

III : Intelligent Systems

CSE 4009 ARTIFICIAL INTELLIGENCE [3 0 0 3]

Course Objectives:

- To develop the skills of designing intelligent agents that can solve general purpose problems
- To represent and process knowledge using Propositional and First Order Logic
- To familiarize on quantifying and Probabilistic reasoning

Course Outcomes:

At the end of the course, students will be able to

- Describe the basic concepts and techniques of Artificial Intelligence.
- Develop skills of using AI algorithms for solving practical problems

1. INTRODUCTION :

What is AI? Foundations of Artificial Intelligence, History of Artificial Intelligence, The state of the Art
(Chapter 1: 1.1,- 1.4 of Text Book 1) (2 hrs)

2. INTELLIGENT AGENTS :

Agents and Environments, The concept of Rationality, The Nature of Environments, The structure of Agents.
(Chapter 2: 2.1- 2.4 of Text Book 1) (4 hrs)

3. SOLVING PROBLEMS BY SEARCHING :

Problem Solving agents, Example Problems, Searching for Solutions, Uninformed search strategies, Informed (Heuristic) search strategies, Heuristic functions.
(Chapter 3: 3.1 to 3.5 except 3.5.3, 3.5.4 and 3.6 except 3.6.3, 3.6.4 of Text Book 1) (9 hrs)

4. ADVERSARIAL SEARCH :

Games, Optimal decision in games, Alpha Beta Pruning
(Chapter 5: 5.1 to 5.3 of Text Book 1) (4 hrs)

5. LOGICAL AGENTS :

Knowledge based agents, The Wumpus World, Logic, Propositional logic, Propositional Theorem Proving.
(Chapter 7: 7.1 to 7.5, Chapter 8: 8.2 to 8.4 of Text Book1) (6 hrs)

6. FIRST-ORDER LOGIC

Representation revisited, Syntax and semantics of First order logic, Using First order logic, Knowledge engineering in First order logic.
(Chapter 8: 8.1 to 8.4 of Text Book1) (4 hrs)

7. KNOWLEDGE REPRESENTATION:

Ontological Engineering, Categories and objects, Reasoning systems for categories, The internet shopping world.

(Chapter 12:12.1-12.7 of Text Book 1)

(3 hrs)

8. QUANTIFYING UNCERTAINTY AND PROBABILISTIC REASONING:

Acting under uncertainty, Basic probability notation, Inference using full joint distributions, independence, Baye's Rule and its use, Representing knowledge in an uncertain domain, the semantics of Bayesian networks

(Chapter 13: 13.1 – 13.5, 14: 14.1 to 14.2 of Text Book1)

(4 hrs)

Text Books:

1. Stuart Russell and Peter Norvig – “*Artificial Intelligence A Modern Approach*”, Pearson Education, Third Edition, 2010.

References:

1. Elaine Rich, Kevin Knight, Shivashankar B. Nair, Third Edition, Tata McGraw Hill Edition, 2008.
2. Saroj Kaushik– *Artificial Intelligence*, Cengage Learning Publications, First Edition, 2011.
3. Don W. Patterson - *Introduction to Artificial Intelligence and Expert Systems*, PHI Publication, 2006.

CSE 4010 MACHINE LEARNING [3 0 0 3]

Course Objectives:

- To give basic knowledge about the key algorithms and theory that forms the foundation of machine learning and computational intelligence
- To provide a practical knowledge of machine learning algorithms and methods

Course Outcomes:

- Understand the principles, advantages, limitations and possible applications of machine learning.
- Identify and apply the appropriate machine learning technique to classification, pattern recognition, optimization and decision problems.
- Implement simple algorithms for supervised learning, reinforcement learning, and unsupervised learning.
- Evaluate the performance of a simple learning system on a real-world dataset.

1. INTRODUCTION :

Machine learning basics, Examples of Machine learning application, Steps in developing machine learning application, Learning theory.

(Chapter 1 and 2 of Text Book 1 and Text Book 2)

(3 hrs)

2. CLASSIFICATION AND REGRESSION:

Bayesian decision theory, Maximum likelihood ratio, parametric classification, regression, Multivariate methods, K- nearest neighbor classification.

(Chapter 3, 4 and 5 of Text Book 1)

(8 hrs)

3. SUPERVISED LEARNING: