22UCSC602 Artificial Intelligence and Machine Learning (3-0-0) 3

Contact Hours:39

Course Learning Objectives (CLOs): This course focuses on following learning perspectives:

- To introduce the basic concepts, theories and state-of-the-art techniques of artificial intelligence and machine learning.
- Enable student with knowledge enough to be a self-learner in exploring the application of machine learning /AI algorithms in the different fields of science, medicine, finance etc.

Course Outcomes (COs):

Description of the Course Outcome: At the end of the course the student will be able to:		**Mapping to POs(1-12)/ PSOs (13-16)**		
		Substantial Level (3)	**Moderate Level (2)**	**Slight Level (1)**
CO-1	**Explain** the search techniques for any real time problems.	-	3,4	1,2
CO-2	**Apply** Knowledge representation using First order logic for making decisions.	-	3,4	1,2

CO-3	**Apply** regression and classification techniques for prediction	-	3,4	-
CO-4	**Apply** the concepts of machine learning to the real-world problems.	-	3,4	-
CO-5	**Demonstrate** machine learning techniques to solve complex problems.	3		

POs/PSOs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Mapping Level	1.0	1.0	2.0	2.0	2.5	-	-	-	-	-	-	-	-	-	-	-

Pre-requisites: Knowledge of Python Programming Fundamentals

Contents:

Unit-I

Introduction: AI Problems Underlying Assumption, AI Techniques, Criteria for Success.

State Space Search & Heuristic Search Techniques: Defining the Problems as A State Space Search, Production Systems, Searching Techniques like Informed and Uniformed Search.

Generate And-Test: Hill Climbing, Best-First Search, Problem Reduction, Constraint Satisfaction, and Means-ends Analysis. **8 Hrs.**

Unit-II

Knowledge Representation: Issues, Representations and Mappings, Approaches to Knowledge Representation.

Using Predicate Logic: Representing, Computable Functions and Predicates, Resolution. Representing Knowledge Using Rules, Procedural Versus Declarative Knowledge, Forward Versus Backward Reasoning. **8 Hrs.**

Unit-III

Linear Regression: Multivariate Regression, Logistic regression, Polynomial Regression.

Linear Models for Classification: Decision Trees, Regression Trees, K-nearest neighbors (KNN) algorithm. Bayes Theorem. **8 Hrs.**

Unit-IV

Unsupervised learning and clustering – k-means clustering, hierarchical clustering, generative adversarial network, Dimensionality Reduction **7 Hrs.**

Unit-V

Perceptron: Neural Networks - Introduction, Early Models, Perceptron Learning, Backpropagation, Initialization, Training & Validation, Support Vector Machines, Introduction, Early Models. **8 Hrs.**

Reference Books:

1) Elaine Rich and Kevin Knight "Artificial Intelligence", 2/E, Tata Mcgraw-Hill, 2005.
2) Stuart Russel and Peter Norvig, "Artificial Intelligence: A Modern Approach", 3/E, Prentice Hall, 2009.
3) Trevor Hastie, Robert Tibshirani, and Jerome H. Friedman "The Elements of Statistical Learning".
4) Christopher Bishop, "Pattern Recognition and Machine Learning" Mitchell Tom "Machine Learning", McGraw Hill, 1997.