Course Name: Artificial Intelligence and Soft Computing

Course Code: CS(EE)701B

Course Credit: 4

Contact Hour: 4

Prerequisite: Basic math, Science and Computer programming

Course Objective:

1. To provide a strong foundation of fundamental concepts in Artificial Intelligence
2. To provide a basic exposition to the goals and methods of Artificial Intelligence
3. To enable the student to apply these techniques in applications which involve perception, reasoning and learning

Course Outcome:

On completion of the course students will be able to

1. Understand the various searching techniques, constraint satisfaction problem and example problems- game playing techniques.
2. Apply these techniques in applications which involve perception, reasoning and learning.
3. Explain the role of agents and how it is related to environment and the way of evaluating it and how agents can act by establishing goals.
4. Acquire the knowledge of real world Knowledge representation.
5. Analyze and design a real world problem for implementation and understand the dynamic behavior of a system.
6. Use different machine learning techniques to design AI machine and enveloping applications for real world problems.

CO Mapping with departmental POs

H: High, M: Medium, L: Low

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	H	H										
CO 2												
CO 3		M							M			
CO 4												
CO 5			M	H	H							
CO 6	H				H				H			H

Course Content

Module I: Introduction **5L**

History and Definition of AI, Foundations Intelligent Agents - Agents and environments-Good behavior- the nature of environments, Structure of agents-Problem Solving agents, Example problems-Searching for solutions

Uninformed search strategies- Breadth- first, depth-first, depth limited search, Uninformed search strategies –Iterative deepening DFS, bi-directional search strategies, Avoiding repeated states, searching with partial information Example problems & Review

Module II: Searching Techniques **7L**

Informed search and exploration- Informed search strategies, greedy best-first, A* Algorithm, Memory-bounded heuristic search, heuristic functions, Local search algorithms and optimization problems, searching in continuous space, CSP – backtracking search for CSPs, Backtracking search for CSPs, Local search for CSP- structure of problems, Adversarial search- Games-Optimal

decisions in games-minimax algorithm, multiplayer games Alpha-beta pruning, Imperfect real time decision, Games that include an element of chance.

Module III: Knowledge Representation **9L**

Introduction to Logic, Syntax and semantics of first order logic, Using first order logic, assertions and queries in first-order logic, kinship domain, Wumpus world problem, Knowledge engineering in first order logic, Inference in first order logic- Propositional vs. first-order inference, Unification and lifting, Storage and retrieval, Forward chaining, Backward chaining, Resolution, Knowledge representation - Ontological engineering, categories and objects, Action, situations and events, Mental events and mental objects.

Module IV: Learning **10L**

Introduction, Learning from observations, Inductive learning, Learning decision trees, Ensemble learning, logical formulation of learning, Knowledge in learning, explanation based learning, Learning using relevance information, inductive logic programming, Statistics learning methods, learning with complete data, Learning with hidden variables – EM algorithm, Instance based learning, Introduction to Neural networks, Neural networks, learning neural network structures, Reinforcement learning, passive reinforcement learning, Active reinforcement learning Generalization in reinforcement learning.

Module V: Applications **9L**

Communication - Communication as action, A formal grammar for a fragment of English, Syntactic analysis Augmented grammars, Semantic interpretation, Semantic interpretation, Ambiguity and disambiguation, Discourse understanding-Grammar induction, Probabilistic language processing - Probabilistic language models, Information Retrieval and implementation, Information Extraction, Machine translation systems.

Text Book

1. Stewart Russell and Peter Norvig. " Artificial Intelligence-A Modern Approach ", 2nd Edition, Pearson Education/ Prentice Hall of India, 2004

References

1. Nils J. Nilsson, “Artificial Intelligence: A new Synthesis”, Harcourt Asia Pvt. Ltd., 2000.
2. Elaine Rich and Kevin Knight, “Artificial Intelligence”, 2nd Edition, Tata McGraw-Hill, 2003.
3. George F. Luger, “Artificial Intelligence-Structures and Strategies For Complex Problem Solving”, Pearson Education / PHI, 2002.