NARSIMHA REDDY ENGINEERING COLLEGE
UGC-AUTONOMOUS INSTITUTION

NRCM
Your roots to success...

An **Autonomous** Institute
NAAC Accreditation **'A'** Grade
Accredited by **NBA**
Approved by **AICTE**, Affiliated to **JNTUH**

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

1: SYLLABUS (NR21)

CY4101PC: MACHINE LEARNING

IV-I:CSE(CS)								
Course Code	**Category**	**Hours/Week**			**Credits**	**Max Marks**		
MC3002	**Mandatory Course**	**L**	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
		3	**0**	**0**	**3**	**30**	**70**	**100**
Contact Classes:45	**Tutorial classes:15**	**Practical classes: Nill**				**Total Classes:60**		
Prerequisites: Data Structures, Knowledge on statistical methods								

Course Objectives

- This course explains machine learning techniques such as decision tree learning, Bayesian learning etc.
- To understand computational learning theory.
- To study the pattern comparison techniques.

Course Outcomes

- Understand the concepts of computational intelligence like machine learning
- Ability to get the skill to apply machine learning techniques to address the real time problems in different areas
- Understand the Neural Networks and its usage in machine learning application.
- Ability to get the best hypothesis using genetic algorithms in different machine learning problems.
- Designing systems by using analytical learning system.

UNIT - I

Introduction - Well-posed learning problems, designing a learning system,
Perspectives and issues in machine learning Concept learning and the general to
specific ordering – introduction, a concept learning task, concept learning as search,

find-S: finding a maximally specific hypothesis, version spaces and the candidate elimination algorithm, remarks on version spaces and candidate elimination, inductive bias

Decision Tree Learning – Introduction, decision tree representation, appropriate problems for decision tree learning, the basic decision tree learning algorithm, hypothesis space search in decision tree learning, inductive bias in decision tree learning, issues in decision tree learning.

UNIT - II

Artificial Neural Networks-1– Introduction, neural network representation, appropriate problems for neural network learning, perceptions, multilayer networks and the back-propagation algorithm.

Artificial Neural Networks-2- Remarks on the Back-Propagation algorithm, An illustrative example: face recognition, advanced topics in artificial neural networks.

Evaluation Hypotheses – Motivation, estimation hypothesis accuracy, basics of sampling theory, a general approach for deriving confidence intervals, difference in error of two hypotheses, comparing learning algorithms.

UNIT - III

Bayesian learning – Introduction, Bayes theorem, Bayes theorem and concept learning, Maximum Likelihood and least squared error hypotheses, maximum likelihood hypotheses for predicting probabilities, minimum description length principle, Bayes optimal classifier, Gibs algorithm, Naïve Bayes classifier, an example: learning to classify text, Bayesian belief networks, and the EM algorithm.

Computational learning theory – Introduction, probably learning an approximately correct hypothesis, sample complexity for finite hypothesis space, sample complexity for infinite hypothesis spaces, the mistake bound model of learning.

Instance-Based Learning- Introduction, *k*-nearest neighbour algorithm, locally weighted regression, radial basis functions, case-based reasoning, remarks on lazy and eager learning.

UNIT- IV

Genetic Algorithms – Motivation, Genetic algorithms, an illustrative example, hypothesis space search, genetic programming, models of evolution and learning, parallelizing genetic algorithms.

Learning Sets of Rules – Introduction, sequential covering algorithms, learning rule sets: summary, learning First-Order rules, learning sets of First-Order rules: FOIL, Induction as inverted deduction, inverting resolution.

Reinforcement Learning – Introduction, the learning task, *Q*–learning, non-deterministic, rewards and actions, temporal difference learning, generalizing from examples, relationship to dynamic programming.

UNIT - V

Analytical Learning-1- Introduction, learning with perfect domain theories: PROLOG-EBG, remarks on explanation-based learning, explanation-based learning of search control knowledge.

Analytical Learning-2- Using prior knowledge to alter the search objective, using prior knowledge to augment search operators.

Combining Inductive and Analytical Learning-Motivation, inductive-analytical approaches to learning using prior knowledge to initialize the hypothesis.

TEXT BOOK:

    1. Machine Learning – Tom M. Mitchell, - MGH

REFERENCE BOOK:

    1. Machine Learning: An Algorithmic Perspective, Stephen Marshland, Taylor & Francis