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

COURSE CONTENT

APPLIED ARTIFICIAL INTELLIGENCE								
IV Semester: CSE (Artificial Intelligence & Machine Learning) | CSE (DS)								
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
ACAD03	Core	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. The 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 – 1: BEYOND CLASSICAL SEARCH (09)
Local search in continuous spaces - searching with non-deterministic actions - online search agents and unknown environments – logical agent: knowledge based agents – Wumpus World – knowledge engineering in first order logic – ontological engineering.

MODULE – 2: KNOWLEDGE REPRESENTATION (10)
Knowledge Representation: Introduction, Approaches to Knowledge Representation, Knowledge Representation using Semantic Network, Knowledge Representation using Frames.
Advanced Knowledge Representation Techniques: Case Grammars, Semantic Web.

MODULE – 3: PROBLEM REDUCTION AND GAME PLAYING (10)
Introduction – Problem reduction - Game Playing, Bounded Look-ahead Strategy and use of Evaluation Functions, Alpha-Beta Pruning

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

MODULE – 4: EXPERT SYSTEMS AND APPLICATIONS (10)

Expert System and Applications: Introduction, Phases in Building Expert Systems, Expert System Architecture, Expert Systems vs Traditional Systems, Truth Maintenance Systems, Application of Expert Systems, List of Shells and Tools.

MODULE – 5: ROBOTICS (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.

V. TEXTBOOKS:

1. Stuart Russel, Peter Norvig, "AI – A Modern Approach", Second Edition, Pearson Education, 2007.
2. Kevin Night, Elaine Rich, Nair B., "Artificial Intelligence (SIE)", McGraw Hill, 2008.
3. Saroj Kaushik. Artificial Intelligence. Cengage Learning. 2011

VI. REFERENCE BOOKS:

1. Dan W. Patterson, "Introduction to AI and ES", Pearson Education, 2007.
2. Peter Jackson, "Introduction to Expert Systems", Third Edition, Pearson Education, 2007.
3. Stuart Russel, Peter Norvig, "AI – A Modern Approach", Second Edition, Pearson Education, 2007.
4. G. Luger, W. A. Stubblefield, "Artificial Intelligence", Third Edition, Addison-Wesley Longman, 1998.
5. N. J. Nilson, "Principles of Artificial Intelligence", Narosa Publishing House, 1980.

VII. 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

VIII. 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