21AML05	STATISTICAL MACHINE LEARNING	L	T	P	C
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Course Objectives

- The main objective of this course is to emphasis on statistical analysis and methodology, which is the predominant approach in modern machine learning.

UNIT I	**Statistical Theory**	**9 Hours**

Maximum likelihood, Bayes, minimax, parametric versus nonparametric methods, Bayesian versus Non-Bayesian approaches, classification, regression, density estimation

UNIT II	**Convexity and Optimization**	**9 Hours**

Convexity, conjugate functions, unconstrained and constrained optimization, KKT conditions.

UNIT III	**Parametric Methods**	**9 Hours**

Linear regression, model selection, generalized linear models, mixture models, classification, graphical models, structured prediction, hidden Markov models

UNIT IV	**Kernel Methods**	**9 Hours**

Mercel kernels, kernel classification, kernel PCA, kernel tests of independence.

UNIT V	**Computation**	**9 Hours**

The EM Algorithm, simulation, variational methods, regularization path algorithms, graph algorithms

UNIT VI	**CASE STUDY**	

Case Study on Algoritms

TOTAL PERIODS: 45

Course Outcomes:

- Understand the methodology with theoretical foundations and computational aspects.
- Understand the analysing an algorithm's statistical properties and performance guarantees.
- Understand with practical aspects of methodology and intuition to help students to develop tools
- Learn to make judgment in choosing a suitable for selecting appropriate methods and approaches to problems in their own research.
- Understand the basic concepts of Statistical Machine Learning

Text books:

1. The Elements of Statistical Learning by Hastie, Tibshirani and Freedman
2. Pattern Recognition and Machine Learning by Bishop

Reference Books:

1. Chris Bishop, Pattern Recognition and Machine Learning, Springer, Information Science and Statistics Series, 2006.
2. Trevor Hastie, Robert Tibshirani, Jerome Friedman, The Elements of Statistical Learning: Data Mining, Inference, and Prediction, Springer Texts in Statistics, Springer Verlag, New York, 2001.