



TEERTHANKER MAHAVEER UNIVERSITY
(Established under Govt. of U. P. Act No. 30, 2008)
Delhi Road, Moradabad (U.P.)

PhD PROGRAMME

SYLLABUS FOR DISCIPLINE-SPECIFIC COURSE
COMPUTER APPLICATIONS/
COMPUTER SCIENCE & ENGINEERING

Course Code: PDS240139	INTELLIGENCE SYSTEM	L	T	P	C
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Objective:	This course emphasizes the integration of machine learning, natural language processing, and robotics to solve real-world problems efficiently.				
Course Outcomes:					
CO 1:	Demonstration of Problem Solving, State Space Search, Problem Solving Methods, and Search Techniques that require Intelligence.				
CO 2:	Applying the concept of propositional Logic and First Order Predicate Logic, Applications, Reasoning Methods, and Reasoning Process.				
CO 3:	Analyzing the Knowledge representation and its application				
CO 4:	Understanding and Applying Principles Machine Learning concept and application				
CO 5:	Understanding the Theory of Cognitive Learning.				
Course Content:					
Unit 1:	AI problems, the foundation of AI and history of AI intelligent agents: Agents and Environments, the concept of rationality, the nature of environments, structure of agents, Searching- Searching for solutions, uniformed search strategies – Breadth-first search, depth-first Search. Search with partial information (Heuristic search) Hill climbing, A*, AO* Algorithms, Problem reduction,				
Unit 2:	First-order logic. predicate logic- logic programming, Inference in first-order logic, propositional vs. first-order inference, unification & lifts, forward chaining, Backward chaining, Resolution, Learning from observation, Inductive learning, Decision trees, Explanation based learning, Statistical Learning methods, Reinforcement Learning.				
Unit 3:	Knowledge representation: Scope of knowledge, difficulties in knowledge acquisition methods, machine learning, intelligent agents, selecting an appropriate knowledge acquisition method, semantic nets-frames and inheritance, constraint propagation, representing knowledge using rules, and rules-based deduction systems. Reasoning under uncertainty, review of probability, Baye's probabilistic interferences theory.				
Unit 4:	Statistical Learning- Machine Learning and Inferential Statistical Analysis, Bayesian Reasoning a probabilistic approach to inference, K-Nearest Neighbor Classifier. Machines (SVM)- Introduction, Linear				

	Discriminant Functions for Binary Classification, Logistic Regression and Linear Regression for Classification Tasks, Nonlinear Classifier, Regression by Support Vector Machines. Random Forest and Clustering and Association.
Unit 5:	Single layer perceptrons, Structure and learning of perceptrons, Pattern classifier, introduction to ANN and Bayes' classifiers, Feed-forward ANN, Structures of Multi-layer feed-forward networks. Back propagation algorithm, Backpropagation - training and convergence, Functional approximation with backpropagation. Practical and design issues of backpropagation learning, Feed-forward ANN, Structures of Multi-layer feed-forward networks, Learning with Neural Networks: Towards Cognitive Machine, Convolution Neural Networks. Memory-based learning, Hebbian learning. Competitive learning.
Text Books:	<ol style="list-style-type: none"> 1. I. S. Russel and P. Norvig, "Artificial Intelligence – A Modern Approach", Second Edition, Pearson Education 2. David Poole, Alan Mackworth, Randy Goebel, "Computational Intelligence: a logical approach", Oxford University Press. 3. G. Luger, "Artificial Intelligence: Structures and Strategies for complex problem-solving", Fourth Edition, Pearson Education 4. J. Nilsson, "Artificial Intelligence: A new Synthesis", Elsevier Publishers.