

III- Year I- Semester	Name of the Course	L	T	P	C
PC3102	Machine Learning	3	0	0	3

Syllabus:

Unit 1-Introduction to Statistical Learning and Linear Regression

Introduction to Statistical Learning: What Is Statistical Learning? Assessing Model Accuracy.

Linear Regression: Simple Linear Regression, Estimating the Coefficients, Assessing the Accuracy of the Coefficient Estimates, Assessing the Accuracy of the Model.

Unit 2-Multiple Linear Regression and Classification

Multiple Linear Regression: Estimating the Regression Coefficients, Other Considerations in the Regression Model, Comparison of Linear Regression with K-Nearest Neighbours.

Classification: An Overview of Classification, Why Not Linear Regression? Logistic Regression, Generative Models for Classification, A Comparison of Classification Methods.

Unit 3-Resampling Methods, Linear Model Selection and Regularization

Resampling Methods: Cross-Validation, the Bootstrap.

Linear Model Selection and Regularization, Subset Selection, Shrinkage Methods, Dimension Reduction Methods, Considerations in High Dimensions.

Unit 4-Tree-Based Methods

Tree-Based Methods: The Basics of Decision Trees, Regression Trees, Classification Trees, Trees Versus Linear Models, Advantages and Disadvantages of Trees, Bagging, Random Forests, Boosting and Bayesian Additive Regression Trees.

Unit 5-Support Vector Machines and Unsupervised Learning

Support Vector Machines, Maximal Margin Classifier, Support Vector Classifiers, Support Vector Machines.

Unsupervised Learning: The Challenge of Unsupervised Learning, Principal Components Analysis, Missing Values and Matrix Completion, Clustering Methods.

Text Books:

1. Gareth James, et al. An Introduction to Statistical Learning: with Applications in R, Springer. 2nd edition (2021 edition).

Reference Books:

1. Tom Mitchell, "Machine Learning", McGraw Hill, 1997
2. E. Alpaydin, "Introduction to Machine Learning", PHI, 2005.
3. Andrew Ng, Machine learning yearning, <https://www.deeplearning.ai/machine-learning-yearning/>
4. Hands-on machine learning with R" by Bradley Boehmke & Brandon Greenwell
5. "Machine learning with R, the tidyverse, and mlr" by Hefin I. Rhys