

Code	Course Title	CHs	Pre-Req
CS542	Computer Vision	3(3+0)	Nil
Recommended Texts			
<ol style="list-style-type: none"> 1. Computer Vision: Algorithms and Applications, Richard Szeliski, Springer; 2nd ed. 2022 edition (March 7, 2022), ISBN-13 : 978-3030343712 Compute Vision: A modern Approach, David A. Forsyth, Jean Ponce, Pearson; 2nd edition (October 26, 2011), ISBN-13 : 978-0136085928 2. Computer Vision: Models, Learning, and Inference, Simon J. D. Prince, Cambridge University Press, ISBN-13: 978-1107011793, 2012 3. Learning OpenCV: Computer Vision with the OpenCV Library, Gary Bradski, Adrian Kaehler, O'Reilly Media, ISBN-13: 978-0596516130, 2016 			
Course Description			
<p>This course provides an introduction to computer vision, including fundamentals of image formation, feature detection and matching, image classification, scene understanding, and deep learning with neural networks. We will develop basic methods for applications that include finding known models in images, image stabilization, automated alignment, tracking, boundary detection, and recognition. We will develop the intuitions and mathematics of the methods in class, and then learn about the difference between theory and practice in projects.</p>			
Course Objectives			
<ul style="list-style-type: none"> • Be familiar with both the theoretical and practical aspects of computing with images; • Have described the foundation of image formation, measurement, and analysis; • Have implemented common methods for robust image matching and alignment; • Understand the geometric relationships between 2D images and the 3D world. • Have gained exposure to object and scene recognition and categorization from images; • Developed the practical skills necessary to build computer vision applications. 			

Week Wise Topics to be Covered			
W1	Computer Vision Basics	W8	Content based image retrieval
W2	Basic Image processing, Kernels, Morphological operations	MID EXAM/ MID OF SEMESTER	
W3	Smoothing, Blurring, Lighting and color spaces, thresholding, gradients and edge detection	W9	Bag of (visual) words model
W4	Contours	W10	Extracting key points and local invariant descriptors
W5	Histograms, connected-components labeling	W11, W12	Clustering features to form a codebook
W6	Object detection, sliding windows and image pyramids	W13, W14	Vector quantization
W7	HOG Descriptor, non-maxima suppression, hard-negative mining	W15	Inverted indexes and searching
		W16	Tf-idf weighting, spatial verification