

**Vikram University, Ujjain**

**Board of studies in Computer science (Faculty of Engineering Science)**

**SYLLABUS of**

**Certificate course in Machine Learning**

**Exclusively for University Teaching Department (ICS, VUU)**

**Certificate course in Machine Learning**

**PROGRAMME of UTD (ICS, VUU)**

**(Effective from Academic Session 2020-21)**

**[Modified as according to the provision of “Ordinance .....”]**

**COURSE STRUCTURE**

**Certificate course in Machine Learning**

<b>Paper code</b>	<b>Title of Paper</b>	<b>Theory External Marks</b>	<b>Min. Pass marks</b>	<b>Internal Marks</b>	<b>Min. Pass marks</b>	<b>Total</b>
<b>CML-101</b>	<b>Artificial Intelligence</b>	<b>75</b>	<b>27</b>	<b>25</b>	<b>09</b>	<b>100</b>
<b>CML- 102</b>	<b>Machine Learning</b>	<b>75</b>	<b>27</b>	<b>25</b>	<b>09</b>	<b>100</b>
<b>CML-103</b>	<b>Internship/Industrial Training/Project Work</b>	<b><u>150</u></b>	<b><u>54</u></b>	<b>50</b>	<b>28</b>	<b>200</b>
	<b>Total</b>	<b><u>300</u></b>		<b>100</b>		<b>400</b>

## **CML-101- Artificial Intelligence**

### **Unit-1**

Basic Problem solving methods: Production systems-state space search, control strategies. Heuristic search, forward and backward reasoning, Hill climbing techniques Breadth first search, Depth first search, Best search.

### **Unit-2**

Knowledge Representation: Predicate logic, Resolution question Answering, Nonmonotonic Reasoning, statistical and probabilistic reasoning, Semantic Nets. Conceptual Dependency, frames and scripts.

### **Unit-3**

AI languages: Important characteristics of AI languages PROLOG, LISP.

### **Unit-4**

Introduction to Expert Systems: Structure of an Expert system interaction with an expert, Design of an Expert system.

### **Unit-5**

Neural Network: Basic Structure of a neuron, Perception Feed forward, Back propagation, Hopfield Network.

### **Reference Books:**

1. Rich E and Knight K Artificial Intelligence, TMH New Delhi,
2. Nilsson N.J. Principles of Artificial Intelligence, Springer Verlag, Berlin.
3. Barr A, Fergenzaub EA. and Cohen PR, Artificial Intelligence. Addisonwesley Reading (Mass) 1989.
4. Waterman D.A. A guide to Expertsystem, Addison - Wesley, Reading (Mass) 1986,
5. Artificial Intelligence Hand book, Vol. 1-2, ISA. Research Triangle Park 1989,

## **CML-102- Machine Learning**

### **UNIT-1**

Learning Problems-Perspectives and Issues-Concept Learning - Version Spaces and Candidate Eliminations-Inductive bias-Decision Tree learning-Representation Algorithm- Heuristic Space Search.

### **UNIT-2**

Neural Network Representation - Problems - Perceptrons – Multilayer Networks and Back Propagation Algorithms - Advanced Topics - Genetic Algorithms - Hypothesis Space Search Genetic Programming - Models of Evaluation and Learning.

### **UNIT-3**

Bayes Theorem - Concept Learning - Maximum Likelihood – Minimum Description Length Principle - Bayes Optimal Classifier - Gibbs Algorithm - Naïve Bayes Classifier – Bayesian Belief Network - EM Algorithm - Probability Learning - Sample Complexity - Finite and Infinite Hypothesis Spaces - Mistake Bound Model.

### **UNIT-4**

K- Nearest Neighbour Learning - Locally weighted Regression - Radial Bases Functions - Case Based Learning.

### **UNIT-5**

Learning Sets of Rules - Sequential Covering Algorithm - Learning Rule Set - First Order Rules - Sets of First Order Rules - Induction on Inverted Deduction - Inverting Resolution -Analytical Learning - Perfect Domain Theories - Explanation Base Learning – FOCL Algorithm- Reinforcement Learning - Task - Q-Learning - Temporal Difference Learning

### **Reference Books:**

1. Machine Learning - Tom M. Mitchell, - MGH
2. Machine Learning: An Algorithmic Perspective, Stephen Marsland, Taylor & Francis