CS407: Pattern Recognition	L	T	P	Linear Algebra, Probability Theory
	3	1	0	

Course Objective: To equip with basic mathematical and statistical techniques commonly used in pattern recognition. Also provide with an adequate background on probability theory, statistics, and optimization theory to tackle a wide spectrum of engineering problems.

S. No.	Course Outcomes (CO)
CO1	Learn various data pre-processing techniques.
CO2	Understand feature selection methodologies.
CO3	Apply different learning approaches in pattern recognition
CO4	Implement performance evaluation of models.

S. No	Contents	Contact Hours
UNIT 1	Pattern recognition fundamentals: Basic concepts of pattern recognition, fundamental problems in pattern recognition system, design concepts and methodologies, example of automatic pattern recognition systems, a simple automatic pattern recognition model.	8

UNIT 2	Bayesian decision theory: Minimum-error-rate classification, Classifiers, Discriminant functions, Decision surfaces, Normal density and Discriminant functions, Discrete features, Missing and noisy features.	**8**
UNIT 3	Maximum-likelihood and Bayesian parameter estimation:Maximum-Likelihood estimation: Gaussian case, Maximum a Posteriori estimation, Bayesian estimation: Gaussian case, Problems of dimensionality, Dimensionality reduction: Principle component analysis.	**8**
UNIT 4	Non-parametric techniques for density estimation: Parzen-window method, K-Nearest Neighbour method, Fuzzy classifications. Unsupervised learning and Clustering: k-mean clustering, fuzzy k-mean clustering, similarity measures, criterion functions for clustering, hierarchical clustering.	**8**
UNIT 5	Neural Network Classifiers: Single and Multilayer Perceptron, Feedforward operations and classifications, network learning, training protocols,Back Propagation Learning, Bayes discriminants and neural networks.	**8**
UNIT 6	Stochastic Methods: Stochastic search, Boltzmann factor, simulated annealing algorithm, deterministic simulated annealing, Boltzmann learning. Evolutionary Methods: Genetic algorithms, genetic programming, particle swarm optimization.	**8**
	Total	**48**