



# C. U. SHAH UNIVERSITY – WADHWAN CITY

## FACULTY OF TECHNOLOGY AND ENGINEERING DEPARTMENT OF COMPUTER ENGINEERING M. TECH. SEMESTER: - II

**SUBJECT NAME: Digital Image Processing (DIP)**

**SUBJECT CODE: 5TE02DIP1**

**Teaching & Evaluation Scheme: -**

Subject Code	Subject Name	Teaching Scheme (Hours)				Credits	Evaluation Scheme								
		Th	Tu	Pr	Total		Theory				Practical (Marks)				Total
							Sessional Exam		University Exam		Internal		University		
							Marks	Hours	Marks	Hours	Pr/Viva	TW	Pr		
5TE02DIP1	Digital Image Processing	4	0	2	6	5	30	1.5	70	3.0	-	20	30	150	

**Objectives:**

- Cover the basic theory and algorithms that are widely used in digital image processing
- Expose students to current technologies and issues that are specific to image processing systems
- Develop hands-on experience in using computers to process images
- Develop critical thinking about shortcomings of the state of the art in image processing

**Prerequisites:**

- Fundamental knowledge of mathematics and Computer Graphics.

**Course outline:**

Sr. No.	Course Contents
1	<b>Digital Image Fundamentals:</b> Image Formation Model, Image Sampling and Quantization, Representation of Digital Images, Basic Relationship between Pixels, Distance Measures.
2	<b>Image Enhancement:</b> Spatial Domain Methods: Point Operators, Histogram Processing, Neighborhood Averaging, Averaging of Multiple Images, Media Filtering, DFT, smoothing and sharpening in spatial and frequency domain, Homomorphic filtering
3	<b>Image Restoration :</b> Degradation Model, Noise Models, Constrained Restorations, Inverse Filtering, Wiener Filter.
4	<b>Color Image Processing:</b> Color models; Pseudo color, Image processing, color transformation, segmentation.
5	<b>Wavelets And Multi-Resolution Processing:</b> Image pyramids, sub band coding, Harr transform; multi resolution expression, Wavelet transforms

6	<b>Image Compression &amp; Coding:</b> Fundamentals of redundancies, Basic Compression Methods: Huffman coding, Arithmetic coding, LZW coding, JPEG & MPEG Compression standard.
7	<b>Morphological Image Processing:</b> Erosion, dilation, opening, closing, hit or miss transformation, Basic Morphological Algorithms: hole filling, boundary extraction, connected components, thinning, thickening, skeletons
8	<b>Image Segmentation And Representation:</b> Detection of Discontinuities, Point Detection, Line Detection, Edge Detection, Edge Linking, Hough Transformation, Thresholding, Basic Global and Local Thresholding, Region Based Segmentation, Simple Method of Representation, Signatures, Boundary Segments, Boundary and Regional Descriptors, Object Recognition and Tracking
9	<b>Advanced Photography:</b> Introduction to Image Cloning, Warping, Morphing, Imprinting, Watermarking, Super Resolution Image, Image Rendering.

### **Learning Outcomes:**

At the end of this all modules the students will be well acquainted with the knowledge of Image Processing.

### **Books Recommended:**

#### **Text Books:**

1. Digital Image Processing, **Gonzalez Rafael C. and Woods Richard C.**; Pearson Education, Prentice Hall of India, 2nd Ed. (2002)
2. Fundamentals of Digital Image Processing, **Jain A.K.**, PHI, 1st Ed. (1989)
3. Digital Image Processing, **Pratt W. K.**, Prentice Hall, 1st Ed. (1989)
4. Digital Image Processing, Vol. 1 and 2, **Rosenfold and Kak A.C.**, Prentice Hall, 1st Ed. (1986)