



Kot Bhalwal, Jammu



Model Institute of Engineering
& Technology (Autonomous)
Course Handout

COURSE HANDOUT

ARTIFICIAL INTELLIGENCE (MCA-205)

MCA- 2ND SEMESTER

ACADEMIC YEAR (2025-26)

Ms. Arti Kotru

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Department of Computer Applications



Department of Computer Applications

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Dr. Arun K. Gupta Teaching-Learning Centre

Version 1.1

Please Do Not Print Unless Necessary





Course Code	Course Name	Course Type	Cd	L	T	P	Marks		
							Sessional	Final Exam	Total
MCA-205	Artificial intelligence	PCC	4	4	0	0	40	60	100

COURSE OUTCOMES

At the end of the course the student will be able to:	
CO1	Assimilate the fundamental concepts in Artificial Intelligence
CO2	Analyze a real-world problem for implementation and understand the dynamic behavior of a system.
CO3	Apply techniques in applications which involve perception, reasoning and learning.
CO4	Develop a practical skills in designing and implementing multi-agent systems and genetic algorithms
CO5	Use different machine learning techniques to design AI machine and enveloping applications for real world Problems.

Unit-I: Introduction

Introduction to AI: History of AI, Basic Elements of AI, Introduction to Turing Machine, Turing Test and Rational Agent Approaches; State Space Representation of Problems, Game Playing, Min-Max Search, Alpha Beta Cutoff Procedures.

Introduction to Expert system, Expert System Life Cycle, Study of existing expert systems like MYCIN and DENDRAL.

Unit-II: Searching Techniques

Heuristic Search techniques-Hill Climbing, Best first search: OR graph, A* algorithm, Problem Reduction: AND-OR graph, The AO* Algorithm. Constraint satisfaction: Introduction and algorithm.

Unit-III Knowledge Representation

Knowledge Representation Structures: Propositional Logic, First Order Predicate Logic, CNF, DNF, Prenex Normal Form, Resolution, Unification, Inference Mechanisms Semantic Nets, Frames, Scripts, conceptual dependences, Procedural & Declarative knowledge, Reasoning, Uncertainty.

Unit- IV Multi Agent Systems and Genetic Algorithms

Multi Agent Systems: Agents and Objects; Agents and Expert Systems; Generic Structure of Multiagent System, SemanticWeb, Agent Communication, Knowledge Sharing using Ontologies, Agent Development Tools. Genetic Algorithms (GA): Encoding Strategies, Genetic Operators, Fitness Functions and GA Cycle; Problem Solving using GA.

Unit-V Understanding Natural Languages

Understanding Natural Languages: Parsing techniques, context free and transformational grammars, transition nets, augmented transition nets, Fillmore's grammar; grammar-free analyzers, sentence generation.

Textbooks

S.No	Name of the Books	Name of the Author	Publisher Name	Edition (Pub.Yr.)
1	Artificial Intelligence: A Modern Approach	S. Russell and P. Norvig	Pearson Education	2nd (2012)
2.	Introduction to Artificial Intelligence and Expert Systems	Dan W. Patterson	Prentice Hall India	1st (2015)



Reference Books

S.No	Name of the Books	Name of the Author	Publisher Name	Edition (Pub.Yr.)
1	Our final invention: Artificial intelligence and the end of the human era	Barrat, James	Macmillan,	2 nd (2013).

COURSE PLAN

Unit-I Introduction to AI

S.No	Topics	Recommended Books
1	History of AI	Book 1, Ch.1
2	Basic Elements of AI	Book 1, Ch.1
3	Introduction to Turing Machine, Turing Test	Book 2, Ch.2
4	Rational Agent Approaches, State Space Representation of Problems	Book 1, Ch.1
5	Game Playing, Min-Max Search, Alpha Beta Cut-off Procedures	Book 1, Ch.6
6	Introduction to Expert system, Expert System Life Cycle, Study of existing expert systems like MYCIN and DENDRAL.	Book 2, Ch.15

Unit-II Searching Techniques

7	Heuristic Search techniques-Hill Climbing	Book 1, Ch.4
8	Best first search: OR graph, A* algorithm	Book 1, Ch.4
9	Problem Reduction: AND-OR graph, The AO* Algorithm	Book 1, Ch.3
10	Constraint satisfaction: Introduction and algorithm	Book 1, Ch.5

Unit-III Knowledge Representation

11	Knowledge Representation Structures: Propositional Logic	Book 2, Ch.2
12	First Order Predicate Logic	Book 1, Ch.8
13	CNF, DNF, Prenex Normal Form	Book 1, Ch.9
14	Resolution, Unification, Inference Mechanisms	Book 1, Ch.9
15	Semantic Nets, Frames, Scripts	Book 2, Ch.7
16	Conceptual dependences	Book 2, Ch.7
17	Procedural & Declarative knowledge	Book, Ch.6
18	Reasoning, Uncertainty	Book 2, Ch.5

Unit-IV Multi Agent Systems and Genetic Algorithms

19	Multi Agent Systems: Agents and Objects	Book 1, Ch.2
20	Agents and Expert Systems	Book 1, Ch.2
21	Generic Structure of Multiagent System, Semantic Web Agent Communication, Knowledge Sharing using Ontologies, Agent Development Tools	https://www.ibm.com/think/topics/multiagent-system
22	Genetic Algorithms (GA): Encoding Strategies	Book 2, Ch.17
23	Genetic Operators, Fitness Functions,	Book 2, Ch.17
24	GA Cycle; Problem Solving using GA	Book 2, Ch.17

Unit-V Understanding Natural Languages

25	Parsing techniques	Book 2, Ch.12
26	Context free and transformational grammars.	Book 2, Ch.12
27	Transition nets, augmented transition nets.	Book 2, Ch.12
28	Fillmore's grammar; grammar-free analyzers, sentence generation	Book 2, Ch.12



ADDITIONAL WEB RESOURCES

1.	MOOC: Introduction to Artificial Intelligence (AI) https://www.coursera.org/learn/introduction-to-ai
2.	NPTEL: Video lectures on Introduction to Artificial Intelligence Lecture series by Prof. Mausam, IIT Delhi https://nptel.ac.in/courses/106102220

GRADING AND ASSESSMENT

- **Sessional Test:** 20 marks
- **Assignment:** 10 marks
- **Attendance:** 10 marks
- **Final Examination:** 60 marks

COURSE POLICIES

- **Attendance:** Minimum 75% attendance is mandatory to appear in the final examination of the course.
- **Academic Integrity:** MIET's academic integrity policies apply. Plagiarism will not be tolerated.
- **Late Submissions:** Assignments and projects must be submitted by the specified timelines.

FACULTY INFORMATION

- **Office Hours**
Monday (12:55 PM - 1:45 PM)
Friday (12:55 PM - 1:45 PM)
- **Contact Information**
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