

Course Name	Course Code
Computer Vision	234CSM-3

Prerequisite	Credit	Theory	Practice
None	4	3	1

Course Description
This Course provides the students an overview of digital image processing and computer vision analysis. It introduces the fundamental concepts of image formation, low-level image processing and enhancement in both the Spatial and Fourier domains. It enables the students to perform higher level vision tasks by studying segmentation, feature extraction, matching, and object recognition concepts to find applicability of computer vision techniques in real world situations.

Course Topics	Duration
Introduction & Computer vision basics: Applications, Fundamental Steps, Components of Image Processing System, 2D Geometric Transformations, Camera Models.	1
Imaging and Image Representation, Image sampling and quantization	1
Basic relationships between pixels, Neighborhood, Connectivity	1
Image Enhancement Binary Image operations, Point Processing, Basic grey level transformation-Image Negative.	1
Contrast Stretching, Histogram, Histogram equalization – Image subtraction – Image averaging.	1
Image Filtering in Spatial Domain: Basic Concepts, Mask Processing, Low pass filtering: Average Filter, Weighted Average filter, Median Filter, High pass filters: Laplacian filters.	2
Image Filtering in Frequency Domain: Basic Concepts, Fourier Transform, Ideal Low Pass Filters (ILPF), Ideal High Pass Filters (IHPF).	1
Color Image Processing: Gray scale Image, Color Spaces Color conversions: RGB, CMYK, HSV.	2

Course Learning Outcomes
By the end of successfully completing this course, students are expected to:

- Students understand about digital image different processing and computer vision.
- Students get the concepts and apply practically about the fundamentals of image formation, low-level image processing and enhancement in both the Spatial and Fourier domains.
- Students know how to perform higher level vision tasks based on studying segmentation, feature extraction, pattern matching, object recognition and practical implementations

Textbook

- Bernd and Horst Hau Becker, Computer Vision and Application, Academic Press, 2000.
- Rafael C Gonzalez, Richard E Woods, 2nd Edition, Digital Image Processing - Pearson Education 2003.

References

- Forsyth and Ponce, Computer Vision: A Modern Approach, Prentice-Hall, 2003.

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