher M. Brown, 1st Edition, Prentice Hall 1982
3. *Fundamentals of Computer Vision*, Shah M., 1997.

#### e- Resources & other digital material

1. <https://sites.usc.edu/iris-cvlab/>
2. [https://onlinecourses.nptel.ac.in/noc21\\_ee23/preview](https://onlinecourses.nptel.ac.in/noc21_ee23/preview)
3. <https://nptel.ac.in/courses/106105216>
4. <https://nptel.ac.in/courses/108103174>
5. <https://www.coursera.org/learn/introduction-computer-vision-watson-opencv>
6. <https://www.coursera.org/projects/computer-vision-opencv-for-images>