MACHINE LEARNING (Major Elective-II)

Semester II (Computer Engineering)
SUB CODE: MECE206-B

TEACHING SCHEME (Credits and Hours):

Teaching scheme				Total Credit	Evaluation Scheme					
L	T	P	Total		Theory		Mid Sem Exam	CIA	Pract.	Total
Hrs	Hrs	Hrs	Hrs		Hrs	Marks	Marks	Marks	Marks	Marks
04	00	02	06	05	3	70	30	20	30	150

LEARNING OBJECTIVES:

The objective of this course is

- How can machine understand the visual world of humans
- Understand a range of machine learning algorithms along with their strengths and weaknesses
- Understand the basic theory underlying machine learning
- Read current research papers and understand the issues raised by current research
- Improving performance through experience, theory and practice of machine learning from variety of perspectives

OUTLINE OF THE COURSE:

Unit No	Topics
1	Introduction
2	Decision Tree Learning
3	Artificial Neural Networks
4	Bayesian Learning Methods
5	Computational Learning Theory
6	Instance Based Learning
7	Genetic Learning
8	Reinforcement Learning

Total hours (Theory): 60

Total hours (Practical): 30

Total hours: 90

DETAILED SYLLABUS

Sr. No	Topic	Lecture Hours	Weight age (%)
1	Introduction • Well – Posed Learning System • Designing a Learning System • Perspective and Issues in Machine Learning	5	5
2	Decision Tree Learning • Decision Tree Representation • The Basic Decision Tree Learning Algorithm • Inductive Bias in Decision Tree Learning • Issues in Decision Tree Learning	08	15
3	Artificial Neural Networks • Perceptions • Multilayer Networks and Back propagation Algorithm • An illustrative Example: Face Recognition • Advanced Topics in Artificial Neural Networks	08	15
4	Bayesian Learning Methods • Bayes Theorem and Concept Learning • Bayes Optimal Classifier • Gibbs Algorithm • Naïve Bayes Classifier • Bayesian Belief Networks • The EM Algorithm	08	15
5	Computational Learning Theory • Probably Learning • Sample Complexity for Finite Hypothesis Spaces • Sample Complexity for Infinite Hypothesis Spaces • The Mistake Bound Model for Learning	08	15
6	Instance Based Learning • Nearest Neighbor Learning • Locally Weighted Regression • Radial Basis Functions • Case-Based Reasoning	08	10
7	Genetic Learning • Motivation • Genetic Algorithms • Hypothesis Space Search • Genetic Programming • Models of Evaluation and Learning • Parallelizing Genetic Algorithms	08	15
8	Reinforcement Learning • The Learning Task • Q Learning , Nondeterministic Remarks and Actions • Temporal Difference Learning	07	10

INSTRUCTIONAL METHOD AND PEDAGOGY (Continuous Internal Assessment (CIA) Scheme)

- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.
- Lectures will be conducted with the aid of multi-media projector, black board, OHP etc.
- Attendance is compulsory in lecture and laboratory which carries 10 marks in overall evaluation.
- One internal exam will be conducted as a part of internal theory evaluation.
- Assignments based on the course content will be given to the students for each unit and will be evaluated at regular interval evaluation.
- Surprise tests/Quizzes/Seminar/tutorial will be conducted having a share of five marks in the overall internal evaluation.
- The course includes a laboratory, where students have an opportunity to build an appreciation for the concepts being taught in lectures.
- Experiments shall be performed in the laboratory related to course contents.

STUDENTS LEARNING OUTCOMES:

On successful completion of the course, the student will:

- Be able to learn How can machine understand the visual world of humans
- Be able to Understand a range of machine learning algorithms along with their strengths and weaknesses
- Be able to Understand the basic theory underlying machine learning
- Be able to Read current research papers and understand the issues raised by current research
- Be able to Improving performance through experience, theory and practice of machine learning from variety of perspectives

REFERENCE BOOKS:

1. Machine learning by Tom Mitchell, TMH
2. Introduction to machine learning by Athem Ealpaydin , PHI
3. Computational Intelligence – An Introcution By IMPAndries P. Engelbrecht, Wiley Publication