CSE-----: Image Processing

Program: B.Tech. (CSE)	Year: 2	Semester: 4
Course: Program Elective	Credits: 3	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):

On completion of this course, the students will have the ability to:
CO1 Understand fundamental concepts of digital image processing
CO2 Apply image enhancement transformations
C03 Explain colour image processing
C04 Describe image morphology
C05 Understand basic concepts of image segmentation and image representation

Course Topics:

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

UNIT – II		
2. Image Enhancement		
2.1 Gray level transformations	1	
2.2 Histogram processing	1	
2.3 Spatial filtering	1	6
2.4 Fourier transform	1	
2.5 Frequency-domain filtering	1	
2.6 Convolution	1	
UNIT – III		
3. Color Image Processing		
3.1 Colour models	1	
3.2 Pseudocolor image processing	1	4
3.3 Colour transformations	1	
3.4 Segmentation	1	
UNIT – IV		
4. Morphological Image Processing		
4.1 Dilation, erosion, opening, closing	3	
4.2 Hit-or-miss transformation	1	6
4.3 Basic morphological algorithms including connected components, convex hull, skeletons	2	
UNIT-V		
5. Image Segmentation		5
5.1 Point/line/edge detection, Hough transform	3	
5.2 Thresholding, region-based segmentation	2	
UNIT-VI		
6. Image Representation and Description		
6.1 Representation including chaincodes, signatures, boundary segments, skeletons	3	5
6.2 Description including boundary descriptors, regional descriptors	2	
UNIT-VII		
7. Applications of Image Processing		
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,* 2nd edition, Prentice Hall (2002).

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

Evaluation Methods:

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

Prepared By: Preety Singh
Last Update: December 5, 2017