PCS6J006|PATTERN RECOGNITION (4-0-0)

MODULE I
Feature, Feature extraction and Pattern Representation, Concept of Supervised and Unsupervised Classification, Introduction to Application Areas.
Bayes Decision Theory : Discriminant Functions and Services, the Normal Distribution, Bayesian Classification, Estimating Probability Density Functions, Nearest Neighbor Rules, Bayesian Networks.

MODULE II
Classifier: the Perceptron Algorithm, Least-Squares Methods, Multilayer Perceptron's, Back Propagation Algorithm, Decision Trees ,Combinations of Classifiers, Support Vector Machines ,Radial Basis Function Networks
Feature Selection: Data Preprocessing,ROC Curves,Class Separability Measures,Feature Subset Selection,Bayesian Information Criterion

MODULE III
Feature Generation: The Karhunen-Loeve Transform, The Singular Value Decomposition, Independent Component Analysis, The Discrete Fourier Transform, The Hadamard Transform ,The Haar Transform.
Template Matching: Similarity Measures Based on Optimal Path Searching Techniques: Bellman's Optimality Principle and Dynamic Programming, The Edit Distance , Dynamic Time Warping in Speech Recognition, Measures Based on Correlations

MODULE IV
Unsupervised Classification:
Clustering :Sequential Algorithms, Hierarchical Clustering , Hard Clustering Algorithms : The Isodata or k-means or c-means Algorithm , k-Medoids Algorithms (The PAM, CLARA, CLARANS Algorithms)

Miscellaneous (Optional):
Graph Clustering, Learning Clustering, Clustering High Dimensional Data-Subspace Clustering, Ensemble learning algorithms, Markov random fields, Kalmanfilters,and Particle filters.

Text Book:
1. R.O.Duda, P.E.Hart and D.G.Stork, Pattern Classification, John Wiley

Reference Books:
1. C.M.Bishop, Pattern Recognition and Machine Learning, Springer, 2006
2. Theodoridis, S. and K. Koutroumbas, Pattern recognition. 4th ed. 2009, San Diego, CA: Academic Press.