

## DIGITAL IMAGE PROCESSING (Minor Elective-III)

Semester III (Computer Engineering)

SUB CODE: MECE302-B

### Teaching Scheme (Credits and Hours)

Teaching scheme				Total Credit	Evaluation Scheme					Total
L	T	P	Total		Theory		Mid Sem Exam	CIA	Pract.	
Hrs	Hrs	Hrs	Hrs		Hrs	Marks	Marks	Marks	Marks	
03	00	02	05	04	3	70	30	20	30	150

### LEARNING OBJECTIVES:

The objective of this course is

- To study the image fundamentals and mathematical transforms necessary for image processing.
- To study the image enhancement techniques
- To study image compression procedures
- To study image segmentation and representation techniques
- To study image restoration procedures

### OUTLINE OF THE COURSE:

Unit No	Topics
1.	Introduction
2.	Image Enhancement
3.	Image Restoration
4.	Color Image Processing
5.	Wavelets and Multi-resolution Processing
6.	Image Compression
7.	Morphological Image Processing

**Total hours (Theory): 45**

**Total hours (Practical): 30**

**Total hours: 75**

**DETAILED SYLLABUS:**

<b>Sr. No</b>	<b>Topic</b>	<b>Lecture Hours</b>	<b>Weight age (%)</b>
1	<b>Introduction :</b> Fundamentals, Applications; Image processing system components, Image sensing and acquisition, Sampling and quantization, Neighbors of pixel adjacency connectivity, regions and boundaries; Distance measures.	05	15
2	<b>Image Enhancement:</b> Frequency and Spatial Domain, Contrast Stretching, Histogram Equalization, Low pass and High pass filtering.	06	15
3	<b>Image Restoration:</b> Noise models, mean, order—statistics, adaptive filters. Band reject, Band pass and notch filters.	08	20
4	<b>Color Image Processing:</b> Color models; Pseudo color, Image processing; color transformation, segmentation.	08	20
5	<b>Wavelets and Multi-resolution Processing:</b> Image pyramids, sub band coding, Harr transform; multi resolution Expression, Wavelet transforms.	06	15
6	<b>Image Compression:</b> Fundamentals; models; error free and lossy compression; standards.	07	10
7	<b>Morphological Image Processing:</b> Boundary extraction; region filtering; connected component extraction; convex hull; Thinning; Thickening; skeletons; pruning; image segmentation.	05	05

**INSTRUCTIONAL METHOD AND PEDAGOGY** (Continuous Internal Assessment (CIA) Scheme)

- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.
- Lectures will be conducted with the aid of multi-media projector, black board, OHP etc.
- Attendance is compulsory in lecture and laboratory which carries 10 marks in overall evaluation.
- One internal exam will be conducted as a part of internal theory evaluation.
- Assignments based on the course content will be given to the students for each unit and will be evaluated at regular interval evaluation.

- Surprise tests/Quizzes/Seminar/tutorial will be conducted having a share of five marks in the overall internal evaluation.
- The course includes a laboratory, where students have an opportunity to build an appreciation for the concepts being taught in lectures.
- Experiments shall be performed in the laboratory related to course contents.

### **STUDENTS LEARNING OUTCOMES:**

On successful completion of the course, the student will:

- Be able to check the correctness of algorithms using inductive proofs and loop invariants.
- Understand the basic concepts image processing.
- Image Restoration & Enhancement techniques.
- JPEG, MPEG understanding.
- Be able to learn colour image processing.
- Be able to learn segmentation.
- Familiar with morphological image processing.

### **REFERENCE BOOKS:**

1. Digital Image Processing, Second Edition by Rafel C Gonzalez and Richard E. Woods, Pearson Education
2. Digital Image Processing by Bhabatosh Chanda and Dwijesh Majumder, PHI
3. Fundamentals of Digital Image Processing by Anil K Jain, PHI
4. Digital Image Processing Using Matlab, Rafel C. Gonzalez and Richard E. Woods, Pearson Education

### **REFERENCE LINKS / E-CONTENT:**

1. <http://www.imageprocessingplace.com/>