

COURSE CODE	COURSE TITLE	L	T	P	C
1152CS213	MULTIAGENT SYSTEM DESIGN	3	0	2	4

Course Category: Program Elective

A. Preamble :

Ability to formulate a problem in logical terms and basic knowledge of logical inference, decision making, algorithmic complexity and multi agent system.

B. Prerequisite Courses:

Sl. No	Course Code	Course Name
1	1151CS117	Java Programming
2	1151CS106	Design and Analysis of Algorithm
3	1151CS119	Introduction to Design and Analysis of Algorithms

C. Related Courses:

Sl. No	Course Code	Course Name
1	1156CS601	Minor Project
2	1156CS701	Major Project

D. Course Outcomes :

Upon the successful completion of the course, students will be able to:

CO Nos.	Course Outcomes	Level of learning domain (Based on revised Bloom's taxonomy)
CO1	Understand the origins and foundations of Agent Orientation in distributed computing	K2
CO2	Apply the possible knowledge and reasoning to multi-agent system for simple and complex decision making process	K3
CO3	Analyze the interactions and communications in multi-agent system using agent-oriented methodologies	K3
CO4	Evaluate the coordination and decision making process using social models in distributed robust applications.	K3
CO5	Create the agent based industrial and practical applications by applying methodology and tool related to competences.	K3

E. Correlation of COs with POs :

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	L	L	M									L	L	L	L
CO2	M	M	H	H	L							M	M	M	M
CO3	M	H	H	H	H							M	H	H	M
CO4	M	H	H	H	L	H						M	M	H	M
CO5	M	M	H		H	H						H	H	H	H

F. Course Content:

UNIT I Introduction to Agent Orientation

9

Intelligent Agents: Introduction, Agents, Abstract Architectures for Intelligent Agents, Concrete Architectures for Intelligent Agents, Agent Programming Languages – Multi-agent Systems and Societies of Agents: Introduction, Agent Communications, Agent Interaction Protocols, Societies of Agents.

UNIT II Reasoning in Agents

9

Knowledge and reasoning: Agents that Reason Logical, First-Order Logic, Building a Knowledge Base, Inference in First-Order Logic, Logical Reasoning System - Uncertain knowledge and reasoning: Uncertain, Probabilistic Reasoning System, Making Simple Decisions, Making Complex Decisions.

UNIT III Multiagent Interaction, Communication & Methodologies

9

Multi-agent Interaction: Utilities and Preferences, Multi-agent Encounters, Dominant Strategies and Nash Equilibria, Competitive and Zero-Sum Interactions, The Prisoner's Dilemma, Other Symmetric 2 x 2 Interactions, Dependence Relations in Multi-agent Systems - Communication: Speech Acts, Agent Communication Languages, Ontologies for Agent Communication, Coordination Languages - Methodologies: Agent-Based Solution Appropriate, Agent-Oriented Analysis and Design Techniques, Pitfalls of Agent Development, Mobile Agents.

UNIT IV Coordination And Social Models

9

Working Together: Cooperative Distributed Problem Solving, Task Sharing and Result Sharing, Result Sharing, Combining Task and Result Sharing, Handling Inconsistency, Coordination, Multi agent Planning and Synchronization - Distributed Rational Decision Making: Evaluation Criteria, Voting, Auctions, Bargaining, General Equilibrium Market Mechanisms, Contract Nets, Coalition Formation.

UNIT V Applications of Agent-Oriented Design

9

Application: Agents for Workflow and Business Process Management, Agents for Distributed Sensing, Agents for Information Retrieval and Management, Agents for Electronic Commerce, Agents for Human-Computer Interfaces, Agents for Virtual Environments, Agents for Social Simulation, Agents for X - Industrial and Practical Applications: Use DAI in Industry, Overview of the Industrial Life-Cycle, Life Cycle Are Agents Used, Industry Constrain the Life Cycle of an Agent-Based System, Development Tools.

TOTAL : 45

LIST OF EXPERIMENTS

1. Simple and composite behaviors usage model
2. JADE agents Messaging Service
3. Yellow Pages service Management
4. Topic-based message delivery mechanism
5. JADE for interaction protocols
6. Application specific ontology
7. Control a number of agents from an external application
8. Mobile agent development
9. Agent creates some other agents for simple conversation

Software Required: JADE Tool, Java Package

G. Learning Resources

i. Text Books:

1. Gerhard Weiss, "Multiagent Systems", MIT Press, Second Edition, 2013.
2. Michael Wooldridge, "An introduction to multiagent systems", John Wiley & Sons, Second Edition, 2009.
3. Stuart Russell, Peter Norvig, "Artificial Intelligence: a modern approach", Pearson Education, Third Edition, 2014.

ii. Reference Books:

1. M. Wooldridge, "Reasoning about Rational Agents", The MIT Press, 2000.
2. M. Huhns & M. Singh (Eds.), "Readings in Agents", Morgan Kaufmann, 1998.
3. J. Ferber, "Multi-Agent Systems", Addison-Wesley, 1999.

iii. Online Resources:

1. <http://agents.umbc.edu>
2. <http://jade.tilab.com>
3. <http://www.agentbuilder.com/AgentTools/>