

Course Code: ELE-601

Course Title: Artificial Intelligence and Applications

Number of Credits: 04

Total Hours: 60

Total Marks: 100

Effective from AY: 2022-23

Prerequisites for the course

Should have knowledge of basic electronics and programming.

Objectives of Course

This course is intended to:

- Introduce the foundation concepts in the field of artificial intelligence.
 - Become familiar with basic principles of AI toward problem solving
 - Know approaches of inference, perception, uncertain knowledge, and reasoning
- Prepares a student to take a variety of focused, advanced courses in various subfields of AI.

Course Content

Unit I	Introduction	08 Hours
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History, Philosophy of AI, Definitions,

Introduction to:

- AI System Hardware CPU, RAM, GPU, Interconnects, Storage, Network Controller;
- AI Accelerators GPUs;
- System Software Operating System, Virtualization, Cloud.

Unit II	Containers, IDE & Schedulers	08 Hours
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Introduction to Containers and IDE; Scheduling and Resource Management Introduction to schedulers and orchestration tools; DeepOps: Deep-dive into Kubernetes with the deployment of various AI-based services.

Unit III	Problem-solving by search	12 Hours
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Introduction to unguided and guided search;

State Space Search: Depth First Search, Breadth First Search, Depth First Iterative Deepening

Heuristic Search: Best First Search, Hill Climbing, Solution Space, TSP, Escaping Local Optima, Stochastic Local Search

Unit IV	Knowledge Representation and Reasoning	10 Hours
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Knowledge Representation (KR) Introduction, Knowledge Progression, KR model, category: typology map, type, relationship, framework, mapping, forward & backward representation, KR system requirements; KR schemes; KR issues; KR using predicate logic, KR using Rules Reasoning: Definitions Reasoning, formal logic, and informal logic, uncertainty, monotonic logic, non-monotonic Logic; Methods of reasoning and examples – deductive, inductive, abductive, analogy; Sources of uncertainty; Approaches to reasoning – symbolic, statistical

and fuzzy; Symbolic Reasoning, Statistical Reasoning		
Unit V	Learning System & Neural Networks	12 Hours
Definition, learning agents, components of the learning system; Rote Learning, Learning from examples; Explanation-based learning, Clustering, Reinforcement Learning Introduction to NN, ANN, CNN, ML, Deep Learning: Model, architecture, Learning Methods		
Unit VI	Applications of AI	10 Hours
Game playing, Computer Vision, Expert Systems, agricultural and soil management applications, Cognitive Science, Finance, meteorology, Health care.		
Case Studies:		
1. Implementation of CNN for databases available in the public domain. 2. Development of your own deep network. 3. Image processing of the data collected using UAV/drone 4. Solving health care/ meteorology problem using AI algorithm.		
Pedagogy		
Lectures/Experiential Learning		
Course Outcome		
Students will: • Gain knowledge of the basic concepts of Artificial Intelligence. • Learn problem-solving, knowledge representation, and reasoning approaches. • Able to deal with all the concepts and problems using NN, ANN, CNN, ML, and deep learning. • Able to apply the knowledge and will generate automated systems (Applications) using AI.		
References/Readings		
1. Deepak Khemani, 'A First Course in Artificial Intelligence', McGraw Hill Education (India), 1st ED, 2014. 2. Stuart J. Russell and Peter Norvig, 'Artificial Intelligence', Pearson, 3rd ED, 2016 3. George F Lugar, Artificial Intelligence: Structure and strategies for complex, Problem Solving, 6th ED, 2021. 4. Wolfgang Ertel, Nathanael T. Black, Introduction to Artificial Intelligence Nils J Nilsson, Springer, 2018		

5. Principles of Artificial Intelligence, Illustrated Reprint Edition, Springer Heidelberg, 2014.
6. Alexander Jung Machine, 'Learning: The Basics (Machine Learning: Foundations, Methodologies, and Applications)', Springer, 2022
7. Cherry Bhargava, Pardeep Kumar Sharma, 'Artificial Intelligence. Fundamentals and Applications', CRC Press, 2022