

## CSE-----: Image Processing

Program: B.Tech. (CSE)  
Course: Program Elective

Year: 2  
Credits: 3

Semester: 4  
Hours: 40

### Course Context and Overview:

The course aims to provide the students an introduction to the fundamentals of image processing. Concepts of a typical image processing system will be covered including image enhancement, representation and recognition for application in principal areas. The course aims to develop a foundation for further study and research in this area. The course will augment theory with assignments in MATLAB and implementation of a term paper.

### Prerequisites Courses:

NIL

### Course Outcomes (COs):

<b>On completion of this course, the students will have the ability to:</b>
<b>CO1</b> Understand fundamental concepts of digital image processing
<b>CO2</b> Apply image enhancement transformations
<b>CO3</b> Explain colour image processing
<b>CO4</b> Describe image morphology
<b>CO5</b> Understand basic concepts of image segmentation and image representation

### Course Topics:

Topics	Lecture Hours	
<b>UNIT – I</b>		
<b>1. Introduction to digital image fundamentals</b>		
1.1 Introduction to digital image processing, applications	1	6
1.2 Components of an image processing system	1	
1.3 Image sensing and acquisition	1	
1.4 Sampling and quantization	1	
1.5 Pixel relationships	1	
1.6 Image operations	1	

<b>UNIT – II</b>		
<b>2. Image Enhancement</b>		
2.1 Gray level transformations	1	6
2.2 Histogram processing	1	
2.3 Spatial filtering	1	
2.4 Fourier transform	1	
2.5 Frequency-domain filtering	1	
2.6 Convolution	1	
<b>UNIT – III</b>		
<b>3. Color Image Processing</b>		
3.1 Colour models	1	4
3.2 Pseudocolor image processing	1	
3.3 Colour transformations	1	
3.4 Segmentation	1	
<b>UNIT – IV</b>		
<b>4. Morphological Image Processing</b>		
4.1 Dilation, erosion, opening, closing	3	6
4.2 Hit-or-miss transformation	1	
4.3 Basic morphological algorithms including connected components, convex hull, skeletons	2	
<b>UNIT-V</b>		
<b>5. Image Segmentation</b>		
5.1 Point/line/edge detection, Hough transform	3	5
5.2 Thresholding, region-based segmentation	2	
<b>UNIT-VI</b>		
<b>6. Image Representation and Description</b>		
6.1 Representation including chaincodes, signatures, boundary segments, skeletons	3	5
6.2 Description including boundary descriptors, regional descriptors	2	
<b>UNIT-VII</b>		
<b>7. Applications of Image Processing</b>		
7.1 Object detection, Biometrics, Bio-medical image processing	8	8

**Textbook references (IEEE format):****Text Book:**

1. Rafael C. Gonzalez and Richard E. Woods, *Digital Image Processing*, 2<sup>nd</sup> edition, Prentice Hall (2002).

**Reference books:**

2. Anil K. Jain, *Fundamentals of Digital Image Processing*, Prentice Hall.

**Evaluation Methods:**

<b>Component</b>	<b>Weightage</b>
Continuous evaluation (quizzes, assignments)	20%
Midterm	30%
Final Examination	50%

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