

# Machine Learning SYLLABUS

#### Module - 1

Introduction to Machine Learning
Supervised Learning
Unsupervised Learning
Reinforcement Learning
Statistical Decision Theory
Bias – Variance

#### Module - 2

Linear Regression

Multivariate Regression

Subset Selection

Shrinkage Methods

Principal Components Regression

Partial Least Squares

### Module - 3

Linear Classification
Logistic Regression
Linear Discriminant Analysis
Tutorial to live Machine Learning project
Artificial Neural Networks - Early Models and Backpropagation
Artificial Neural Networks - Training, Initialization and Validation
Parameter Estimations

### Module - 4

Separating Hyperplane Approaches - Perceptron Learning Support Vector Machines

### SVM Kernels Hingle Loss Formulation of SVM Objective

#### Module - 6

Decision Trees
Regression Trees
Decision Trees Real Life Examples

#### Module - 7

Evaluation and Evaluation Measures
2 Class Evaluation Measures
The ROC Curve
Minimum Description Length Analysis
Ensemble Methods

#### Module - 8

Gradient Boosting
Random Forests
Naive Bayes
Bayesian Networks
Multiclass Classification

### Module - 9

Undirected Graphical Methods
Hidden Markov Models
Variable Elimination
Tree Width and Belief Propagation

### Module - 10

Partitional Clustering
Hierarchical Clustering
The BIRCH and CURE Algorithms
Density Based Clustering

## Module - 11

Gaussian Mixture Models Expectation Maximization

# Module - 12

Linear Theory
Reinforcement Learning