22MEHO204	INTRODUCTION TO MACHINE LEARNING					
PREREQUISITES		**CATEGORY**	**L**	**T**	**P**	**C**
Machine learning is a mathematical discipline, and students will benefit from a good background in probability, linear algebra and calculus, programming, and experience is essential.		**PE**	**3**	**0**	**0**	**3**

COURSE OBJECTIVES:

1.	Understand a wide variety of learning algorithms. Understand how to evaluate models generated from data. Apply the algorithms to a real problem, optimize the models learned and report on the expected accuracy that can be achieved by applying the models.

UNIT I	**INTRODUCTION**	**9**	**0**	**0**	**9**

Introduction: Basic definition-types of learning-designing a learning system-perspective and issues in machine learning-hypothesis space and inductive bias- evaluation-cross-validation.

UNIT II	**CONCEPT LEARNING AND THE GENERAL-TO-SPECIFIC ORDERING**	**9**	**0**	**0**	**9**

Introduction-a concept task, concept learning as search-find S: finding a maximally specific hypothesis- version spaces and the candidate elimination algorithm-remarks on version spaces and candidate elimination-inductive bias.

UNIT III	**DECISION TREE LEARNING**	**9**	**0**	**0**	**9**

Introduction-decision tree representation-appropriate problems for decision tree learning-the basic decision tree learning algorithm-hypothesis space search in decision tree learning-inductive bias in decision tree learning-issues in decision tree learning.

UNIT IV	**ARTIFICIAL NEURAL NETWORKS**	**9**	**0**	**0**	**9**

Introduction-neural network representation-appropriate problems for neural network learning- perceptrons- multilayer networks and the back propagation algorithm-remarks on the back propagation algorithm-an illustrative example: face recognition, advanced topics in artificial neural networks.

UNIT V	**LEARNING SYSTEM**	**9**	**0**	**0**	**9**

Probability and Bayes learning, bayes optimal classifier, gibbs algorithm, Naïve bayes classifier, instance based learning - K nearest neighbour learning - locally weighted regression, Computational learning theory-PAC learning model -Sample complexity-VC Dimension -Ensemble learning, analytical learning-learning with perfect domain theories: prolog –EBG.

TOTAL(45L) : 45 PERIODS

REFERENCES:

1.	Machine Learning. Tom Mitchell. First Edition, McGraw- Hill, 1997.
2.	Introduction to Machine Learning Edition 2, by Ethem Alpaydin
3.	T. Hastie, R. Tibshirani, and J. Friedman. The Elements of Statistical Learning. Springer 2011. (Available for download on the authors' web-page: http://statweb.stanford.edu/ ~tibs/ElemStat Learn/)
4.	Kevin P. Murphy. Machine Learning: A Probabilistic Perspective, MIT Press 2012. (Electronic copy available through the Bodleian library.)
5.	Christopher M. Bishop. Pattern Recognition and Machine Learning, Springer 2007.
6.	S. Haykin. Neural networks and learning machines. Pearson 2008.

COURSE OUTCOMES: Upon completion of this course, the students will be able to:		**Bloom Taxonomy Mapped**
CO1	Have a good understanding of the fundamental issues and challenges of machine learning: data, model selection, model complexity, etc.	Understand
CO2	Have an understanding of the strengths and weaknesses of many popular machine learning approaches.	Understand
CO3	Appreciate the underlying mathematical relationships within and across Machine Learning algorithms and the paradigms of supervised and un-supervised learning.	Understand
CO4	Be able to design and implement Artificial Neural Networks algorithms in a range of real-world applications.	Create
CO5	Be able to design and implement various machine learning algorithms in a range of real-world applications.	Create

COURSE ARTICULATION MATRIX															
COs/POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	2	2	0	1	3	0	0	0	0	0	0	1	2	2	0
CO2	2	2	0	1	3	0	3	0	0	0	0	1	2	2	0
CO3	2	2	0	1	3	0	0	0	0	0	0	1	2	2	0
CO4	2	2	0	1	3	0	3	0	0	0	0	1	2	2	0
CO5	2	2	0	1	3	0	3	0	0	0	0	1	2	2	0
Avg	**2**	**2**	**0**	**1**	**3**	**0**	**1.8**	**0**	**0**	**0**	**0**	**1**	**2**	**2**	**0**
3/2/1 – indicates strength of correlation (3 – high, 2- medium, 1- low)															