Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India
(Autonomous Institute Affiliated to University of Mumbai)

Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
ITC7051	Image Processing	04	-	-	04	-	-	4
		Examination Scheme						
		ISE	MSE		ESE			
		10	30		100 (60%Weightage)			

Pre-requisite Course Codes		
After successful completion of the course, student will be able to:		
Course Outcomes	CO1	Improve subjective quality of images.
	CO2	Extract important features from image data.
	CO3	Represent an image to transform and describe Image.
	CO4	Identify compression algorithm to reduce the size of the Image
	CO5	Apply the concept of image processing in various applications.

Module No.	Topics	Ref.	Hrs.
1	**Introductions to Signal Processing Only as a prerequisite for Image Processing. Hence not part of theory exam** Analog, discrete and digital signals, 1D, 2-Dsignals with examples. Discrete time signals: sequences, Discrete time systems LTI systems and their properties. Convolution and Correlation- need, methods and examples.	3	04
2	**Introduction to digital image processing** Introduction: Definition of digital image, generation of digital image, steps in digital image processing, 2D sampling, spatial and tonal resolutions, pixel connectivity,elements of digital image processing systems.	1,2,4	05
3	**Image enhancement in the spatial domain** Point operations, histogram processing, spatial filtering: smoothing, sharpening, median, high boost.	1,4	07
4	**Two Dimensional Discrete Fourier Transform** Introduction to image in frequency domain, Concept of basis images, two dimensional D.F.T. and its properties, two dimensional F.F.T. Filtering in the frequency domain: smoothening, sharpening and homomorphic filtering.	1,4	06

5	**Image segmentation** Detection of discontinuities, edge linking and Boundary detection, Hough transform, thresholding, region oriented segmentation.	1,4	06
6	**Image representation and description** Boundary descriptors: shape number, Fourier descriptor, statistical moments; regional descriptors.	1,4	06
7	**Image data compression** Image data redundancies: coding, inter-pixel, psycho visual; Fundamentals of lossless compression: Arithmetic coding, Huffman coding, LZW coding, RLE, Bit plane coding, predictive coding Lossy compression : JPEG, Sub band	1,4	06
8	**Image morphology** Morphological operation: Dilation erosion, Opening & Closing, Hit or Miss Transform, Basic Morphological Algorithms.	1,4	04
9	**Applications of image processing** Case Study on the following applications: Digital watermarking, Biometric authentication (face, fingerprint, signature recognition) Vehicle number plate detection and recognition, Content Based Image Retrieval, Text Compression.	1,4,5	04
	Total hours of instructions		48

References:

1. Gonzalez &Woods, "*Digital Image Processing*", Third Edition, Pearson Education.
2. W. Pratt, "*Digital Image Processing*", Fourth Edition, 2013, Wiley Publication.
3. J. G. Proakis and D. G. Manolakis, "*Digital Signal processing Principals, Algorithms and Applications*", Third edition, PHI publications.
4. A.K. Jain, "*Fundamentals of Image processing*", Prentice Hall of India Publication, 1995
5. S. Jayaraman, S Esakkirajan and T Veera kumar, "*Digital Image Processing*", Mc Graw Hill Education (India) Private Limited, New Delhi, 2009.