

Branch Name:	Information and Communication Technology
Semester/Year:	Semester VIII / Fourth Year
Subject Title:	Fundamental of Image Processing(Elective-IV)
Subject Code:	1ET1070805
Pre-requisite:	Signals & Systems, Introductory Programming

Course Objective:

This course will strengthen fundamental knowledge about digital image processing techniques. Digital image processing is used in almost all engineering fields and wide range of applications in industrial automation, medical, agriculture, security, entertainment, remote sensing, computer vision and many more

Teaching and Examination Scheme:

Teaching Scheme (Hours Per Week)				Examination Scheme (Marks)				Total
L	T	P	Credit	Theory		Practical		
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
3	0	2	4	70	30	30	20	150

Content:

Sr. No.	Topic	Total Hrs.	% Weightage
1	Introduction: Overview, Applications of image processing in different fields, Fundamental steps in digital image processing, Components of an image processing system.	04	10
2	Digital Image Fundamentals: Light, brightness adaption and discrimination, Human visual system, Image as a 2D data, Image representation Gray scale and Colour images, Image sampling and quantization	04	10
3	Image Enhancement and Filtering in Spatial Domain: Intensity transformation functions: Contrast stretching, Thresholding, Image negative, Log transformation, Power-law transformation, Intensity level slicing and Bit-plane slicing. Image histogram, Histogram equalization process. Fundamentals of spatial filtering, Correlation and convolution, Spatial filtering mask	06	15
4	Image Filtering in the Frequency Domain: Preliminary Concepts, Extension to functions of two variables, Image Smoothing, Image Sharpening, Homomorphic filtering, 2D- DFT, 2D- FFT, 2D- DCT, Fundamentals of 2D-wavelet transform	06	15
5	Image Restoration: Reasons for image degradation, Model of image degradation/restoration process, Noise probability density functions, Image restoration using spatial filtering	04	10
6	Image Segmentation: Detection of discontinuities, Point, line, and edge detection, thresholding, Edge linking, and boundary detection, Region-based segmentation, Hough transform.	06	15
7	Morphological Image Processing: Basic morphological operations, Structuring elements, dilation and erosion, Opening and closing, The Hit-or-Miss transformation, Basic morphological algorithms: hole filling, connected components, thinning, thickening, Skeletons, pruning.	06	15
8	Representation and Description: Representation, Boundary descriptors, Regional descriptors.	04	10

Course Outcome: After learning the course the students will be able

	CO Statement
CO-1	Understand Image Representation
CO-2	Analyze general terminology of image processing and Understand the fundamental concepts of image processing.
CO-3	Examine various types of images, transformations, and spatial filtering
CO-4	Evaluate the techniques for image enhancement and image restoration
CO-5	Perform image segmentation and representation techniques

List of Reference Books:

1. Digital Image Processing By Rafael C. Gonzalez and Richard E. Woods, Pearson Education.
2. Digital Image processing By S. Sridhar, Oxford University Press.
3. Fundamentals of Image Processing by Anil K. Jain, Prentice Hall.
4. Digital Image Processing By Pratt W.K, John Wiley & Sons.

List of Suggested titles of Experiments:

1. Reading and displaying image
2. Point processing methods for image processing
3. Arithmetic operations for image processing
4. Logical operations for image processing
5. Histogram calculation and equalization
6. Geometric transformation
7. Image restoration
8. Image enhancement-noise removal using spatial filters
9. Frequency domain filtering
10. Edge detection
11. Morphological operations