

| <b>Devi Ahilya University, Indore, India<br/>Institute of Engineering &amp; Technology</b> |  |          |          | <b>IV Year B.E. (Electronics and<br/>Telecommunication)</b> |          |          |              |
|--|--|----------|----------|---|----------|----------|--------------|
| <b>Subject Code &amp; Name</b>   | <b>Instructions Hours per<br/>Week</b> |          |          | <b>Credits</b>  |          |          |              |
| <b>ETR8E5<br/>MACHINE LEARNING</b>   | <b>L</b>                               | <b>T</b> | <b>P</b> | <b>L</b>  | <b>T</b> | <b>P</b> | <b>Total</b> |
| <b>Duration of Theory<br/>Paper: 3 Hours</b>   | <b>3</b>                               | <b>1</b> | <b>2</b> | <b>3</b>  | <b>1</b> | <b>1</b> | <b>5</b>     |

**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

**Prerequisites:** Basic knowledge of a programming language and Basic knowledge of probabilities and statistics is required.

## COURSE 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, Computational Learning theory, PAC Learning, VC dimension. Artificial Neural Networks Learning: Neural Network Representation, Perceptron, Backpropagation algorithm.

### **Unit-IV Language Learning:**

Classification problems in language: word-sense disambiguation, Formal Language learning, introduction to Hidden Markov models (HMM's).  
Support Vector Machines: Maximum margin linear separators. Quadratic programming solution to finding maximum margin separators..

**Unit-V Genetic Algorithms (GAs):**

Motivation, Representing Hypotheses, Genetic operators, fitness Function and Selection, Working of Genetic Algorithm, Evolutionary Programming and Genetic Programming, Case studies of Machine Learning data sets .

**Learning Outcomes:**

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

**BOOKS RECOMMENDED:**

- [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.

**List of Practical Assignments:**

List of Assignment in Machine Learning Lab:

- 1) Problem based on different machine Learning algorithm
- 2) Works on different machine learning Tools
- 3) Case Study on different data sets