AMITY UNIVERSITY
UTTAR PRADESH

L	T	P/S	SW/FW	TOTAL CREDIT UNITS
3	-	2	-	4

Course Title: ARTIFICIAL INTELLIGENCE & ROBOTICS

Course Code: CSIT811

Credit Units: 4

Course Objectives:

- The primary objective of this course is to provide an introduction to the basic principles, techniques, and applications of Artificial Intelligence.
- The emphasis of the course is on teaching the fundamentals and not on providing a mastery of specific commercially available software tools or programming environments.
- Upon successful completion of the course, students will have an understanding of the basic areas of artificial intelligence search, knowledge representation, learning and their applications in design and implementation of intelligent agents for a variety of tasks in analysis, design, and problem-solving.
- Aim of this course is to know about Lisp and Prolog and use of these languages in AI. Graduate students are expected to develop some familiarity with current research problems and research methods in AI by working on a research or design project.

Pre-requisites: NIL

Course Contents/Syllabus:

	Weightage (%)
Module I: Introduction to AI and Problem Representation:	**20%**
Introduction: Artificial Intelligence (AI) and its importance, AI Problems (tic tac toe problem, water jug problems), Application area of AI. Problem Representations: State space representation, problem-reduction representation, production system, production system characteristics and types of production system.	
Module II: Heuristic Search Techniques and Game Playing	**20%**

Heuristic Search Techniques :AI and search process, brute force search, depth-first search, breadth-first search, time and space complexities, heuristics search, hill climbing, best first search, A* algorithm and beam search, AO search, constraint satisfaction. Game Playing: AI and game playing, plausible move generator, static evaluation move generator, game playing strategies, problems in game playing.	
Module III: Logic and Knowledge Representation	**15%**
Knowledge Representation and Structured Knowledge: Associative networks, frame structures, conceptual dependencies and scripts, ontologies. Logic: Prepositional logic: syntax and semantics, First Order Predicate Logic (FOPL): Syntax and semantics, conversion to clausal form, inference rules, unification, and the resolution principles.	
Module IV: Knowledge Acquisition and Expert System	**15%**
Knowledge Acquisitions: Type of learning, Knowledge Acquisition, Early work in machine learning, learning by induction. Expert System: Introduction to expert system, Phases of expert system, characteristics of expert system and a case study; Introduction of Executive Support System and Decision Support System.	
Module V: Robotics and its application	**15%**
Robotics and Its applications, DDD concept, Intelligent robots, Robot anatomy-Definition, law of robotics, History and Terminology of Robotics-Accuracy and repeatability of Robotics-Simple problems-Specifications of Robot-Speed of Robot-Robot joints and links-Robot classifications-Architecture of robotic systems-Robot Drive systems-Hydraulic, Pneumatic and Electric system	
Module VI: Core of AI	**15%**
Core of AI: Introduction to Neural Network; Fuzzy Logic; LISP and Prolog; Research orientation of soft computing techniques; Knowledge management, Ontology.	

Student Learning Outcomes:

The student will be able to:

- Describe human intelligence and AI
- Explain how intelligent system works.
- Apply basics of Fuzzy logic and neural networks.
- Explain Expert System and implementation.
- Apply Knowledge representation and semantic in Knowledge representation.
- Develop some familiarity with current research problems and research methods in AI.
- Demonstrate and Illustrate about functionalities of Robots and Robotics.

Pedagogy for Course Delivery:

The class will be taught using theory and practical based methods. In addition to assigning some of the models and frameworks by using case based methodology, the course instructor will demonstrate and explain about applications of AI.

List of Practical:

- Introduction to Prolog
- Implementation of Data Structures using Prolog
- Implementation of If Else rule using Prolog
- Introduction to LISP
- Robot Programming Using Java
- Robot movement program

Assessment/ Examination Scheme:

Theory L/T (%)	Lab/Practical/Studio (%)	End Term Examination (%)
75	**25**	**100**

Theory Assessment (L&T):

Continuous Assessment/Internal Assessment					End Term Examination
Components (Drop down)	**Mid-Term Exam**	**Assignment**	**Case Study**	**Attendance**	
Weightage (%)	10	5	10	5	70

Practical (P)

Continuous Assessment/Internal Assessment						End Term Examination
Components (Drop down)	**Mid-Term Exam**	**Lab Record**	**Continuous Performance**	**Internal Viva**	**Attendance**	
Weightage (%)	10	10	10	5	5	60

Text & References:

Text:

- Elaine Rich, Kevin Knight, Artificial Intelligence TMH (Any Edition).
- S.R. Deb, Robotics Technology and flexible automation, Tata McGraw-Hill Education., 2009
- Max Braber, Logic Programming with Prolog, Springer, 2005

References:

- V S Janakiraman, K Sarukesi, P Gopalakrishan, Foundations of Artificial Intelligence and Expert Systems, Macmillan India Ltd.
- Dan W. Patterson, Introduction to AI and Expert System, PHI.