UNIVERSITY OF MADRAS

B.Sc. DEGREE PROGRAMME IN COMPUTER SCIENCE

SYLLABUS WITH EFFECT FROM 2023-2024

Year: III **Semester: V**

Digital Image Processing	**325E5F**
Credits 3	**Lecture Hours:4 per week**

Learning Objectives: (for teachers: what they have to do in the class/lab/field)

- To understand the sensing, acquisition and storage of digital images.
- To study the image fundamentals and mathematical transforms necessary for image processing.
- To understand the digital processing systems and corresponding terminology.
- To understand the base image transformation domains and methods.
- To have an understanding of colour models, type of image representations and related statistics.
- To study the image enhancement techniques, image compression procedures.
- To study image segmentation and representation techniques, image restoration.

Course Outcomes: (for students: To know what they are going to learn)

CO1: Be able to understand basic concepts image processing, image storage and types of transformations that can be applied to images.

CO2: Be able to compare the domains and methods of image processing.

CO3: Be able to check the correctness of algorithms using inductive proofs and loop invariants.

CO4: Learn Image Restoration & Enhancement techniques, colour image processing

Units	Contents
I	**Introduction to Computer Graphics:** Introduction of Coordinate representation and Pixel - Raster Scan & Random Scan systems - Video controller and raster scan display processor.
II	**Introduction to image processing:** Fundamentals - Applications - Image processing system components - Image sensing and acquisition - Sampling and quantization - Neighbours of pixel adjacency connectivity -regions and boundaries - Distance measures.
III	**Image Enhancement:** Frequency and Spatial Domain - Contrast Stretching - Histogram Equalization - Low pass and High pass filtering. **Image Restoration:** Noise models - mean, order—statistics - adaptive filters - Band reject, Band pass and notch filters
IV	**Colour Image Processing:** Colour models - Pseudo colour Image processing - Colour transformation and segmentation. **Image Compression:** Fundamentals – Models - Error free and lossy compression Standards.
V	**Morphological Image Processing: Overview** Boundary extraction - Region filtering - Connected component extraction - convex hull - Thinning; Thickening; skeletons; pruning; Image segmentation.

Text Book:

1. Digital Image Processing, Second Edition by Rafel C. Gonzalez and Richard E. Woods, Pearson Education

Reference books:

1. Digital Image Processing by Bhabatosh Chanda and Dwijesh Majumder, PHI
2. Fundamentals of Digital Image Processing by Anil K Jain, PHI