C. U. SHAH UNIVERSITY
Wadhwan City

FACULTY OF: - Technology and Engineering
DEPARTMENT OF: - Information Technology
SEMESTER: - VIII
CODE: - **4TE08MLE1**
NAME: – Machine Learning

Teaching & Evaluation Scheme: -

Subject Code	Subject Name	Teaching Scheme (Hours)				Credits	Evaluation Scheme							Total
							Theory				Practical (Marks)			
							Sessional Exam		University Exam		Internal		University	
		Th	Tu	Pr	Total		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 Representation, Problems, Perceptrons, Multilayer Networks and Back	10

	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.