



**KALINGA INSTITUTE OF INDUSTRIAL TECHNOLOGY**  
**Deemed to be University**  
**BHUBANESWAR-751024**  
**School of Computer Engineering**

**Lesson Plan**

**Artificial Intelligence (CS30002)**

<b>Lectures:</b>	3 Hrs / Week	<b>Internal Assessment Marks:</b>	50
		<b>Activities:</b>	30
		<ul style="list-style-type: none"><li>• <i>Minimum Activities: 05 and types are quiz, assignment, viva, etc.</i></li><li>• <i>Faculty must share the continuous evaluation for 15 marks each before the Mid-semester and End-semester exams, respectively.</i></li></ul>	
		<b>Mid Sem Exam:</b>	20
		<b>End Term Marks:</b>	50
<b>Credits:</b>	3		
<b>Groups:</b>	B.Tech.		
<b>Faculty Name:-</b>	Dr.Mainak Bandyopadhyay		
<b>Contact Details:-</b>	8009387402, Cabin 10 Campus B		

**Course Objectives:**

**CO1:-**To understand the various characteristics of Intelligent agents

**CO2:-**To learn the different search strategies in AI

**CO3:-**To learn to represent knowledge in solving AI problems .

**CO4:-**To understand the ways of planning and acting in the real world

**CO5:-**To know about the models behind the AI application.

Module No. & Name	Topic/Coverage	No. of lectures	Lecture Serial no.
1. Introduction	<p>1.Introduction:- Use and Application.</p> <p>2. Definition:- Rationality, Thinking Humanly, Acting Humanly, Thinking Rationally and Acting Rationally. Turing Test, Four Capabilities for A.I system.</p> <p>3.Future of Artificial Intelligence.</p>	2	1-2
2. Intelligent Agents	<p>1.Characteristics of Intelligent Agents:- Agent Autonomy, Actuators ,Sensors, Environment, Performance Measure , Agent function and Agent Program. (Vacuum Cleaner Example, etc.)</p> <p>2. Agents and Environment:- Rational Agent , Discuss various environments, Specification of Task Environment (Using Examples).</p> <p>3. Typical Intelligent Agents and their Types:- Simple Reflex, Model based, Goal based and Utility based.(Discuss with Diagram).</p> <p><b>ACTIVITY- 1 [6 marks]</b></p> <p><b>(Must be conducted by 20.12.2024 covering Module nos. 1 &amp; 2)</b></p>	3	3-6
3. Solving Problems by Searching	1.Defining a problem for state space searching. ( State Space Representation of Water-Jug Problem, N-Queen Problem , Monks and Demons problem ,8-Puzzle problem ,etc.) <i>(One or Two problem to be explained in class others can be given for practice).</i>	1	7-19
	2. Search Strategies:- Search Tree, Solution Path, Nodes,Open List, Closed List, concept of space and time complexity.	1	
	3.Uninformed Strategies:- BFS , Uniform Cost	8	

	Search , DFS , Iterative Deepening, Depth Limited and Bidirectional. Discuss the Space and Time complexity of each Strategy.		
	<p>4. Informed (Heuristics Strategies) :- Concept of Heuristics , Admissibility and consistency, Greedy Best First Search , A* Algorithm. Discuss Admissibility, Consistency and Optimality of A*.</p> <p><b>ACTIVITY-2 [6 marks]</b></p> <p><b>(Must be conducted by 20.01.2025 covering part of Module no. 3)</b></p>	3	
4. Beyond Classical Search	1.Local Search Algorithms and Optimization Problems :- Objective Function , Global and Local Minimum/Maximum , Hill Climbing , Problems with Hill Climbing and Solution, Steepest Hill Climbing , Simulated Annealing, Genetic Algorithm (Fitness Function, Crossover and Mutation).	4	20-27
	2. Backtracking Search:- Concept of Constraint Satisfaction Problem , Formulation of problem into CSP. (Crypt-Arithmetic Problem and Map Coloring Problem).	2	
	<p>3. Adversarial Searching :- Concept of Two Players Game, Min-Max Algorithm , Alpha-Beta Pruning. (Tic-tac-toe as an Example)</p> <p><b>ACTIVITY-3 [6 marks]</b></p> <p><b>Mid -Semester</b></p> <p><b>(Must be conducted by 15.02.2025 covering Module nos. 4)</b></p>	2	
5. Knowledge Representation.	<p>1. Basic of Proposition Logic , Truth Tables ,Atomic Sentences, Complex Sentences, Quantifiers , Connectives.</p> <p>2. First Order Predicate Logic.</p> <p>3. Unification.</p> <p>4. Forward Chaining and Backward</p>	5	28-32

	<p>Chaining.</p> <p>5. Resolution.</p> <p>6. Knowledge Representation using First order Predicate logic.</p> <p>7. Logical Agents (Knowledge-based agents, the Wumpus World, entailment, inference, sound and complete inference algorithms, propositional logic, various inference procedures such as model checking and theorem proving, forward and backward chaining etc.)</p> <p><b>ACTIVITY-4 [6 marks]</b></p> <p><b>(Must be conducted by 15.03.2024 covering Module no. 5 prior to Mid Semester Exam)</b></p> <p><b><i>NOTE: 50% of Activities marks i.e. 15 marks to be announced to students before AI mid semester exam</i></b></p>		
6.Planning	<p>1. Planning with state-space search.</p> <p>2. Partial-order planning.</p> <p>3. Planning graphs,</p> <p>4. planning and acting in the real world.</p> <p>5. Plan generation systems.</p>	2	33-35
7.Probabilistic Reasoning.	<p>1. Uncertainty and Review of probability.</p> <p>2.Probabilistic Reasoning.</p> <p>3.Bayesian networks.</p> <p>4.Inferences in Bayesian networks.</p> <p>5. Temporal models and Hidden Markov models.</p> <p><b>ACTIVITY-5 [6 marks]</b></p> <p><b>(Must be conducted by 25.03.2025 covering Module nos. 5, 6 and 7)</b></p>	2	36-37

	<b>END SEMESTER EXAM</b>  <b><i>NOTE: Inform total internal marks (50) to students prior to their End Sem Exam.</i></b>		
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### **Text Books:**

1. Artificial Intelligence: A Modern Approach, Stuart Russel, Peter Norvig, Pearson Education

### **Reference Books:**

1. Artificial Intelligence, Rich, Knight and Nair, Tata McGraw Hill.
2. Principles of Artificial Intelligence, Nils J. Nilsson, Elsevier, 1980.

### **Evaluation Scheme:**

<b>ES No.</b>	<b>Evaluation Component</b>	<b>Percentage of Evaluation</b>
1	Mid-Semester Examination	20
2	Activities	30
3	End-Semester Examination	50

### **Activity based Teaching and Learning:**

Considering the guidelines circulated and after discussing with the faculty members, following activity based teaching and learning is proposed:

#### **■ Activity List**

Component wise distributions of the activities are listed below.

- Problem Solving Assignment
- Critical Thinking Assignment
- Quiz
- Viva / Presentation

**Course Materials:** Course Material will be provided for all topics which can be used as reference. The material consists of –

- Lecture Notes
- Class Work
- Home Work
- Supplementary Reading (including online study aids)