COURSE CODE:	**EE-333**	
COURSE NAME:	**DIGITAL IMAGE PROCESSING**	

CREDIT HOURS: Theory = 02
Practical = 01
Total = 03

CONTACT HOURS: Theory = 32
Practical = 48
Total = 80

PREREQUISITE: Nil

MODE OF TEACHING:

Instruction:	Two hours of lecture per week	67%
Practical:	Three hours of Lab work per week	33%

COURSE DESCRIPTION:

This course is designed to help the student to apply principles and techniques of digital image processing in applications related to digital Imaging system design and analysis. Analyze and implement image processing algorithms. Gain hands-on experience in using software tools for processing digital images.

COURSE OBJECTIVES:

This course introduces the basic theories and methodologies of digital image processing. On the completion of the course the students will be able to perform digital image processing using MATLAB as an analysis, design, and visualization tool.

RELEVANT PROGRAM LEARNING OUTCOMES (PLOs):

The course is designed so that students will achieve the PLOs:

1	Engineering Knowledge:	☑	7	Ethics:		☐
2	Problem Analysis:	☐	8	Individual and Collaborative Team Work:		☐
3	Design/Development of Solutions:	☑	9	Communication:		☐
4	Investigation:	☐	10	Project Management:		☐
5	Tool Usage:	☑	11	Lifelong Learning:		☐
6	The Engineer and Society:	☐				

COURSE LEARNING OUTCOMES:

Upon successful completion of the course, students will be able to:

No.	CLO	Domain	Taxonomy Level	PLO
1	Understanding the fundamental concepts of image processing.	Cognitive	2	1
2	Analyze images using mathematical transformations and operations.	Cognitive	4	3
3	Develop solutions by using modern tools to solve practical problems.	Cognitive	5	5

TOPICS COVERED:

Theory:

Week	Topics
1	**Introduction to image processing** Examples and applications of image processing Elements of visual perception Image sensing and acquisition Image sampling and quantization
2	**Mathematical tools used in image processing** Neighborhood, Connectivity, Regions & Boundaries Distance Measures Image Operations on Pixel
3	**Introduction to histograms** Histogram based techniques Convolution and correlation
4	**Spatial Filters & Sharpening Filters** Smoothing in spatial domain Sharpening in spatial domain
5-6	**Image Restoration and Reconstruction** Noise models Noise reduction by spatial filtering Noise reduction by frequency filtering
7-8	**Morphological Image Processing** Erosion and dilation Opening and closing Basic morphological algorithms
9	**Discrete Fourier Transform** Extension of DFT to 2D DFT properties
10	**Filtering the frequency domain** Image smoothing in frequency domain Image sharpening in frequency domain
11-12	**Color Image Processing** Color models Color transformations
13-14	**Image Segmentation** Point, line, and edge detection Thresholding Region-based segmentation
15	**Image Compression** Basic image compression Error-Free, lossy& Image Compression Standards
16	**Advanced topics in image processing**
17-18	**ESE**

TEXT AND MATERIAL:

Textbook(s)

   a. Digital Image Processing, (3rd Edition) by Rafael Gonzalez and Richard E Woods, 2007.

Reference Books:

   a. Fundamentals of Digital Image Processing (2nd Edition) by Anil K. Jain Prentice Hall, 2005.
   b. Digital Image Processing using MATLAB (2nd Edition) by Rafael Gonzalez and Richard E Woods, 2009.

ASSESMENT SYSTEM:

1. **CLOs Assessment**

Cognitive	Psychomotor	Affective
Spreadsheet	-	-

2. **Relative Grading**

Theoretical / Instruction			67%
	Assignments 10%		
	Quizzes 10%		
	Mid Semester Exam 30%		
	End Semester Exam 50%		
Practical Work			33%
Laboratory Work		70%	
	Laboratory Attendance 20%		
	Laboratory Report 20%		
	Laboratory Quiz 30%		
Viva/Quiz		30%	
Total			**100%**