JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA
KAKINADA 533003, Andhra Pradesh, India
DEPARTMENT OF MECHANICAL ENGINEERING

III Year - II Semester		**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**
INTRODUCTION TO ARTIFICIAL INTELLIGENCE & MACHINE LEARNING					

Course objectives:

1) To understand the basic concepts of artificial intelligence, neural networks and genetic algorithms.
2) To understand the principles of knowledge representation and reasoning.
3) To gain knowledge about bayesian and computational learning and machine learning.
4) To explore various machine learning techniques.
5) To understand the machine learning analytics and deep learning techniques.

UNIT– I:

Introduction: Definition of Artificial Intelligence, Evolution, Need, and applications in real world. Intelligent Agents, Agents and environments; Good Behavior-The concept of rationality, the nature of environments, structure of agents.

Neural Networks and Genetic Algorithms: Neural network representation, problems, perceptrons, multilayer networks and back propagation algorithms, Genetic algorithms.

UNIT– II:

Knowledge Representation and Reasoning: Logical Agents: Knowledge based agents, the Wumpus world, logic. Patterns in Propositional Logic, Inference in First-Order Logic-Propositional vs first order inference, unification and lifting

UNIT– III:

Bayesian and Computational Learning: Bayes theorem , concept learning, maximum likelihood, minimum description length principle, Gibbs Algorithm, Naïve Bayes Classifier, Instance Based Learning- K-Nearest neighbour learning

Introduction to Machine Learning (ML): Definition, Evolution, Need, applications of ML in industry and real world, classification; differences between supervised and unsupervised learning paradigms.

UNIT– IV:

Basic Methods in Supervised Learning: Distance-based methods, Nearest-Neighbors, Decision Trees, Support Vector Machines, Nonlinearity and Kernel Methods.

Unsupervised Learning: Clustering**,** K-means, Dimensionality Reduction, PCA and kernel.

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UNIT– V:

Machine Learning Algorithm Analytics: Evaluating Machine Learning algorithms, Model, Selection, Ensemble Methods (Boosting, Bagging, and Random Forests).

Modeling Sequence/Time-Series Data and Deep Learning: Deep generative models, Deep Boltzmann Machines, Deep auto-encoders, Applications of Deep Networks.

TEXT BOOKS:

1) Stuart Russell and Peter Norvig, Artificial Intelligence: A Modern Approach, 2/e, Pearson Education, 2010.
2) Tom M. Mitchell, Machine Learning, McGraw Hill, 2013.
3) Ethem Alpaydin, Introduction to Machine Learning (Adaptive Computation and Machine Learning), The MIT Press, 2004.

REFERENCE BOOKS:

1) Elaine Rich, Kevin Knight and Shivashankar B. Nair, Artificial Intelligence, 3/e, McGraw Hill Education, 2008.
2) Dan W. Patterson, Introduction to Artificial Intelligence and Expert Systems, PHI Learning, 2012.
3) T. Hastie, R. Tibshirani, J. H. Friedman, The Elements of Statistical Learning, 1/e, Springer, 2001.
4) Bishop, C. M., Pattern Recognition and Machine Learning, Springer, 2006.
5) M. Narasimha Murty, Introduction to Pattern Recognition and Machine Learning, World Scientific Publishing Company, 2015.

Course outcomes: At the end of the course, student will be able to

CO1: Discuss basic concepts of artificial intelligence, neural networks and genetic algorithms.
CO2: Apply the principles of knowledge representation and reasoning.
CO3: Learn about bayesian and computational learning and machine learning.
CO4: Utilize various machine learning techniques.
CO5: Apply the machine learning analytics and deep learning techniques.