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| **Course Code: CSE3002** | **Course Title: Artificial Intelligence** | **TPC** | **3** | | **2** | **4** |
| **Version No.** | **1.0** | | | | | |
| **Course Pre-requisites/ Co-requisites** | CSE1004/CSE1001 | | | | | |
| **Anti-requisites (if any).** | None | | | | | |
| **Objectives:** | 1. To have a thorough understanding of classical and modern AI applications 2. To identify the type of an AI problem (search inference, decision making under uncertainty, game theory, etc.) 3. To describe the strengths and limitations of various state-space search algorithms, and choose the appropriate algorithm. 4. To understand non-classical AI approaches such as genetic algorithms and neural networks 5. To be able to assess the potential of AI in research and real-world environments | | | | | |
| **Expected Outcome:** | On completion of the course, students will have the ability to   1. Exhibit strong familiarity with a number of important AI techniques, in particular search, knowledge representation, planning and constraint management. 2. Interpret the modern view of AI as the study of agents that receive precepts from the environment and perform actions. 3. Build awareness of AI facing major challenges and the complexity of typical problems within the field. 4. Assess critically the techniques presented and apply them to real world problems. 5. Develop self-learning and research skills to tackle a topic of interest on his/her own or as part of a team. | | | | | |
| **Module No. 1** | **Introduction to Al and Production Systems** | | | **9 Hours** | | |
| Introduction to AI-Problem formulation, Problem Definition -Production systems, Control strategies, Search strategies. Problem characteristics, Production system characteristics -Specialized production system- | | | | | | |
| **Module No. 2** | **Problem Solving Methods** | | | **9 Hours** | | |
| Problem graphs, Matching, Indexing and Heuristic functions -Hill Climbing-Depth first and Breath first, Constraints satisfaction - Related algorithms, Measure of performance and analysis of search algorithms. | | | | | | |
| **Module No. 3** | **Knowledge Representation** | | | **9 Hours** | | |
| Knowledge based agents- Prepositional Logic- First Order logic- Inferences | | | | | | |
| **Module No. 4** | **Knowledge Inference** | | | **9 Hours** | | |
| Knowledge representation -Production based system, Frame based system. Inference - Backward chaining, Forward chaining, Rule value approach, Fuzzy reasoning - Certainty factors, Bayesian Theory-Bayesian Network-Dempster - Shafer theory. | | | | | | |
| **Module No. 5** | **Planning and Learning** | | | **9 Hours** | | |
| Basic plan generation systems - Strips -Advanced plan generation systems – K strips -Strategic explanations – Explanation bases Learning- Machine learning, adaptive Learning. Reinforcement learning- Decision tree learning | | | | | | |
| **Module No. 6** | **Expert Systems** | | | **9 Hours** | | |
| Genetic algorithms Expert systems - Architecture of expert systems, Roles of expert systems - Knowledge Acquisition –Meta knowledge, Heuristics. | | | | | | |
| **Text Books**   1. Stuart Russell and Peter Norvig, “Artificial Intelligence: A Modern Approach” Prentice Hall, Third Edition, 2009 | | | | | | |
| **References**   1. Deepak Khemani, “A First Course in Artificial Intelligence”, McGraw Hill Education (India), 2013. 2. Nick Bostrom, “Superintelligence:Paths,Dangers,Strategies”, 1st edition, 2014. 3. David Poole,Alan Mackworth, “Artificial Intelligence:Foundations of Computational Agents”, 2ndedition, 2017. 4. Elaine Rich and Kevin Knight. “Artificial Intelligence”, Tata McGraw Hill, 1991. | | | | | | |
| **Lab Exercises**   1. Introduction to LISP and PROLOG programming languages. 2. Write a program to solve any 2 player game scenarios (Eg:8 Queens, 8 Puzzle) 3. Search a list of items using best first search. 4. Write a program for min max problem 5. Write a program to find the minimal moves in a 8 queens problem. 6. Write a program for greedy search. 7. Solve 8-puzzle problem using best first search. 8. Solve Robot (traversal) problem using means End Analysis 9. Solve traveling salesman problem. 10. Write a program to solve “Water Jug Problem” 11. Write a program to maintain family tree. 12. Program for bayes rule. 13. Design an expert system scenario with learning and planning capability of AI. | | | | | | |
| **Mode of Evaluation** | Continuous Assessment Test-1                     20%  Continuous Assessment Test-2                     20%  Continuous Assessment Test-3                     20%  Cumulative Lab Exercises                    20%         Practical Assessment (Mini Project)            20% | | | | | |
| **Recommended by the Board of Studies on** | 06.07.2018 | | | | | |
| **Date of Approval by the Academic Council** | 2nd Academic Council 21.07.2018 | | | | | |