Code: 22MCA3C02 **Course: Machine Learning using Python**
Credits: 4 **L:T:P: 4:0:0**
SEE: 100 Marks **CIE: 50 Marks**
SEE Hours: 3 **Max. Marks:100**

Prerequisites if any	NIL
Learning objectives	The goal of this course is to comprehend I. To understand the basic theory underlying machine learning. II. To be able to formulate machine learning problems corresponding to different applications.

Course Outcomes:

On the successful completion of the course, the student will be able to

COs	**Course Outcomes**	**Bloom's level**
CO1	Choose the learning techniques and investigate concept learning	Understand
CO2	Identify the characteristics of decision tree and solve problems associated with	Apply
CO3	Apply effectively neural networks for appropriate applications	Apply
CO4	Apply Bayesian techniques and derive effectively learning rules	Apply
CO5	Evaluate hypothesis and investigate instant based learning and reinforced learning	Apply
CO6	Perform statistical analysis of machine learning techniques.	Apply

Mapping with POs and PSOs:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12		PSO1	PSO2
CO1	2	3												3	
CO2		3	2											2	3
CO3			3	2	3						2			3	
CO4				3				2						2	3
CO5					3		2								2
CO6			3											3	

Mapping Strength: **Strong– 3** **Medium – 2** **Low – 1**

Course Structure

	Module – 1 Introduction	No. of Lecture Hours	No. of Tutorial Hours
1.1	The three different types of machine learning,	2	-
1.2	A road map for building machine learning systems,	2	
1.3	Well posed learning problems, Designing a Learning system,	2	
1.4	Perspective and Issues in Machine Learning.	2	
	Module – 2 Concept Learning and Decision Trees		
2.1	Concept learning task ,Concept learning as search	2	-
2.2	Find-S algorithm ,Version space,	2	
2.3	Candidate Elimination algorithm ,Inductive Bias,	2	
2.4	Decision Tree learning – Representation – Algorithm – Heuristic Space Search.	2	
	Module – 3 Artificial Neural Networks		
3.1	Introduction, Neural Network representation,	2	-
3.2	Appropriate Problems, Perceptrons,	2	
3.3	Back propagation algorithm.(SLE*:* Multilayer Networks)	2	
3.4	Back propagation algorithm	2	
	Module – 4 Bayesian Learning		
4.1	Bayes Theorem – Concept Learning	2	-
4.2	Maximum Likelihood	2	
4.3	Minimum Description Length Principle –	2	
4.4	Bayes Optimal Classifier – Naïve Bayes Classifier	2	
	Module – 5 Instant Based Learning and Learning Set of Rules		
5.1	K- Nearest Neighbor Learning –Locally Weighted Regression	2	-
5.2	Radial Basis Functions –Case- Based Reasoning	2	
5.3	Sequential Covering Algorithms – Learning Rule Sets – Learning First Order Rules	2	
5.4	Learning Sets of First Order Rules –Induction as Inverted Deduction	2	
	Module – 6 Analytical Learning and Reinforced Learning		
6.1	Perfect Domain Theories	2	-
6.2	Explanation Based Learning –	2	
6.3	Inductive-Analytical Approaches	2	
6.4	FOCL Algorithm	2	
6.5	Reinforcement Learning	2	
6.6	Task –Q-Learning	2	
	Total No. of Lecture Hours	52	
	Total No. of Tutorial Hours		-
	Total No. of Self learning Hours		

Self-learning topics identified:

1. Introduction to basic terminology and notations
2. Models of Evolution and Learning
3. Multilayer Networks
4. Bayesian Belief Network
5. Inverting Resolution

Textbooks:

1. Tom M. Mitchell, “Machine Learning”, McGraw-Hill Education (INDIAN EDITION), 2013
2. “Python Machine Learning”, Unlock deeper insights into machine learning with this vital guide to cutting-edge predictive analytics, Sebastian Raschka, 3rd Edition, Packt Publishing Ltd., 2019
3. Hands-On Machine Learning with Scikit-Learn and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems, AurelienGeron, 2nd Edition, O’Reilly Publications, 2019

Reference Books:

1. EthemAlpaydin, Introduction to Machine Learning (Adaptive Computation and machine learning) The MIT Press Cambridge, 3rd Edition, 2014
2. Simon Rogers, Mark Girolami, A first course in machine learning, Chapman, & Hall/CRC machine learning & pattern recognition, 2011