MACHINE LEARNING

VIII Semester: CSE / IT								
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
ACS014	**Core**	3	0	0	3	30	70	100
Contact Classes: 45	**Tutorial Classes: Nil**	**Practical Classes: Nil**				**Total Classes: 60**		

OBJECTIVES:

The students will try to learn:

1. The fundamental concepts, issues and challenges of machine learning associated to data for model selection.
2. The supervised learning methods such as decision trees, Naïve Bayes classifier, k-nearest neighbor learning for building data models and basics of unsupervised learning methods.
3. The knowledge used for making predictions or decisions without human intervention on real-world problems.

COURSE OUTCOMES:

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

CO1: **Recognize** the characteristics of machine learning that make it useful to real-world problem.
CO2: **Discuss** the steps involved in designing a learning system by considering well posed learning problems.
CO3: **Analyze** the underlying mathematical relationships within and across machine learning algorithms.
CO4: **Relate** the hypothesis space search for an application using decision tree learning.
CO5: **Explain** models for reasoning with uncertainty as well as the use of unreliable information.
CO6: **Identify** appropriate learning functions as activation function for neural network design.
CO7: **Make use** of optimizing function for reducing the error in prediction model.
CO8: **Develop** artificial neural network using back propagation algorithm for different applications.
CO9: **Demonstrate** Naïve Bayes algorithm based on Bayes theorem for classification problem.
CO10: **Make Use of** k-nearest neighbor algorithm for solving both classification and regression problems.
CO11: **Discuss** the reinforcement learning by observing the current environment state.
CO12: **Identify** appropriate machine learning techniques and computing environment suitable for the applications.

UNIT-I	**TYPES OF MACHINE LEARNING**	**Classes: 09**

Concept learning: Introduction, version spaces and the candidate elimination algorithm; Learning with trees: Constructing decision trees, CART, classificationexample.

UNIT -II	**LINEAR DISCRIMINANTS**	**Classes: 09**

Perceptron (MLP): Going forwards, backwards, MLP in practices, deriving back; Propagation support vector Machines: Optimal separation, kernels.

UNIT -III	**BASIC STATISTICS**	**Classes: 09**

Averages, variance and covariance, the Gaussian; The bias-variance tradeoff Bayesian learning: Introduction, Bayes theorem, Bayes optimal classifier, NaïveBayes classifier.

Graphical models: Bayesian networks, approximate inference, making Bayesian networks, Hidden Markov models, the forwardalgorithm		
UNIT -IV	**EVOLUTIONARY LEARNING**	**Classes: 09**
Genetic Algorithms, genetic operators; Genetic programming; Ensemble learning: Boosting,bagging; Dimensionality reduction: Linear discriminate analysis, principal component analysis (JAX-RPC)		
UNIT -V	**CLUSTERING**	**Classes: 09**
Similarity and distance measures, outliers, hierarchical methods, partitional algorithms, clustering large databases, clustering with categorical attributes,comparison		
Text Books:		
1. Tom M. Mitchell, "Machine Learning ", McGraw-Hill, 1st Edition,2013. 2. Stephen Marsland, "Machine Learning - An Algorithmic Perspective ", CRC Press, 1st Edition,2009.		
Reference Books:		
1. Rajjal Shinghal, "Pattern Recognition and Machine Learning", Springer-Verlag, New York, 1st Edition, 2006.		
Web References:		
1. Httd://ww.udemy.com/MachineLearning/Online_Course 2. https://en.wikipedia.org/wiki/Machine_learning		