Code CSA3001	Agent based Intelligent Systems	Course Type	LT
		Credits	3

Course Objectives:

- To analyze, design, implement and evaluate intelligent agent programs and systems of varying complexities.
- Demonstrate good knowledge of basic theoretical foundations of the following common intelligent systems methodologies.
- Determine which type of intelligent system methodology would be suitable for a given type of application problem..

Course Outcomes:

At the end of the course, students should able to

- Understand the fundamental concepts in the study intelligent agents.
- Be familiar with the basic concepts, methods, knowledge representation and reasoning.
- To analyze and understand types of planning problems, and apply in agent based intelligent systems.
- To understand how to apply statistics to design intelligent agents.
- To analyze for high level planning and application of agent-based systems.

Student Outcomes (SO): a, c, k, l, m

a. An ability to apply the knowledge of mathematics, science and computing appropriate to the discipline.
c. An ability to design, implement and evaluate a system / computer-based system, process, component or program to meet desired needs.
k. An ability to use current techniques, skills, and tools necessary for computing practice.
l. An ability to apply mathematical foundations, algorithmic principles and computer science theory in the modelling and design of computer-based systems (CS).
m. An ability to apply design and development principles in the construction of software systems (CS).

Module No.	Module Description	No.of Hours	SO
1	**Introduction:** Overview: definitions of agents, distributed AI and agents, intelligent agents, multi-agent systems, cooperation, agent application areas. Solving-Searching - Heuristics -Constraint Satisfaction Problems - Game playing.	5	a, k
2	**Knowledge representation and reasoning:** Reasoning: multi-agent epistemic logic, action logics, deliberation. Logical Agents-First order logic-First Order Inference-Unification-Chaining- Resolution Strategies-Knowledge Representation-Objects-Actions-Events.	6	c, l
3	**Planning agents:** Planning Problem-State Space Search-Partial Order Planning-Graphs-Nondeterministic Domains-Conditional Planning Continuous Planning Multi-Agent Planning.	6	a, c
4	**Agents and uncertainity:** Acting under uncertainty – Probability Notation-Bayes Rule and use – Bayesian Networks-Other Approaches-Time and Uncertainty-Temporal Models- Utility Theory - Decision Network – Complex Decisions.	5	c, l, m
5	**Higher level agents:** Knowledge in Learning-Relevance Information-Statistical Learning Methods Reinforcement Learning-Communication-	6	k, m

	Formal Grammar-Augmented Grammars Future of AI.		
5	**Guest Lecture on Contemporary Topics**	**2**	
	Total Hours	**30**	

Mode of Teaching and Learning: *Flipped Class Room, Activity Based Teaching/Learning, Digital/Computer based models, wherever possible to augment lecture for practice/tutorial and minimum 2 hours lectures by industry experts on contemporary topics*

Mode of Evaluation and assessment:

The assessment and evaluation components may consist of unannounced open book examinations, quizzes, student's portfolio generation and assessment, and any other innovative assessment practices followed by faculty, in addition to the Continuous Assessment Tests and Term End Examinations.

Text Book(s):

1.	Stuart Russell and Peter Norvig, "Artificial Intelligence - A Modern Approach",2nd Edition, Prentice Hall, 2002
2.	Michael Wooldridge, "An Introduction to Multi Agent System", John Wiley, 2002.

Reference Book(s):

3.	Shoham Y. and Leyton-Brown K., Multi-Agent Systems: Logical, Algorithmic and Game Theoretic foundations, Cambridge University Press, 2009.
4.	Wooldridge M., An Introduction to MultiAgent Systems, 2nd Edition, Wiley, 2009.

Recommendation by the Board of Studies on	**24-06-2020**
Approval by Academic council on	29.06.2020
Compiled by	**Mr. Ashish Kumar Sahu**