



INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal - 500 043, Hyderabad, Telangana

COURSE CONTENT

AI FOUNDATIONS								
I Semester: CSE / IT / CSE (AI&ML) / CSE (DS) / CSE (CS)								
II Semester: ECE / EEE								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
ACSE02	Foundation	L	T	P	C	CIA	SEE	Total
		3	0	0	3	40	60	100
Contact Classes: 48	Tutorial Classes: NIL	Practical Classes: NIL			Total Classes: 48			
Prerequisite: Python Programming								

I. COURSE OVERVIEW:

Artificial intelligence (AI) is the simulation that examines to achieve intelligent human behaviors on machines especially on a computer system. This course provides the ideas, methods, and problem-solving paradigms that helps in providing solutions to real-world problems without human effort. Furthermore, it is a mathematical language that enables knowledge to be expressed precisely and unambiguously, making it perfect for usage in AI systems. AI applications are becoming increasingly common in a wide variety of applications including machine language, deep learning, natural language processing, computer vision, and robotics.

II. COURSES OBJECTIVES:

The students will try to learn:

- I The fundamental concepts of Artificial Intelligence, including the characteristics of intelligent agents and how AI systems solve problems through state space search and production systems.
- II The various problem-solving strategies such as heuristic search, optimization, and logic-based reasoning using predicate logic, along with effective knowledge representation techniques.
- III the structure and functionality of software agents, their communication mechanisms, and explore real-world AI applications in natural language processing, robotics, machine learning, and expert systems.

III. COURSE OUTCOMES:

At the end of the course students should be able to:

- CO1 Explain the ability to design a plan for the real-world problems and mapping it to the digital world.
- CO2 Choose appropriate problem-solving methods and optimize the search results.
- CO3 Develop agents through knowledge representation for any given AI based problem using logic programming.
- CO4 Discover how planning helps to automate complicated tasks, manage complex procedures, and optimize them for better results.
- CO5 Apply principles of negotiation, bargaining, argumentation, and trust management in multi-agent systems to develop cooperative and competitive software solutions
- CO6 Apply artificial intelligence techniques to real-world domains by utilizing language models, information retrieval and extraction.

IV. COURSE SYLLABUS:

MODULE – 1: INTRODUCTION (09)

Introduction - Definition - Future of Artificial Intelligence - Characteristics of Intelligent Agents - Typical Intelligent Agents - Problem Solving Approach to Typical AI problems.

MODULE – 2: PRODUCTION SYSTEMS (09)

Defining the Problem as a State Space Search, Production Systems, Problem Characteristics, Production System Characteristics, Issues in the Design of Search Programs.

MODULE – 3: PROBLEM-SOLVING METHODS AND KNOWLEDGE REPRESENTATION (10)

Problem solving Methods, Search Strategies, Uninformed, Informed, Heuristics, Local Search Algorithms and Optimization Problems, Searching with Partial Observations, Backtracking Search, Performance of Search Algorithms.

Using Predicate Logic: Representing Simple Facts in Logic, Representing Instance and ISA Relationships, Computable Functions and Predicates, Properties of Wff, Clausal Forms, Conversion to clausal forms, Resolution.

MODULE – 4: SOFTWARE AGENTS (10)

Architecture for Intelligent Agents, Agent communication, Negotiation and Bargaining, Argumentation among Agents, Trust and Reputation in Multi-agent systems.

MODULE – 5: APPLICATIONS (10)

AI applications, Language Models, Information Retrieval, Information Extraction, Natural Language Processing, Machine Translation, Speech Recognition, Robot, Hardware, Perception, Planning, Moving. Case study on Reinforcement Learning - Learning Decision Trees - Expert Systems

V. TEXT BOOKS:

1. S. Russel, P. Norvig, “Artificial Intelligence – A Modern Approach”, Third Edition, Pearson Education, 2015.

VI. REFERENCE BOOKS:

1. Kevin Night, Elaine Rich, Nair B., “Artificial Intelligence (SIE)”, Third Edition, McGraw Hill, 2017.
2. Dan W. Patterson, “Introduction to AI and ES”, Pearson Education, 2007.

VII. ELECTRONICS RESOURCES:

1. Department of Computer Science, University of California, Berkeley,
<http://www.youtube.com/playlist?list=PLD52D2B739E4D1C5F>
2. NPTEL: Artificial Intelligence, <https://nptel.ac.in/courses/106105077/>
3. <http://www.udacity.com/> 4. <http://www.library.thinkquest.org/2705/>
4. <http://www.ai.eecs.umich.edu/>

VIII. MATERIALS ONLINE

1. Course template
2. Tutorial question bank
3. Tech talk topics
4. Assignments
5. Definitions and terminology
6. Open ended experiments
7. Model question paper-I
8. Model question paper-II
9. Lecture notes
10. Power point presentations
11. ELRV videos