CMP 481.3 Image Processing and Pattern Recognition (3-1-2)

	Theory	Practical	Total
Sessional	30	20	50
Final	50	-	50
Total	80	20	100

Course Objectives:

To provide the knowledge of image processing and pattern recognition and their application.

Course Contents:

1. Introduction to Digital Image Processing (4 hrs)

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

2. Two-dimensional Systems (5 hrs)

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

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.

4. Image Coding and Compression (4 hrs)

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

5. Introduction to Pattern Recognition and Image (3 hrs)

6. Recognition and Classification (5 hrs)

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

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.

8. Segmentation (3 hrs)

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

9. Frequency Approach and Transform Domain (3 hrs)

10. Advanced Topics (4 hrs)

Neural network and their application to pattern recognition, Hopfield nets, Hamming nets, Perceptron.

Laboratory:

Laboratory exercises using image processing and pattern recognition packages.

Text Books:

1. K.Castlemann, Digital Image Processing, Prentice Hall of India Pvt. Ltd., 1996.
2. Sing_tze Bow, M. Dekker, Pattern Recognition and Image Processing, 1992.

Reference Books:

1. A.K. Jain, *Fundamental of Digital Image Processing*, Prentice Hall of India Pvt, Ltd., 1995.
2. R.C. Gonzalez and P. Wintz, *Digital Image Processing*, Addison-Wesley Publishing, 1987.
3. M.James, *Pattern Recognition*, BSP Professional books, 1987.
4. P. Monique and Dekker, *Fundamentals of Pattern Recognition*, 1989.