

III YEAR SEM-1 B.Tech CSE	ELECTIVE	L	T	P	C
CODE: CS3504	Machine Learning	2	2	0	4

UNIT I: Introduction to ML

A brief introduction to Machine Learning, Supervised Learning, Unsupervised Learning, Reinforcement Learning, Statistical decision theory – Regression, Classification, Bias-variance, Linear Regression, Multivariate Regression, Dimensionality Reduction: Subset Selection, Shrinkage Methods, Principle Component Regression, Partial Least Square.

Unit II: Statistical Models

Naïve Bayes, Bayesian Classifier, Gaussian Multivariate model, Gaussian Mixture model, Parameter Estimation: Maximum Likelihood Estimation, Expectation and Maximization, Priors & MAP Estimation, Bayesian Parameter Estimation

Unit II: Artificial Neural Networks and SVM

Feed forward network, Perceptron Learning, Back propagation, SVM – Formulation, SVM – Interpretation & Analysis, SVMs for Linearly Non-Separable Data, SVM Kernels, SVM – Hinge Loss Formulation.

Unit IV: Decision Trees and Ensemble method

Introduction, Entropy, Information gain, Decision Trees, Stopping Criteria, Loss-Function for Classification, Missing Values, Multi-way splits, Imputations & Surrogate Splits, Instability, Smoothness & Repeated Subtrees, Ensemble Methods: Bagging, Boosting

Unit V: Evaluation Measures & Hypothesis Testing

Evaluation Measures: Evaluation Measure, Bootstrapping & Cross Validation, 2 Class Evaluation Measure, The ROC Curve, Hypothesis Testing: Introduction to Hypothesis testing, Basic concept, Sampling Distributions & the Z Test, Student's t-test, The Two Sample & Paired Sample t-tests, Confidence Intervals.

Unit VI: Clustering

Clustering: Partitional Clustering, Hierarchical Clustering, Threshold Graphs, The BIRCH Algorithm, The CURE Algorithm, Density Based Clustering.

Text Books:

1. T. Mitchell. Machine Learning. McGraw-Hill, 1997.

Reference Books:

1. Kevin Murphy, Machine learning: a probabilistic perspective, MIT Press, 2012.
2. Christopher Bishop, pattern recognition and machine learning, Springer, 2007.

Video Reference:

Title	Expert Name	Affiliation	Weblink
Introduction to machine learning	Prof. Balaraman Ravindran	IIT, Madras	http://nptel.ac.in/courses/106106139/