Course Type	Course Code	Name of the Course	L	T	P	Credits
DP	NCSC514	**Artificial Intelligence Lab**	0	0	2	1

Course Objective
This course is designed to develop skills in practically implementing algorithms for solving problems using artificial intelligence (AI). The students are expected to use Python and Prolog for the implementation purpose.

Learning Outcomes
On successful completion of this practical course, the students will achieve the following:

- gain experience in practically solving games and other interesting problems, such as Tic-Tac-Toe, N-Queen, Travelling Salesman, Map Coloring, 8-Puzzle, Cryptographic Puzzle, etc. using AI;
- develop skills on practically implementing various search algorithms (uninformed/blind, informed/heuristic, adversarial, local, genetic etc.) for problem solving purpose;
- learn Prolog as declarative programming language and use it for expert system development;
- gain experience in implementing probabilistic reasoning techniques and basic machine learning algorithms.

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1	Implementing uninformed/blind search techniques (BFS, DFS and its variants, UCS etc.) to solve problems such as vacuum-cleaning, 8-Puzzle etc.	2	Better understanding of the uninformed search techniques in the context of AI-based problem solving
2	Implementing informed/heuristic search techniques (Greedy Best First, A* and its variants, Hill Climbing, Simulated Annealing, etc.) to solve problems such as Travelling Salesman, N-Queen, 8-Puzzle, etc.	4	Better understanding of the heuristic search techniques in the context of AI-based problem solving
3	Implementing AI agent for playing two-player game	2	Better understanding of the adversarial search techniques in AI
4	Implementing AI agent to solve constraint satisfaction problems (CSPs), such as Map-coloring, Cryptographic puzzles, etc.	2	Better understanding of the CSPs and relevant algorithms in AI
5	Implementing Genetic Algorithm (GA) for solving problems, such as Travelling Salesman, N-Queen etc.	2	Better understanding of the nature- inspired GA and its operators
6	Learning basic programming constructs for Prolog; Knowledge representation, rule-base development, and reasoning with Prolog	8	Developing skills for programming in Prolog and building expert systems
7	Implementing exact and approximate inference generation algorithms for Bayesian Network	4	Better understanding of the probabilistic reasoning in AI
8	Developing machine learning models (Neural Network, Decision Tree, K-Nearest Neighbor, Naïve Bayes, etc.) and applying on publicly available datasets	4	Better understanding of the basic machine learning algorithms and acquiring skill to implement the same
	Total	**28**	

Text Books:

1. **Artificial Intelligence: A Modern Approach**, by S. Russell. Norvig, PHI (Third Edition)
2. **Prolog Programming for Artificial Intelligence** by Ivan Bratko. Addison-Wesley (4th Edition)

Reference Books:

1. **Programming in Prolog** by W F Clocksin and C S Mellish, Fifth Edition
2. **Artificial Intelligence** by Kevin Knight, Elaine Rich, Third Edition
3. **Artificial Intelligence, Structures and Strategies for Complex Problem Solving** by George F Luger, Sixth Edition, Pearson
4. **Machine Learning** by Mitchell, Tom M., Indian Edition