

Programme: B. Tech. (CSE)	Course Title: Digital Image Processing (DIP)			Course Code: CSE 2012
Type of Course: Program Elective	Prerequisites: NIL			Total Contact Hours: 40
Year/Semester: 2 nd /4 th	Lecture Hrs/Week: 3	Tutorial Hrs/Week: 0	Practical Hrs/Week: 0	Credits: 3

Learning Objective

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 OpenCV.

Course outcomes (COs):

On completion of this course, the students will have the ability:		Bloom's Level
CO-1	Understand fundamental concepts of digital image processing	2
CO-2	Understand image enhancement transformations and Apply them in various real life problems	2, 3
CO-3	Understand color image processing and its applications in real life	2
CO-4	Understand and Implement image morphological techniques	2, 3
CO-5	Understand basic concepts of image segmentation and image representation	2
CO-6	Design and Development of image processing-based solutions for various real-world problems	3, 6

Topic	Lecture Hours	
UNIT – I		
1. Introduction to digital image fundamentals		
1.1 Introduction to digital image processing, applications, Components of an image processing system	1	4
1.2 Image sensing and acquisition, Sampling, and Quantization	1	
1.3 Pixel relationships	1	
1.4 Image operations	1	
UNIT – II		
2. Image Enhancement		

2.1 Gray level transformations	1	11
2.2 Histogram processing	3	
2.3 Spatial filtering, Convolution	3	
2.5 Frequency-domain filtering	4	
UNIT – III		4
3. Color Image Processing		
3.1 Color models	1	
3.2 Pseudocolor image processing	1	
3.3 Colour transformations	1	
3.4 Using color in image segmentation	1	
UNIT – IV		7
4. Morphological Image Processing		
4.1 Dilation, erosion, opening, closing	3	
4.2 Hit-or-miss transformation	1	
4.3 Basic morphological algorithms: Extraction of connected components, convex hull, skeletons	3	
UNIT-V		7
5. Image Segmentation		
5.1 Point/line/edge detection, Hough transform	3	
5.2 Thresholding, region-based segmentation	4	
UNIT-VI		7
6. Image Pattern Classification		
6.1 Patterns and Pattern Classes	2	
6.2 Pattern Classification: Prototype matching, deep learning	5	

Textbook references:

Textbook:

1. Rafael C. Gonzalez and Richard E. Woods, *Digital Image Processing*, 4th Edition, Pearson, 2018.

Reference books:

2. Anil K. Jain, *Fundamentals of Digital Image Processing*, Prentice Hall.
3. Bernd Janhe, *Digital Image Processing*, 6th edition, Springer 2005
4. Kenneth R. Castleman, *Digital Image Processing*, 2nd edition, Prentice Hall, 1995.

Evaluation Method	
Item	Weightage (%)
Quiz 1	15
Project	15
Assignment / Viva	10
Mid Sem	25
End Sem	35

*Please note, as per the existing institute's attendance policy the student should have a minimum of 75% attendance. Students who fail to attend a minimum of 75% lectures will be debarred from the End Term/Final/Comprehensive examination.

CO and PO Correlation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2											2		
CO2	2	3	2		2						2		2	1	3
CO3	1	1	2		2						1		2	1	3
CO4	2	3	1		2		1				2		2	1	2
CO5	1	2	1		2						2		2	1	2
CO6	3	3	2		2		1				2	1	3	2	3

Last Updated On: 14th January 2021

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Approved By: