COURSE CODE	COURSE TITLE	L	T	P	C
1152IT130	**MACHINE LEARNING**	3	0	0	3

Course Category:

~~Foundation (0)~~/ **Program Core (1)** ~~/ Program Elective (2) / Allied Elective (3) / University Elective (4) / Value Education Elective (5) / Independent Learning (6) / Industry - Higher Learning Institute Interaction (7)~~

a.Preamble :

This course is a branch of computing science that deals with the specification, design and implementation of machine learning models, such systems designed to be responsive to the needs of their end-users.

b. pre-requisite:

Data Warehousing and Mining

c. Related Courses:

- Project Work

d.COURSE EDUCATIONAL OBJECTIVES

- To understand the concepts of machine learning
- To appreciate supervised and unsupervised learning and their applications
- To understand the theoretical and practical aspects of Probabilistic Graphical Models
- To appreciate the concepts and algorithms of reinforcement learning
- To learn aspects of computational learning theory

e. Course Outcomes:

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

CO Nos.	Course Outcomes	Knowledge Level (Based on revised Bloom's Taxonomy)
CO1	To implement a neural network for an application of your choice using an available tool	K2,S3
CO2	To implement probabilistic discriminative and generative algorithms for an application of your choice and analyze the results	K2,S3
CO3	To use a tool to implement typical clustering algorithms for different types of applications	K2,S3

CO4	To design and implement an HMM for a sequence model type of application	K2,S3
CO5	To identify applications suitable for different types of machine learning with suitable justification.	K2,S3

UNIT I INTRODUCTION

Machine Learning - Machine Learning Foundations –Overview – applications - Types of machine learning - basic concepts in machine learning Examples of Machine Learning - Applications - Linear Models for Regression - Linear Basis Function Models - The Bias-Variance Decomposition - Bayesian Linear Regression - Bayesian Model Comparison

UNIT II SUPERVISED LEARNING

Linear Models for Classification - Discriminant Functions -Probabilistic Generative Models - Probabilistic Discriminative Models - Bayesian Logistic Regression. Decision Trees - Classification Trees- Neural Networks -Feed-forward Network Functions - Ensemble methods- Bagging- Boosting.

UNIT III UNSUPERVISED LEARNING

Clustering- K-means - The EM Algorithm in General -Model selection for latent variable models - high-dimensional spaces -- The Curse of Dimensionality -Dimensionality Reduction - Factor analysis - Principal Component Analysis - Probabilistic PCA.

UNIT IV PROBABILISTIC GRAPHICAL MODELS

Directed Graphical Models - Bayesian Networks - Exploiting Independence Properties - From Distributions to Graphs -Examples -Markov Random Fields - Inference in Graphical Models - Learning –Naive Bayes classifiers-Markov Models – Hidden Markov Models

UNIT V ADVANCED LEARNING

Sampling – Basic sampling methods – Reinforcement Learning- K-Armed BanditElements - Model-Based Learning- Value Iteration- Policy Iteration. Temporal Difference Learning.

TOTAL: 45 Periods

h.Learning Resources

i.Text Books :

1.Tom Mitchell, "Machine Learning", McGraw-Hill, 1997

2. Kevin P. Murphy, “Machine Learning: A Probabilistic Perspective”, MIT Press, 2012

ii.REFERENCES:

1. Christopher Bishop, “Pattern Recognition and Machine Learning” Springer, 2006