Subject Name : Artificial Intelligence
Subject Code : CE 602 / IT 602

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
03	00	02	05	4	3	70	30	20	30	150

Learning Objectives:

The search and problem solving methods are applicable throughout a large range of industrial, civil, medical, financial, robotic, and information systems. We will investigate questions about AI systems such as: how to represent knowledge, how to effectively generate appropriate sequences of actions and how to search among alternatives to find optimal or near-optimal solutions.

By the end of the course, students should be able to:

Identify the type of an AI problem (search, inference, decision making under uncertainty, game theory, etc). Formulate the problem as a particular type. Compare the difficulty of different versions of AI problems, in terms of computational complexity and the efficiency of existing algorithms. Implement, evaluate, and compare the performance of various AI algorithms, including both empirical demonstration and theoretical proofs.

Outline of the Course:

Sr. No	Title of the Unit	Minimum Hours
1	Introduction	3
2	Problem Spaces and Search	8
3	Adversarial search and Game Playing	8
4	Knowledge and Reasoning	12
5	Introduction to PROLOG	8
6	Uncertain knowledge and reasoning	6

Total hours (Theory): 45

Total hours (Lab): 30

Total hours: 75

Detailed Syllabus:

Sr. No	Topic	Lecture Hours	Weightage(%)
1	**Introduction** The AI problems, AI technique, philosophy and development of Artificial intelligence	3	5
2	**Problem Spaces and Search** State space search, Uninformed and informed search techniques: BFS, A*, variations of A*. Local search and optimization: hill climbing, simulated annealing	8	15
3	**Adversarial Search and Game Playing** Minimax algorithm, alpha-beta pruning, stochastic games, Constraint-satisfaction problems	8	10
4	**Knowledge and Reasoning** Logical agents, Propositional logic, First-order logic, Inference in FoL: forward chaining, backward chaining, resolution, Knowledge representation: Frames, Ontologies, Semantic web and RDF	12	35
5	**Introduction to PROLOG** • Facts and predicates, data types, goal finding, backtracking, simple object, compound objects, use of cut and fail predicates, recursion, lists, simple input/output, dynamic database.	8	20
6	**Uncertain knowledge and reasoning** Probabilistic reasoning, Bayesian networks, Fuzzy logic	6	15
	Total	**45**	**100**

Instructional Method and Pedagogy:

- 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.

Learning Outcome:

On successful completion of the course, the student will:

- Be familiar with Artificial Intelligence, its foundation and principles.
- Examine the useful search techniques; learn their advantages, disadvantages and comparison.
- Learn programming language to program intelligent systems.
- Understand important concepts like Expert Systems, AI applications.
- Be exposed to the role of AI in different areas like NLP, Pattern Recognition etc.
- Learn the practical applicability of intelligent systems, specifically its applications.
- Be able to develop intelligent systems.

Reference Books:

1. Artificial Intelligence, Elaine Rich & Kevin Knight, TMH Publication
2. Introduction to Turbo PROLOG, Carl Townsend, BPB Publication
3. Introduction to AI & Expert Systems, Dan W. Patterson, PHI Publication

List of experiments:

Sr. No	Name of Experiment
1	Study of facts, objects, predicates and variables in PROLOG.
2	Study of Rules and Unification in PROLOG.
3	Study of “cut” and “fail” predicate in PROLOG.
4	Study of arithmetic operators, simple input/output and compound goals in PROLOG.
5	Study of recursion in PROLOG.
6	Study of Lists in PROLOG.
7	Study of dynamic database in PROLOG.
8	Study of string operations in PROLOG. Implement string operations like substring, string position, palindrome etc.)
9	Write a prolog program to maintain family tree.
10	Write a prolog program to implement all set operations (Union, intersection, complement etc.)
11	Write a prolog program to implement Library Management system.
12	Write a prolog program to solve “Water Jug Problem”.