

## NIRMA UNIVERSITY

<b>Institute:</b>	Institute of Technology
<b>Name of Programme:</b>	Master of Computer Application (2-Years Programme)
<b>Course Code:</b>	3MCAD363
<b>Course Title:</b>	Artificial Intelligence
<b>Course Type:</b>	Departmental Elective
<b>Year of Introduction:</b>	2021-22

### Credit Scheme

L	T	Practical Component				C
		LPW	PW	W	S	
3	0	2	-	-	-	4

### Course Learning Outcomes (CLO):

At the end of the course, students will be able to –

1. identify the major areas and challenges of artificial intelligence
2. analyze the applicability of various search algorithms to solve problems
3. apply various knowledge representation and reasoning techniques to model the problems of artificial domain
4. develop an expert system for a specific application domain

### Syllabus:

**Total Teaching hours: 45**

Unit	Syllabus	Teaching hours
Unit-I	<b>Introduction:</b> Man vs Computers, AI techniques to help computers to be smarter, languages of AI, characteristic of AI computing, applications of AI, problem solving by intelligent computers, major components of intelligent system, Introduction to Prolog Language.	05
Unit-II	<b>State Space Search:</b> State space representation, defining the Problems as a State Space Search, Production systems, Problem Characteristics, Algorithms of problem solving, Issues involved in problem representation, Types of production system, needs of heuristic search,	07
Unit-III	<b>Search and Control Strategies:</b> Uninformed (Blind) and informed search, depth first search, breadth first search, heuristic search techniques: generate-and-test, hill climbing, best-first search, A*, AO*, problem reduction, constraint satisfaction, means-ends analysis.	13
Unit-IV	<b>Knowledge Representation:</b> Knowledge, representing knowledge, categories of knowledge representation schemes, logic, reasoning in propositional logic, first order logic, procedural representation, semantic nets, structured representation	06
Unit-V	<b>Reasoning under uncertainty:</b> Introduction to reasoning, reasoning with uncertain knowledge, non-monotonic reasoning, probabilistic reasoning, Bayesian network, Dempster-Shafer theory, fuzzy reasoning	05

Unit-VI	<b>Expert Systems:</b> Architecture of an expert system, features of an expert system, actors of an expert system, examples of an expert system, applications of an expert system, limitations of expert system, limitations of expert system, hybrid AI, intelligent systems.	05
Unit-VII	<b>Introduction to prolog:</b> Introduction to PROLOG, Structure of PROLOG program, Facts, Predicates and Clauses, prolog Variables, Recursion, Cut and Fail Predicates, List, String and File Operations, Static and Dynamic Databases	04

Self-Study: The self-study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self-study contents.

Suggested Readings/References:

1. Elaine Rich and Kevin Knight, Artificial Intelligence, Tata McGraw-Hill.
2. Russell and Norving, Artificial Intelligence A Modern Approach, Pearson.
3. D.W. Patterson, Artificial Intelligence and Expert Systems, Prentice Hall of India.
4. D.W. Rolston, Artificial Intelligence and Expert System, Development, McGraw-Hill
5. Deepak Khemani, A First Course in Artificial Intelligence, McGraw-Hill
6. Carl Townsend, Introduction to Prolog Programming, BPB publications.
7. Ivan Bratko, PROLOG Programming for Artificial Intelligence, Addison-Wesley.

Suggested List of Experiments:	Sr. No.	Title	Hours
	1	To understand How to do programming in prolog. Different sections, predicates, facts, rules etc. To understand and perform a prolog program to create and solve query based on family relationship.	04
	2.	To understand and perform how to implement control structures, arithmetic operations etc. in prolog. To perform a prolog program which constructs a basic calculator (Menu Driven)	02
	3.	To understand and perform a prolog program which allows the user to logon. The program should behave so that the user can attempt entry 3 times. After 3 attempts program should terminate with a message indicating that the user is not permitted access.	02
	4.	To understand and perform how to implement recursion in prolog. To implement a prolog program which should display N Fibonacci numbers.	02
	5.	To understand and perform the usage of Lists. To develop a Prolog program for Appending a list –	02

- i. With repeating elements.
- ii. Without repeating elements.
6. To understand and perform a prolog program for finding Nth element from the list. 02
7. To formulate water jug problem and implement it using prolog. (Show the solution path also). 04
8. To Solve N-Queen problem using any language of your choice and appropriate heuristic 04
9. To implement and compare the results of DFS and BFS obtained for solving 8-puzzle problem. 04
10. To design and develop a program for A\* search algorithm. 04

Suggested Case  
List:

-NA-