INSTITUTE OF AERONAUTICAL ENGINEERING
(Autonomous)
Dundigal - 500 043, Hyderabad, Telangana

COURSE CONTENT

APPLIED ARTIFICIAL INTELLIGENCE							
IV Semester: CSE (AI &ML)							
Course Code	**Category**	**Hours / Week**		**Credits**	**Maximum Marks**		
ACAD03	**Core**	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:

Applied Artificial Intelligence refers to the practical use and implementation of AI technologies to solve complex problems and enhance various applications across different domains. This course provides knowledge on the key aspects of applying artificial intelligence in identifying real-world problems through the applications of AI. It involves the integration of AI techniques and algorithms into existing systems or the development of new solutions to address specific challenges like creating recommendation systems, virtual assistants like chatbots etc.

II. COURSES OBJECTIVES:
The students will try to learn:
  I.   Knowledge representation, search procedures, and various logical reasoning systems.
  II. A framework for modeling human reasoning and dealing with uncertainty through fuzzy logic.
  III. Applications of game playing, designing communicating agents, and robotic technology.

III. COURSE OUTCOMES:
At the end of the course students should be able to:

CO1 Explain appropriate knowledge representation techniques to generate inferences for any search problem

CO2 Outline knowledge that allows systematic and rigorous reasoning to enhance clarity and precision of knowledge representation.

CO3 Examine the situations that is inherently fuzzy or ambiguous while designing logical systems to deal such data.

CO4 Choose reverse engineering human capabilities and apply them to develop intelligent systems.

CO5 Build new architectures, designs for communicating agents and robotic applications.

CO6 Select design technologies of AI for enhanced learning, reasoning, and perception to simulate or approximate human intelligence.

IV. COURSE SYLLABUS:

MODULE – I: SEARCH TECHNIQUES (09)
Search techniques review - knowledge representation review - logical agents - simple reflex agent - Building knowledge base - Knowledge Engineering - General ontology - Representing categories - measures - composite objects - Resolution - complete inference procedure.

MODULE – II: REASONINING SYSTEMS (10)
Logical Reasoning systems - indexing - retrieval and unification - theorem provers - forward-chaining production systems - frame systems and semantic networks - Certainty factors - Bayesian Theory - Dempster - Shafer theory.

MODULE – III: GAME PLAYING (10)
Overview – Minimax search procedure, Alpha Beta pruning, adding Alpha-Beta cutoffs, Iterative Deepening, Expectimax search.

Fuzzy Logic Systems – Introduction, Crisp Sets, Fuzzy Sets, Fuzzy Logic Control, Fuzzy Hedges, Neuro Fuzzy Systems.

MODULE – IV: AI APPLICATIONS (10)
Perception – Image Formation – Early Image Processing Operations – Object Recognition by Appearance – Reconstructing the 3D world – Object Recognition from Structural World – Using Vision – Other Application Domains.

MODULE – V: AI AGENTS (09)
Agents that communicate - Types of communicating agents - Introduction to Robotics – Robot Hardware - Robotic Perception – Planning to Move – Planning Uncertain Movements – Moving – Software Architectures - configuration spaces - navigation and motion planning – Application Domains.

IV. TEXTBOOKS:
1. Stuart Russel, Peter Norvig, "AI – A Modern Approach", Pearson Education, 2nd edition 2007.
2. Kevin Night, Elaine Rich, Nair B., "Artificial Intelligence (SIE)", McGraw Hill, 2008.

V. REFERENCE BOOKS:
1. Dan W. Patterson, "Introduction to AI and ES", Pearson Education, 2007.
2. Peter Jackson, "Introduction to Expert Systems", Pearson Education, 3rd edition, 2007.
3. Stuart Russel, Peter Norvig, "AI – A Modern Approach", Pearson Education, 2nd edition 2007.
4. G. Luger, W. A. Stubblefield, "Artificial Intelligence", Addison-Wesley Longman, 3rd edition, 1998.

VI. ELECTRONICS RESOURCES:
1. https://bpbonline.com/products/applied-machine-learning-solutions-with-python
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/
5. CS50's Introduction to Artificial Intelligence with Python | Harvard University
6. Artificial Intelligence Search Methods for Problem Solving - Course (nptel.ac.in)
7. http://www.ai.eecs.umich.edu

VII. MATERIALS ONLINE
1. Course Template
2. Tutorial Question Bank
3. Definition and Terminology
4. Tech-Talk topics
5. Assignments
6. Model question paper - I
7. Model question paper - II
8. Lecture notes
9. Early learning readiness videos (ELRV)
10. PowerPoint Presentations