Text / Reference book:

- K. Castlemann. “Digital Image Processing”, Prentice Hall of India Ltd., 1996
- A. K. Jain, “Fundamental of Digital Image Processing”, Prentice Hall of India Pvt. Ltd., 1995
- C. Gonzalez and P. Wintz, “Digital Image Processing”, Addision-Wesley Publishing, 1987
- Sing_Tze Bow, M. Dekker, “Pattern Recognition and Image Processing”, 1992
- M. James, “Pattern Recognition”, BSP professional books, 1987
- P. Monique and M. Dekker, “Fundamentals of Pattern Recognition”, 1989

Course Synopsis: This course deals with image components.

Goal: To be familiar with processing of images, recognition of the pattern and their applications.

Course Contents:

Unit 1. Introduction to Digital Images Processing (4 Hrs)

Digital image representation, Digital image processing: Problems and applications, Elements of visual perception, Sampling and quantization, relationships between pixels.

Unit 2. Two-Dimensional Systems (5 Hrs)

Fourier Transform and Fast Fourier Transform, Other image transforms and their properties: Cosine transform, Sine transform, Haar transform.

Unit 3. Image Enhancement and Restoration (8 Hrs)

Point operations, contrast stretching, clipping and thresholding, digital negative, intensity level slicing, bit extraction, Histogram modeling: Equalization modification, specification, Spatial operations: Averaging, directional smoothing, median, filtering spatial low pass, high pass and band pass filtering, magnification by replication and interpolation.

Unit 4. Image Coding and Compression (4 Hrs)

Pixel coding: run length, bit plan, Predictive and inter-frame coding.

Unit 5.Introduction to Pattern Recognition and Images (3 Hrs)

Unit 6. Recognition and Classification (5 Hrs)

Recognition classification, Feature extraction, Models, Division of sample space

Unit 7. Grey Level Features Edges and Lines (6 Hrs)

Similarity and correlation, Template matching, Edge detection using templates, Edge detection using gradient models, model fitting, Line detection, problems with feature detectors.

Unit 8. Segmentation (3 Hrs)

Segmentation by thresholding, Regions for edges, line and curve detection

Unit 9. Frequency Approach and Transform Domain (3 Hrs)

Unit 10. Advanced Topics (4 Hrs)

Neural networks and their application to pattern recognition, Hopfield nets, Hamming nets, perception.