

Amrita VishwaVidyapeetham
Amrita School of Computing, Amritapuri
Department of Computer Science and Engineering
B.Tech Computer Science and Engineering (Artificial Intelligence)

Semester-III

Course Code: **22AIE201** Course Title: **Fundamentals of AI** **L-T-P-C: 2- 0- 3- 3**

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Course Objectives

- To introduce classical AI and rational intelligent agents.
- To introduce techniques for problem solving by search and adversarial games.
- To introduce constraints, logic, and inference techniques
- To introduce planning, acting, and multi-agent systems.
- To introduce knowledge-representation and reasoning.

Course Outcomes

After completing this course, students will be able to

CO1: Analyse different elements of an AI system.

CO2: Apply elementary principles of AI for problem solving and search.

CO3: Apply constraints and logic for intelligent systems.

CO4: Apply knowledge representation and reasoning for defining intelligent systems.

Syllabus:

Unit 1 History and Foundations of AI, Rational Intelligent Agents, Agents and Environments, Nature of Environments, Structure of Agents.

Unit 2 Problem Solving by Search: Uninformed and Informed Search Strategies, Heuristic Functions; Adversarial Search: Games, Optimal Decisions in Games, Alpha-Beta Pruning

Unit 3 Constraint Satisfaction Problems, Inference in CSPs, Backtracking Search; Knowledge-Based Agents, Propositional and First-Order Logic, Resolution Theorem Proving, Unification Forward and Backward Chaining

Unit 4 Classical Planning: Algorithms for Planning, Planning Graphs, Hierarchical Planning, Planning and Acting in Nondeterministic Domain, Multi-Agent Planning; Knowledge Representation: Ontological Engineering, Categories and Objects, Events, Reasoning with Default Information.

Textbooks/ References:

- (i) Russell, Stuart Jonathan, Norvig, Peter, Davis, Ernest. Artificial Intelligence: A Modern Approach. United Kingdom: Pearson, 2010. Deepak Khemani.
- (ii) A First Course in Artificial Intelligence. McGraw Hill Education (India), 2013. Denis Rothman. Artificial Intelligence by Example, Packt, 2018.

Course Plan:

Lect. Hrs.	Topic	Keywords	CO Mapping	Remarks
1	Introduction and History	What is AI? The Foundations of AI The History of AI The State of the Art	CO1	
2-3	Intelligent Agents	Agents and Environments Good Behavior The Nature of Environment The Structure of Agents	CO1	QUIZ 1
4-7	Problem Solving by searching	Problem-solving agents Example problems Searching for Solutions Uninformed Search Strategies	CO2	Lab Assignment 1- Exploring Search Algorithms

8-11	Informed search and Exploration	Heuristic search techniques Heuristic functions Local search algorithm and Optimization problem Local search in continuous spaces	CO2	Lab Assignment 2 QUIZ 2
12-13	Constraint Satisfaction Problem	Constraint Satisfaction problem Backtracking Search for CSPs Local Search for Constraint Satisfaction Problems The Structure of Problems	CO3	Theory Assignment 1 Lab Assignment 3
14-16	Adversarial Search	Games Optimal Decisions in Games Alpha-Beta Pruning	CO2,CO3	QUIZ 3
17-19	Knowledge and Reasoning	Knowledge-Based Agents Propositional Logic : A Very Simple Logic Reasoning Pattern in Propositional Logic Effective Propositional Inference Agents Based on Propositional Logic	CO4	QUIZ 4
20-23	First Order Logic	Representation Revisited Syntax and Semantics of First-Order Logic, Using First-Order Logic	CO3	Lab Assignment 4 (aima package)
24-27	Inference in First-Order Logic	Proportional Vs First-Order Inference Unification and Lifting Forward Chaining Backward Chaining Resolution	CO4	Theory Assignment 2 QUIZ 5

28-31	Planning	The Planning Problem Planning with State-Space Search, Partial Order Planning.	CO3,CO4	Application development
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CO-PO MAPPING

PO ----- CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO3	PSO3
CO1	3	2	2	2	3	2	2	2	2	2	-	2	3	2	3
CO2	2	2	2	2	3	-	-	-	2	2	-	2	3	2	3
CO3	2	2	2	2	3	-	-	-	2	2	-	2	3	2	3
CO4	3	2	2	2	3	-	-	-	2	2	2	2	3	2	3

Evaluation Pattern

Component	Remarks	Weightage
Internal		
Midterm Exam	Pen and Paper Exam	20
	Theory 2 Assignments, 3 marks each=6 marks	

Assignments	Lab: Submission and Viva 4 Lab sheets 5 marks each= 20 marks Application development= 4 marks (Group of 4 students)	30
4 Quiz pen and paper	Max 10 minutes test During class hours 5 marks each	20
External		
End Semester	Pen and Paper Exam	30