| Course Code | 18CSC305J | Course Name | ARTIFICIAL INTELLIGENCE | Course Category | C | Professional Core | L | T | P | C |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | 3 | 0 | 2 | 4 |

| Pre-requisite Courses | Nil | Co-requisite Courses | Nil | Progressive Courses | Nil |
|---|---|---|---|---|---|
| Course Offering Department | Computer Science and Engineering | Data Book / Codes/Standards | | Nil | |

| Course Objectives | *The purpose of learning this course is to:* |
|---|---|
| 1 | *Gain knowledge for building intelligent agents and in problem formulation* |
| 2 | *Understand the search technique procedures applied to real world problems* |
| 3 | *Understand the types of logic and knowledge representation schemes* |
| 4 | *Acquire knowledge in planning and learning algorithms* |
| 5 | *Gain knowledge in Expert systems and advances in Artificial Intelligence* |

| Course Outcomes (CO): | *At the end of this course, learners will be able to:* | Learning | | | Program Learning Outcomes (PO) | | | | | | | | | | | | PSO | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | | | |
| | | Level of Thinking (Bloom) | Expected Proficiency (%) | Expected Attainment (%) | Engineering Knowledge | Problem Analysis | Design & Development | Analysis, Design, Research | Modern Tool Usage | Society & Culture | Environment & Sustainability | Ethics | Individual & Team Work | Communication | Project Mgt. & Finance | Life Long Learning | PSO - 1 | PSO - 2 | PSO – 3 |
| CO-1 : | *Formulate a problem and build intelligent agents* | *4* | *60* | *70* | *3* | *2* | *3* | - | - | - | - | - | - | - | - | - | *1* | *1* | *1* |
| CO-2 : | *Apply appropriate searching techniques to solve a real-world problem* | *5* | *60* | *70* | *3* | *2* | *3* | - | - | - | - | - | - | - | - | - | *2* | *1* | *2* |
| CO-3 : | *Analyze the problem and infer new knowledge using suitable knowledge representation schemes* | *5* | *60* | *70* | *2* | *3* | *3* | - | - | - | - | - | - | - | - | - | *2* | *1* | *2* |
| CO-4 : | *Prepare a plan and solve real world problems using learning algorithms* | *5* | *60* | *70* | *2* | *3* | *2* | - | - | - | - | - | - | - | - | - | *2* | *2* | *3* |
| CO-5 : | *Design an expert system and implement advanced techniques in Artificial Intelligence agents.* | *5* | *60* | *70* | *2* | *3* | *3* | *2* | - | - | - | - | - | - | - | | *3* | *2* | *3* |

| Duration (hour) | | 15 | 15 | 15 | 15 | 15 |
|---|---|---|---|---|---|---|
| S-1 | SLO-1 | *Introduction to AI-AI techniques* | *Searching techniques- Uniformed search- General search Algorithm* | *Knowledge and reasoning-Approaches and issues of knowledge reasoning* | *Planning- Planning problems, Simple planning agent* | *Expert system-Architecture* |
| | SLO-2 | *Problem solving with AI* | *Uniformed search Methods-Breadth first search* | *Knowledge base agents-Logic Basics* | *Planning languages* | *Pros and Cons of expert system* |
| S-2 | SLO-1 | *AI Models, Data acquisition and learning aspects in AI* | *Uniformed search Methods-Depth first search* | *Logic-Propositional logic-syntax ,semantics and inferences* | *Blocks world ,Goal stack planning* | *Rule based systems* |
| | SLO-2 | *Problem solving- Problem solving process, Formulating problems* | *Uniformed search Methods-Depth limited search* | *Propositional logic- Reasoning patterns* | *Mean Ends Analysis* | *Frame based expert system* |
| S-3 | SLO-1 | *Problem types and characteristics* | *Uniformed search Methods- Iterative Deepening search* | *Predicate logic – Syntax and semantics, instance and is relationship* | *Non-linear Planning* | *Case study* |
| | SLO-2 | *Problem space and search* | *Bi-directional search* | *Unification and Resolution* | *Conditional planning, Reactive planning* | *Case study* |
| S 4-5 | SLO-1 | *Lab 1: Implementation of toy problems* | *Lab4: Implementation and Analysis of DFS and BFS for an application* | *Lab 7: Implementation of unification and resolution for real world problems.* | *Lab 10 :Implementation of block world problem* | *Natural language processing-Levels of NLP* |
| | SLO-2 | | | | | |
| S-6 | SLO-1 | *Intelligent agent* | *Informed search- Generate and test, Best First search* | *Knowledge representation using rules* | *Learning- Machine learning* | *Syntactic and Semantic Analysis* |
| | SLO-2 | *Rationality and Rational agent with performance measures* | *Informed search-A* Algorithm* | *Knowledge representation using semantic nets* | *Goals and Challenges of machine learning* | *Information retrieval* |
| S-7 | SLO-1 | *Flexibility and Intelligent agents* | *AO* research* | *Knowledge representation using frames* | *Learning concepts, models* | *Information Extraction* |
| | SLO-2 | *Task environment and its properties* | *Local search Algorithms-Hill Climbing, Simulated Annealing* | *Inferences* | *Artificial neural network based learning-Back propagation* | *Machine translation* |
| S-8 | SLO-1 | *Types of agents* | *Local Beam Search* | *Uncertain Knowledge and reasoning-Methods* | *Support vector machines* | *NLP Applications* |
| | SLO-2 | *Other aspects of agents* | *Genetic Algorithms* | *Bayesian probability and belief network* | *Reinforcement learning* | *NLP Applications* |
| S-9-10 | SLO-1 | *Lab 2: Developing agent programs for real world problems* | *Lab 5: Developing Best first search and A* Algorithm for real world problems* | *Lab 8: Implementation of knowledge representation schemes - use cases* | *Lab 11: Implementation of learning algorithms for an application* | *Lab 14:Implementation of NLP programs* |
| | SLO-2 | | | | | |

| S-11 | SLO-1 | *Constraint satisfaction problems(CSP)* | *Adversarial search Methods-Game playing-Important concepts* | *Probabilistic reasoning* | *Adaptive learning* | *Advance topics in Artificial Intelligence- Cloud Computing and intelligent agent* |
|---|---|---|---|---|---|---|
| | SLO- | *Crypto arithmetic puzzles* | *Game playing and knowledge structure* | *Probabilistic reasoning over time* | *Multi agent based learning* | *Business intelligence and analytics* |

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| S-12 | SLO-1 | *CSP as a search problem-constrains and representation* | *Game as a search problem-Mini max approach* | *Forward and backward reasoning* | *Ensemble learning* | *Sentiment Analysis* |
| | SLO-2 | *CSP-Backtracking, Role of heuristic* | *Mini max Algorithm* | *Other uncertain techniques-Data mining* | *Learning for decision making* | *Deep learning Algorithms* |
| S-13 | SLO-1 | *CSP-Forward checking and constraint propagation* | *Alpha beta pruning* | *Fuzzy logic* | *Distributed learning* | *Deep learning Algorithms* |
| | SLO-2 | *CSP-Intelligent backtracking* | *Game theory problems* | *Dempster -shafer theory* | *Speedup learning* | *Planning and logic in intelligent agents* |
| S 14-15 | SLO-1 | *Lab 3: Implementation of constraint satisfaction problems* | *Lab 6: Implementation of mini max algorithm for an application* | *Lab 9: Implementation of uncertain methods for an application* | *Lab12: Development of ensemble model for an application* | *Lab 15: Applying deep learning methods to solve an application.* |
| | SLO-2 | | | | | |

| | | |
|---|---|---|
| Learning Resources | 1. *Parag Kulkarni, Prachi Joshi, Artificial Intelligence –Building Intelliegent Systems, 1st ed., PHI learning,2015*<br>2. *DeepakKemhani,FirstcourseinArtificilaIntelligence,McGrawHillPvtLtd,2013*<br>3. *Stuart J. Russell, Peter Norwig , Artificial Intelligence –A Modern approach, 3rd Pearson Education, 2016* | 4. *PrateekJoshi,ArtificialIntelligencewithPhython,1sted.,PacktPublishing,2017*<br>5. *DenisRothman,ArtificialIntelligencebyExample,Packt,2018* |

**Learning Assessment**

| | Bloom's Level of Thinking | Continuous Learning Assessment (50% weightage) | | | | | | | | Final Examination (50% weightage) | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | CLA – 1 (10%) | | CLA – 2 (15%) | | CLA – 3 (15%) | | CLA – 4 (10%) | | | |
| | | Theory (5%) | Practice (5%) | Theory (7.5%) | Practice (7.5%) | Theory (7.5%) | Practice (7.5%) | Theory (5%) | Practice (5%) | Theory (25%) | Practice (25%) |
| Level 1 | Remember | 20% | | 15% | | 15% | | | | 15% | |
| Level 2 | Understand | 20% | | 25% | | 25% | | 35% | | 20% | |
| Level 3 | Apply | 35% | 50% | 35% | 35% | 35% | 40% | 35% | 30% | 35% | 30% |
| Level 4 | Analyze | 25% | 50% | 25% | 35% | 25% | 30% | 30% | 50% | 30% | 35% |
| Level 5 | Evaluate | | | | 30% | | 30% | | 20% | | 35% |
| Level 6 | Create | | | | | | | | | | |
| | Total | 100 % | 100 % | 100 % | 100 % | 100 % | 100 % | 100% | 100% | 100% | 100% |

# CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

| Course Designers | | |
|---|---|---|
| Experts from Industry | Experts from Higher Technical Institutions | Internal Experts |
| *1. Mr.Jagatheeswaran, Lead, Auxo labs jagatheeswarans.iot@auxolabs.in* | *1. Dr. Chitrakala, Anna University, au.chitras@gmail.com* | *1. Dr.M.Pushpalatha, SRMIST* |
| | | *2. Dr.G..Vadivu, SRMIST* |
| | | *3. Dr.C.Lakshmi, SRMIST* |