

Devi Ahilya University, Indore, India Institute of Engineering & Technology				I Year M.E. (Computer Engineering Sp. in Software Engineering) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
SER2E3	L	T	P	L	T	P	Total
Machine Learning	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

The field of machine learning is concerned with the question of how to build computer programs able to construct new knowledge or to improve already possessed knowledge by using input information. The goal of this course is to introduce the theoretical foundations of machine learning, to provide practical experience of applying machine learning techniques and to investigate new problems where machine learning techniques can do better.

Pre requisites: Basic knowledge of a programming language and Basic knowledge of probabilities and statistics is required.

COURSE OF CONTENTS

Unit-I

Introduction: Definition, Applications of machine learning, Importance of machine learning, Aspects of developing a learning system: training data and test data, Issues in machine learning, Types of learning: supervised, unsupervised and Reinforcement learning, Concept learning, General-to-specific ordering of hypotheses. Version spaces and the candidate elimination algorithm.

Unit-II

Supervised Learning: Classification and Regression learning methods, Decision Tree Learning: Representing concepts as decision trees, ID3 algorithm. Picking the best splitting attribute, searching for simple trees and computational complexity. Regression and function approximation, linear regression and best fit, Order of polynomial, Polynomial regression, Cross validation.

Unit-III

Unsupervised Learning: Introduction to unsupervised learning -Clustering -Classification of clustering algorithms: K-Means and EM -Factor Analysis: PCA (Principal Components Analysis) and ICA (Independent Component Analysis) -Self-Organized Maps (SOM) and Multi-dimensional Scaling.

Unit-IV

Computational Learning theory, Introduction, PAC Learning, VC dimension, Support Vector Machines (SVM), Genetic Algorithm (GA), illustrative examples for SVM and GA.

Unit-V

Artificial Neural Networks Learning, Introduction, Neural Network Representation, Perceptron, Backpropagation algorithm, Examples of Neural Network Learning.

RECOMMENDED BOOKS

- [1] Tom Mitchell, *Machine Learning*, McGraw-Hill, 1997.
- [2] Richard O. Duda, Peter E. Hart & David G. Stork, *Pattern Classification*, Wiley & Sons, 2001.
- [3] Ethem Alpaydin, *Introduction to Machine Learning*, MIT Press, 2004.
- [4] David E. Goldberg, *Genetic Algorithms in Search, Optimization and Machine Learning*, Kluwer Academic Publishers, Boston, MA, 1989.
- [5] Zbigniew Michalewicz, *Genetic Algorithms + Data Structures = Evolution Programs*, Springer, 1999.

Learning Outcomes:

Upon Completing the Course, students will have knowledge of various machine learning techniques useful for solving the real world problems.

List of Assignment in Machine Learning Lab:

- **Problem based on different machine Learning algorithm**
- **Works on different machine learning Tools**
- **Case Study on different data sets**