Code	Subject	L	T	P	C
PHD19008	Artificial Intelligence and Machine Learning	3	1	-	4

Course Objectives:

1. Acquire knowledge of Artificial intelligence theories fundamentals; so they will be able to design program systems using approaches of these theories for solving various real-world problems.
2. Awake the importance of tolerance of imprecision and uncertainty for design of robust and low-cost intelligent machines.

Unit 1: Introduction: Artificial Intelligence, AI Problems, AI Techniques, The Level of the Model, Criteria For Success. Defining the Problem as a State Space Search, Problem Characteristics, Production Systems, Search: Issues in The Design of Search Programs, Un-Informed Search, BFS, DFS; Heuristic Search Techniques:

Unit 2: Reasoning under Uncertainty: Introduction to Non-Monotonic Reasoning, Truth Maintenance Systems, Logics for Non-Monotonic Reasoning, Model and Temporal Logics; Statistical Reasoning: Bayes Theorem, Certainty Factors and Rule-Based Systems, Bayesian Probabilistic Inference, Bayesian Networks, Dempster-Shafer Theory.

Unit 3: Artificial Neural Networks: Basic concepts: The biological neuron- The artificial neuron- Characteristics of the brain- The McCulloch- Pitts neural model- The perceptron neural network architectures: Single layer feed forward ANNs- Multi layer feed forward ANNs. Multilayer feed forward net- structure- Notations- Activation function- Generalized delta rule. Back Propagation: The Back propagation Algorithm: Learning- Parameter choice- Initialization- Stopping criteria- Training set- Data representation- Hidden layers.

Unit 4: Machine Learning: Knowledge and Learning, Learning by Advise, Examples, Learning in problem Solving, Symbol Based Learning, Explanation Based Learning, Version Space, ID3 Decision Based Induction Algorithm, Unsupervised Learning, Reinforcement Learning, Supervised Learning: Perceptron Learning, Back propagation Learning, Competitive Learning, Hebbian Learning. Fuzzy Logic: Crisp Sets, Fuzzy Sets, Fuzzy Logic Control, Fuzzy Inferences & Fuzzy Systems.

Unit 5: Experts Systems: Overview of an Expert System, Structure of an Expert Systems, Different Types of Expert Systems- Rule Based, Model Based, Case Based and Hybrid Expert Systems, Knowledge Acquisition and Validation Techniques, Black Board Architecture, Knowledge Building System Tools, Expert System Shells, Fuzzy Expert systems.

Text Book:
1. Introduction To Artificial Intelligence & Expert Systems, Patterson, PHI
2. Artificial Intelligence, George F Luger, Pearson Education Publications

References:
1. Artificial Intelligence, Elaine Rich and Knight, Mcgraw-Hill Publications
2. Multi Agent systems- a modern approach to Distributed Artificial intelligence, Weiss.G, MIT Press.
3. Artificial Intelligence: A modern Approach, Russell and Norvig, Printice Hall