

Branch Name:	Computer Engineering / Information and Technology
Semester/Year:	Semester VIII / Final Year
Subject Title:	Artificial Intelligence and Machine Learning
Subject Code:	1ET1030802
Pre-requisite:	Knowledge of Programming, Algorithms, Data Structures

Course Objective:

The field of AI and its techniques are being used in many areas which directly affect human life. Various techniques for encoding knowledge in computer systems such as Predicate Logic, Production rules, Semantic networks find application in real world problems. The fields of AI such as Game Playing, Natural Language Processing, and Connectionist Models are also important. Student should know some programming language for AI.

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture (L)	Tutorial (T)	Practical (P)	Credit	Theory (Marks)		Practical (Marks)		Total (Marks)
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
04	-	02	05	70	30	30	20	150

Subject Contents			
Sr. No	Topic	Total Hours	Weightage (%)
1	Introduction to AI: The AI Problems, AI Techniques, The Level Of The Model, Examples.	02	05
2	State Space Search & Heuristic Search Techniques: Defining The Problems as A State Space Search, Production Systems, Production Characteristics, Production System Characteristics, And Issues in The Design of Search Programs, Additional Problems. Generate-And-Test, Hill Climbing, Best-First Search, Problem Reduction, Constraint Satisfaction.	06	15
3	Knowledge Representation Issues and Approaches: Representations and Mappings, Approaches to Knowledge Representation. Representation Simple Facts in Logic, Representing Instance and Isa Relationships, Computable Functions and Predicates, Resolution. Procedural Versus Declarative Knowledge, Logic Programming, Forward Versus Backward Reasoning.	07	12
4	Slot-and-Filler Structures: Semantic Nets, Frames. Conceptual Dependency.	05	10
5	Game Playing: Overview, And Example Domain: Overview, MiniMax, Alpha-Beta Cut-off, Iterative deepening, Goal Stack Planning, Nonlinear Planning Using Constraint Posting, Hierarchical Planning, Reactive Systems, Other Planning Techniques.	06	12
6	Natural Language Processing:	04	08

	Introduction, Syntactic Processing, Semantic Analysis, Semantic Analysis, Discourse And Pragmatic Processing, Spell Checking		
7	Connectionist Models: Introduction: Hopfield Network, learning in Neural Network, Application of Neural Networks, Recurrent Networks, Distributed Representations, Connectionist AI and Symbolic AI.	06	08
8	Introduction to Machine Learning: Learning Problems, designing a learning system, Issues with machine learning. Concept Learning, Version Spaces and Candidate Eliminations, Inductive bias.	06	12
9	Supervised and Unsupervised learning: Decision Tree Representation, Decision tree learning, Issues in Decision tree learning. K- Nearest Neighbour Learning, Locally Weighted Regression, Radial Bases, Functions, Case Based Reasoning.	06	18

Course Outcome:

After learning the course, the students should be able to:

- To understand working of different algorithms, AI based techniques.
- Understand various search methods.
- Use various knowledge representation methods.
- Understand various Game Playing techniques.
- Use Prolog Programming language using predicate logic.

List of Text Books:

1. Artificial Intelligence –By Elaine Rich And Kevin Knight (2nd Edition) Tata Mcgraw-Hill
2. Introduction to Prolog Programming By Carl Townsend.
3. Tom M Mitchell, “Machine Learning”, McGraw Hill.

List of Reference Books:

1. Artificial Intelligence: A Modern Approach, Stuart Russel, Peter Norvig, PHI.
2. PROLOG Programming For Artificial Intelligence –By Ivan Bratko(Addison-Wesley).
3. Programming with PROLOG –By Klocksinn and Mellish.
4. Peter Harrington, “Machine Learning in Action”, DreamTech.

List of Suggested titles of Experiments (If Any):

1. Write a program to implement Tic-Tac-Toe game problem.
2. Write a program to implement BFS.
3. Write a program to implement DFS.
4. Write a program to implement Single Player Game.
5. Write a program to Implement A* Algorithm.
6. Write a program to solve N-Queens problem using Prolog.
7. Write a program to solve 8 puzzle problem using Prolog.
8. Write a program to solve travelling salesman problem using Prolog.
9. Convert Prolog predicates into Semantic Net.
10. Write the Conceptual Dependency for following statements.
 - a) John gives Mary a book.
 - b) John gave Mary the book yesterday.

e-Resources (If any):

1. <http://www.journals.elsevier.com/artificial-intelligence/>
2. <https://www.technologyreview.com/s/534871/our-fear-of-artificial-intelligence/>