**Course:** MCA (A.Y.-II) 2020 **Semester:** 3

**Prerequisite:** Knowledge of data structures and discrete mathematics

**Course Objective:** To make students aware of knowledge representation, problem solving, heuristic search techniques, natural language processing , Genetic algorithm , neural networks and prolog in AI.

## Teaching and Examination Scheme

| Teaching Scheme | | | | | Examination Scheme | | | | | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| Lecture Hrs/Week | Tutorial Hrs/Week | Lab Hrs/Week | Hrs/ | Credit | Internal Marks | | | External Marks | | |
| | | | | | T | CE | P | T | P | |
| 3 | 1 | 2 | - | 5 | 20 | 20 | 20 | 60 | 30 | 150 |

**SEE** - Semester End Examination, **T** - Theory, **P** - Practical

## Course Content

**W** - Weightage (%) , **T** - Teaching hours

| Sr. | Topics | W | T |
|---|---|---|---|
| 1 | **Introduction to AI with Case Study & Learning**<br>Case study: Google Duplex Definition,Rote learning,learning by taking advice,learning in problem solving,learning from examples,induction | 10 | 5 |
| 2 | **Game Playing & Planning**<br>**Game Playing:** Overview, Minimax search procedure, Alpha-beta cutoffs.<br>**Planning:** Blocks world, Components of Planning system, Goal Stack planning. | 13 | 6 |
| 3 | **Uncertain Reasoning**<br>Introduction to fuzzy logic Fuzzy logic and fuzzy sets,Membership Functions,Fuzzification and Defuzzification,Operations on Fuzzy Sets Fuzzy Functions and Linguistic Variables Fuzzy Relationships, Propositions and Connectives Fuzzy Inference Fuzzy Rules, Fuzzy Control System and Fuzzy Rule Based Systems | 10 | 5 |
| 4 | **Understanding**<br>What is understanding? , What makes it hard?, As constraint satisfaction | 13 | 6 |
| 5 | **Natural Language Processing**<br>Syntactic processing, Semantic analysis, Discourse and pragmatic processing, Spell checking | 10 | 5 |
| 6 | **Neural Networks**<br>Introduction, Advantages and Disadvantages of Neural Networks Biological Neuron and Artificial Neuron, Neural Network Architectures, Applications of Neural Network | 10 | 5 |
| 7 | **Genetic Algorithms**<br>Introduction to Genetic Algorithms,Basic Terminology, Genetic Algorithms, GA Cycle Basic Operators of Genetic Algorithms,Function Optimization,Edge Recombination Schema | 10 | 5 |
| 8 | **Expert Systems (ES)**<br>Introduction to Expert System,Advantages and characteristics of Expert System, Knowledge ,engineering, Steps in Developing an Expert System,ES Applications and recent developments. | 17 | 8 |
| 9 | **An Introduction to programming in Logic**<br>Overview of Prologs,The components of a Prolog program,Syntax and Numeric Function, Basic List Manipulation Functions In Prolog,Functions,Predicates and Conditional,Input, Output and Local Variables,Elementary arithmetic operations,Prolog queries and the mechanism of backtracking | 7 | 3 |

## Reference Books

| | |
|---|---|
| 1. | **Artificial Intelligence (TextBook)**<br>By Elaine Rich and Kevin Knight \| TMH |
| 2. | **Artificial Intelligence :A Modern Approach**<br>By Stuart J. Russell and Peter Norvig \| PEARSON EDUCATION LIMITED |
| 3. | **Artificial Intelligence and Expert Systems**<br>By D.W.Patterson \| PHI |
| 4. | **Expert Systems Principles and Programming**<br>By Giarratano & Riley son \| Vikas Publishing House \| 3rd Edition |

## Course Outcome

**After Learning the Course the students shall be able to:**

1. Summarize elements, techniques and applications of Artificial Intelligence.
2. Recognize problem characteristics and design issues in search algorithms.
3. Identify problem using suitable approach for representing knowledge into logic.
4. Describe various techniques for game playing and planning.
5. Describe essentials of natural language processing and prolog.

## List of Practical

| | |
|---|---|
| **1.** | **Write a program to implement Single Player Game (Using Heuristic Function)** |
| **2.** | **Write a program to implement DFS 8 Puzzle problem** |
| **3.** | **Write a program to implement BFS Water Jug Problem** |
| **4.** | **Write a program to implement Travelling Salesman Problem** |
| **5.** | **Write prolog programs for following problems** |
| **6.** | **Demonstrate Knowledge Base and Query System in prolog.** |
| **7.** | **Convert Prolog predicates into Semantic Net.** |
| **8.** | **Demonstrate supervised learning using artificial neural network** |
| **9.** | **Write a program to implement Travelling Salesman Problem in prolog.** |

## Miscellaneous

### Useful Links

https://sites.google.com/a/paruluniversity.ac.in/wcm/
https://www.geeksforgeeks.org/search-algorithms-in-ai/
https://www.tutorialspoint.com/artificial_intelligence/index.htm
https://www.javatpoint.com/artificial-intelligence-tutorial