GUJARAT TECHNOLOGICAL UNIVERSITY

Introduction to Intelligent Systems
SUBJECT CODE: 3715602

Type of course: Elective

Prerequisite: Data Structures and basics of propositional logic

Rationale: The aim of the course is to introduce to the field of Artificial Intelligence (AI) with emphasis on its use to solve real world problems for which solutions are difficult to express using the traditional algorithmic approach. It explores the essential theory behind methodologies for developing systems that demonstrate intelligent behavior including dealing with uncertainty, learning from experience and following problem solving strategies found in nature.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
L	T	P	C	Theory Marks		Practical Marks		
				ESE(E)	PA (M)	PA (V)	PA (I)	
3	0	2	4	70	30	30	20	150

Content:

Sr. No	Content	Total Hrs	% Weightage
1	**Biological foundations to intelligent systems I:** Artificial neural networks, Back propagation networks, Radial basis function networks, and recurrent networks.	9	20%
2	**Biological foundations to intelligent systems II:** Fuzzy logic, knowledge Representation and inference mechanism, genetic algorithm, and fuzzy neural networks.	8	15%
3	**Search Methods Basic concepts of graph and tree search. Three simple search methods:** breadth-first search, depth-first search, iterative deepening search. Heuristic search methods: best-first search, admissible evaluation functions, hill climbing search. Optimisation and search such as stochastic annealing and genetic algorithm.	8	15%
4	Knowledge representation and logical inference Issues in knowledge representation. Structured representation, such as frames, and scripts, semantic networks and conceptual graphs. Formal logic and logical inference. Knowledge-based systems structures, its basic components. Ideas of Blackboard architectures.	9	25%
5	Reasoning under uncertainty and Learning Techniques on uncertainty reasoning such as Bayesian reasoning, Certainty factors and Dempster-Shafer Theory of Evidential reasoning, A study of different learning and evolutionary algorithms, such as statistical learning and induction learning	8	15%
6	Recent trends in Fuzzy logic, Knowledge Representation 5	6	10%

References:

1. Luger G.F. and Stubblefield W.A. (2008). Artificial Intelligence: Structures and strategies for Complex Problem Solving. Addison Wesley, 6th edition.
2. Russell S. and Norvig P. (2009). Artificial Intelligence: A Modern Approach. Prentice-Hall, 3rd edition.
3. Alexander M Meystel and James S Albus, Intelligent Systems, Wiley

Course Outcome:

After learning the course, the students should be able to:

1. Demonstrate knowledge of the fundamental principles of intelligent systems
2. Analyse and compare the relative merits of a variety of AI problem solving techniques.
3. Acquire a firm grasp of various search techniques and select an appropriate search technique and apply it in practice.

List of Experiments:

- Minimum 10 experiments based on the contents.
- Mini Project in a group of max. 3 students
- Writing a research paper on selected topic from content with latest research issues in that topic

Major Equipments:

- Modern Computing Systems with related software

List of Open Source Software/learning website:

http://www.cs.toronto.edu/~sheila/384/w11/Lectures/csc384w11-Lecture01.pdf

https://www.edx.org/course/introduction-artificial-intelligence

https://www.courses.com/indian-institute-of-technology-kharagpur/artificial-intelligence-b