Name of the Programme: M.Sc. in Artificial Intelligence
Course Code: CSI-501
Title of the Course: Fundamentals of Artificial Intelligence Lab
Number of Credits: 2 (0L+0T+2P)
Effective from AY: 2023-24

Prerequisites for the course:	Artificial Intelligence theory, probability and statistics , linear algebra and Python programming	
Objectives:	To develop a basic understanding of problem solving, knowledge representation, reasoning and learning methods of AI and implement AI algorithms	
Content:	Assignment-1 -Real-world path planning for pedestrians. In the first part, students implement A* over a map that includes roads/paths as well as elevations. In the second part, students collect actual data through walking around the real world, and the cost model is then learned via regression techniques.	10 hours
	Assignment-2 -Solve maze via search -this assignment involves formulating maze-solving as a search problem, image processing (via OpenCV) as a step in maze-solving, as well as guided performance/quality analysis of representational parameters.	10 hours
	Assignment 3-Within the context of an artificial intelligence course, students are taught to identify ethical issues within technical projects and to engage in moral problem solving with regard to such issues.	10 hours
	Assignment 4-Neural network for face recognition using tensor flow -build feedforward neural networks for face recognition using TensorFlow. Students then visualize the weights of the neural networks they train. The visualization allows students to understand feedforward one-hidden layer neural networks in terms of template matching, and allows students to explore overfitting.	10 hours
	Assignment -5 -Organic path finding -Students develop a "human-like" pathfinding technique by specializing a generic search algorithm with custom action cost and heuristic cost functions. Students apply classical search algorithms and reflect on example organic paths to achieve "human-like" pathfinding.	10 hours
	Assignment - 6 -Implement a genetic algorithm in Python to evolve strategies for Robby the Robot to collect empty soda cans that lie scattered around his rectangular grid world. And also Compare the performances of a brute-force search and a search employing the Minimum Remaining Values (MRV) heuristic in solving Sudoku puzzles.	10 hours
Pedagogy:	lectures/practical/ tutorials/assignments/self-study	

References /Readings:	1. A Classical Approach to Artificial Intelligence, M.C. Trivedi, Khanna Book Publishing, 2019. 2. Artificial Intelligence: A modern approach by Stuart Russel, Pearson Education, 2010. 3. Artificial Intelligence by Rich and Knight, The McGraw Hill, 2017. 4. Artificial Intelligence: A new synthesis by Nils and Nilson, Elsevier, 1997. 5. Artificial Intelligence by Luger, Pearson Education, 2002. 6. Artificial Intelligence by Padhy, Oxford Press, 2005. 7.https://www.edx.org/course/artificial-intelligence-ai 8.https://www.udemy.com/course/artificial-intelligence-az/
Course Outcomes:	1.The students need to understand existing implementation of algorithms 2.learn to extend an existing implementation of the back-propagation algorithm and use it to recognize static hand gestures in images. 3.Students learn about feedforward neural networks and the backpropagation algorithm by implementing a perceptron network for AND and XOR Boolean functions and, given an implementation of a feedforward network, learn digit recognition using the MNIST data set. 4. students extend a Tic Tac Toe program to Ultimate Tic Tac Toe and implement a different search strategy than the example code.