Syllabus

**Module I                                                                                                                     10 hours**

**Introduction:**Learning problems, perspectives and issues, concept learning, version spaces and candidate eliminations, inductive bias, decision tree learning, representation, algorithm, heuristic space search.

**Module II                                                                                                                    10 hours**

**Neural Networks And Genetic Algorithms:**Neural network representation, problems, perceptrons, multilayer networks and back propagation algorithms, advanced topics, Genetic algorithms, hypothesis space search, genetic programming, models of evaluation and learning.

**Module III                                                                                                                   12 hours**

**Bayesian and Computational Learning:**Bayes theorem , concept learning, maximum likelihood, minimum description length principle, Bayes optimal classifier, Gibbs Algorithm, Naïve Bayes Classifier, Bayesian belief network, EM algorithm, probability learning, sample complexity, finite and infinite hypothesis spaces, mistake bound model.

**Module IV                                                                                                                   10 hours**

**Instance Based Learning:**K-Nearest neighbour learning, locally weighted regression, radial basis functions, case based learning.

**Module V                                                                                                                    10 hours**

**Hidden Markov Models:**Introduction, discrete Markov processes, hidden Markov models, three basic problems of HMMs evaluation problem, finding the state sequence, learning model parameters, continuous observations, the HMM with input, model selection in HMM.

**Text Book(s)**

1. Tom M. Mitchell, Machine Learning, McGraw Hill , 2013.

2. Ethem Alpaydin, Introduction to Machine Learning (Adaptive Computation and Machine Learning), The MIT Press, 2004

**References**

1. T. Hastie, R. Tibshirani, J. H. Friedman, The Elements of Statistical Learning, 1/e, Springer, 2001.

2. M Narasimha Murty, Introduction to Pattern Recognition and Machine Learning, World Scientific Publishing Company, 2015