

MACHINE LEARNING

I Semester: CSE								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
BCSB03	Elective	L	T	P	C	CIA	SEE	Total
		3	0	0	3	30	70	100
Contact Classes: 45		Total Tutorials: Nil		Total Practical Classes: Nil			Total Classes: 45	

I. COURSE OVERVIEW:

The course covers the concepts of various machine learning algorithms and techniques with a modern outlook focusing on recent advances using modelling techniques, supervised and unsupervised learning.

II. OBJECTIVES:

The students will try to learn:

- I. The Design and analyze various machine learning algorithms and techniques with a modern outlook focusing on recent advances.
- II. The Explore supervised and unsupervised learning paradigms of machine learning.
- III. The Explore Deep learning technique and various feature extraction strategies.

III. COURSE OUTCOMES:

After successful completion of the course, students should be able to:

CO 1	Make use of the basic methods of supervised learning with linear models and binary classification include in multiclass outputs	Apply
CO 2	Summarize decision trees, support vector machines in optimizing basic methods of regression.	Understand
CO 3	Sketch the key issues and applications in clustering and dimensionality reduction.	Apply
CO 4	Experiment matrix factorization used to process reduction in unsupervised learning	Understand
CO 5	Correlate the modeling techniques and scalable machine learning in various time series data and graphical models.	Apply

IV. SYLLABUS:

UNIT-I	SUPERVISED LEARNING (REGRESSION/CLASSIFICATION)	Classes: 10
Basic methods: Distance-based methods, Nearest- Neighbors, Decision Trees, Naive Bayes, Linear models: Linear Regression, Logistic Regression, Generalized Linear Models, Support Vector Machines, Nonlinearity and Kernel Methods, Beyond Binary Classification: Multi-class/Structured Outputs, Ranking.		
UNIT-II	UNSUPERVISED LEARNING	Classes: 10
Clustering: K-means/Kernel K-means, Dimensionality Reduction: PCA and kernel PCA, Matrix Factorization and Matrix Completion, Generative Models (mixture models and latent factor models).		
UNIT-III	MACHINE LEARNING	Classes: 08
Evaluating Machine Learning algorithms and Model Selection, Introduction to Statistical Learning Theory, Ensemble Methods (Boosting, Bagging, Random Forests).		
UNIT-IV	MODELLING TECHNIQUES	Classes: 09

Sparse Modelling and Estimation, Modelling Sequence/Time-Series Data, Deep Learning and Feature Representation Learning.

UNIT-V

SCALABLE MACHINE LEARNING

Classes: 08

A selection from some other advanced topics, e.g., Semi-supervised Learning, Active Learning, Reinforcement Learning, Inference in Graphical Models, Introduction to Bayesian Learning and Inference.

Text Books:

1. Kevin Murphy, Machine Learning: “A Probabilistic Perspective”, MIT Press, 2012
2. Trevor Hastie, Robert Tibshirani, Jerome Friedman, “The Elements of Statistical Learning”, Springer 2009 (freely available to online)
3. Christopher Bishop, “Pattern Recognition and Machine Learning”, Springer, 2007.

Web References:

1. <http://www.tutorialspoint.com/r/>
2. https://en.wikipedia.org/wiki/R_programming_language.
3. <http://www.r-bloggers.com/how-to-learn-r-2/#h.obx6jyuc9j7t>.

E-Text Books:

1. <https://cran.r-project.org/doc/manuals/r-release/R-intro.pdf>
2. <https://www.cs.bris.ac.uk/~flach/mlbook/>.
3. <http://mylovelibrary.com/emylibraryus/free.php?asin=1466583282>.