



C. U. SHAH UNIVERSITY

Wadhwan City

FACULTY OF: - Technology and Engineering

DEPARTMENT OF: - Computer Engineering

SEMESTER: - VIII

CODE: - 4TE08MLE1

NAME: – Machine Learning

Teaching & Evaluation Scheme: -

Subject Code	Subject Name	Teaching Scheme (Hours)				Credits	Evaluation Scheme								
		Th	Tu	Pr	Total		Theory				Practical (Marks)				Total
							Sessional Exam		University Exam		Internal		University		
							Marks	Hours	Marks	Hours	Pr/Viva	TW	Pr		
4TE08MLE1	Machine Learning	3	0	2	5	4	30	1.5	70	3	-	20	30	150	

Objectives:

The learning objectives of this course are to:

- To understand the basic concepts of learning and decision trees.
- To understand the neural networks and genetic algorithms
- To understand the Bayesian techniques
- To understand the instant based learning
- To understand the analytical learning and reinforced learning

Prerequisites:

- Probability and Statistics (or equivalent course elsewhere) and earned a grade of B or higher. In addition, some background in linear algebra and optimization will be helpful.

Course outline:

Sr. No.	Course Contents	Total Hrs.
1	INTRODUCTION, CONCEPT LEARNING AND DECISION TREES: Learning Problems, Designing Learning systems, Perspectives and Issues, Concept Learning, Version Spaces and Candidate Elimination Algorithm, Inductive bias, Decision Tree learning, Representation, Algorithm, Heuristic Space Search.	10
2	NEURAL NETWORKS AND GENETIC ALGORITHMS: Neural Network	10

	Representation, Problems, Perceptrons, Multilayer Networks and Back Propagation Algorithms, Advanced Topics, Genetic Algorithms, Hypothesis Space Search, Genetic Programming, Models of Evolution and Learning.	
3	BAYESIAN AND COMPUTATIONAL LEARNING: Bayes Theorem, Concept Learning, Maximum Likelihood, Minimum Description Length Principle, Bayes Optimal Classifier, Gibbs Algorithm, Naïve Bayes Classifier-Bayesian Belief Network, EM Algorithm, Probably Learning, Sample Complexity for Finite and Infinite Hypothesis Spaces, Mistake r Bound Model.	10
4	INSTANT BASED LEARNING AND LEARNING SET OF RULES: K-Nearest Neighbor Learning, Locally Weighted Regression, Radial Basis Functions, Case-Based Reasoning, Sequential Covering Algorithms, Learning Rule Sets, Learning First Order Rules, Learning Sets of First Order Rules, Induction as Inverted Deduction, Inverting Resolution	10
5	ANALYTICAL LEARNING AND REINFORCED LEARNING: Perfect Domain Theories, Explanation Based Learning, Inductive-Analytical Approaches - FOCL Algorithm, Reinforcement Learning, Task, Q-Learning, Temporal Difference Learning	08
	Total	48

Learning Outcomes:

On Completion of the course, the students will be able to

- Choose the learning techniques with this basic knowledge.
- Apply effectively neural networks and genetic algorithms for appropriate applications.
- Apply Bayesian techniques and derive effectively learning rules.
- Choose and differentiate reinforcement and analytical learning techniques

Books Recommended:

1. Machine Learning by **Tom M. Mitchell**, McGraw-Hill Education (INDIAN EDITION), 2013.
2. Introduction to Machine Learning by **Ethem Alpaydin**, 2nd Edition, PHI Learning, 2013.
3. The Elements of Statistical Learning by **T. Hastie, R. Tibshirani, J. H. Friedman**, Springer; 1st edition, 2001.