

Course Type	Course Code	Name of Course	L	T	P	Credit
DP (Hons)	NCSH302	<b>DIGITAL IMAGE PROCESSING LABORATORY</b>	0	0	3	1.5
<b>Course Objective</b>						
Practical Implementation of different phases of digital image processing with the aim of providing better practical and research understanding of digital image processing and analysis.						
<b>Learning Outcomes</b>						
Enhance the practical ability to understand different phases of digital image processing and also to provide better understanding about their uses in real world applications.						
Unit No.	Topics to be Covered	Practical Hours	Learning Outcome			
1	<b>Introduction:</b> Image Sampling and Quantization, Image Representation, Pixel Geometry.	3	Implementation of fundamentals of digital image processing and pixel geometry.			
2	<b>Image Enhancement:</b> Contrast Enhancement, Histogram Processing, Spatial Domain Filtering, Edge Sharpening, Frequency Domain lowpass and highpass Filtering.	6	Implementation of different image enhancement techniques used in spatial and frequency domains.			
3	<b>Image Restoration:</b> Image Restoration Filtering, Notch Filter, Image Estimation, Geometric Transformation.	3	Implementation of different image restoration techniques used in spatial and frequency domains.			
4	<b>Image Morphology:</b> Fundamental Operations; Morphological Algorithms.	3	Implementation of different operations used in image morphology.			
5	<b>Image Segmentation:</b> Pixel-based Segmentation, Adaptive Thresholding, Region-based Segmentation, Point, Line, and Edge detection, Canny Edge Detector, Hough Transform.	9	Implementation of different types of image segmentation methods and their use in real applications.			
6	<b>Image Compression:</b> Lossless Compression (Run-length Coding, Shannon-Fano Coding, Huffman Coding, Arithmetic Coding), Lossy Compression (Block Truncation Compression, Vector Quantization).	9	Implementation of different lossless and lossy image compression techniques.			
7	<b>Image Representation and Description:</b> Binary Tree and Quad Tree Coding, Freeman Chain Coding, Medial Axis Generation and Thinning, Boundary Descriptors, Regional Descriptors, Topological Descriptors, Relational Descriptors.	3	Implementation of different techniques used for image representation as well as description.			
8	<b>Multiresolution Analysis and Wavelet:</b> Pyramidal Coding; Subband Coding; Application of Wavelets.	3	Implementation of different techniques used for multiresolution analysis used in digital image processing.			
9	End Sem Lab Examination.	3	Evaluation of the performance of the students based on the topics covered throughout the entire lab sessions.			
<b>Total:</b>						<b>42</b>

**Textbooks:**

1. R. C. Gonzalez and R. E. Woods, "Digital Image Processing", Pearson Education.

**Reference Books:**

1. B. Chanda and D. Dutta Mazumdar, "Digital Image Processing and Analysis", PHI.
2. Fundamentals of Digital Image Processing, A. K. Jain, Pearson India Education.