

Course Code	EEE4001B			
Course Category	Professional Elective -V			
Course Title	Artificial Intelligence and Machine Learning			
Weekly Teaching Hrs and Credits	L	T	Laborator y	Credits
	3	0	2	3 + 0 + 1
<u>Pre-requisites:</u> Graph Theory, Probability, Statistics, Calculus.				
<u>Course Objectives:</u> <ol style="list-style-type: none"> 1. To provide an introduction to the field of artificial intelligence. 2. To understand various problem algorithms and methods for solving complex problems. 3. To solve practical problems via implementation of fuzzy logic techniques. 				
<u>Course Outcomes:</u> After completion of this course students will be able to <ol style="list-style-type: none"> 1. Understand the fundamentals of artificial intelligence technique (CL-II). 2. Apply artificial intelligence technique for problem solving (CL-III). 3. Identify the applications of Fuzzy Logic (CL-III). 4. Analyze various machine learning algorithms for solving problems (CL-IV). 				
<u>Course Contents:</u> <p>Basics of Artificial Intelligent Systems: Fundamentals of artificial intelligence. Intelligent control approaches and architecture. Types of AI Agent, Concept of Rationality, nature of environment, structure of agents. Turing Test in AI.</p> <p>Problem Solving Algorithms: Search Algorithms in artificial intelligence, types of search algorithms, problem reduction. Constraint satisfaction problem: Interference in CSPs; Back tracking search for CSPs, Local Search for CSPs, structure of CSP Problem. Beyond classical Search: local search algorithms and optimization problem.</p> <p>Introduction to Fuzzy Logic Control System: Fuzzy sets, fuzzy relations, basic fuzzy set operations, properties of fuzzy sets. Fuzzy logic controller.</p> <p>Foundations of Machine Learning: Machine learning techniques. AI & ML, dataset for ML, data pre-processing, training versus testing, positive and negative Class, cross-validation.</p> <p>Types of Learning: Supervised, Unsupervised and semi-Supervised learning. Supervised Learning, types of supervised machine learning algorithms, types of unsupervised learning algorithm, dimensionality reduction, subset selection, and introduction to principal component analysis</p> <p>Laboratory Exercises / Practical:</p> <ol style="list-style-type: none"> 1. Write program of Vacuum Cleaner World Agent using Python. 2. Calculate the output of a simple neuron. 3. Create and view custom neural networks. 4. Classification of linearly separable data with a perceptron. 5. Classify species of Iris flower using MLP. 6. Implement and test MLP trained with back propagation algorithm 7. Linear Regression Using Python 8. Implementation of fuzzy logic membership functions. 				

9. Temperature monitoring using Fuzzy Logic.
10. Mini Project on any of the technologies studied in the course (Group activity)

Learning Resources:

1. DanW. Patterson. *Introduction to Artificial Intelligence & Expert system*, Prentice Hall of India, 2004.
2. Russell, S. and Norvig, P. 2015. *Artificial Intelligence - A Modern Approach*, 3rd edition, Prentice Hall, 2009.
3. Rich E., Knight K. and Nair B. S., *Artificial Intelligence*, Tata McGraw Hills (2009).

Supplementary Reading:

1. K. Gurney. *An Introduction to Neural Networks*, UCL Press, London, 1997.
2. S. Rajasekaran, G.A. Vijayalakshmi Pai. *Neural Networks, Fuzzy Logic and Genetic Algorithms: Synthesis and Applications*, Prentice Hall of India, 2003.

Web Resources:

Weblinks:

<https://nptel.ac.in/courses/117105084/>

MOOCs:

<https://www.coursera.org/learn/neural-networks-deep-learning>

Pedagogy:

- Power Point Presentations, Videos
- Co-teaching
- Group Activities

Assessment Scheme:

Class Continuous Assessment (CCA) (30 Marks)

Assignments	Midterm Exam	Class Test	Students Initiatives
10	15	5	NIL

Laboratory Continuous Assessment (LCA) (30 Marks)

Understanding the Objectives	Understanding of Procedure and Initiatives	Experimental Skills	Oral
5	5	5	15

Term End Examination:

Term end exam of 40 marks will be based on entire syllabus.

Syllabus:

Module No.	Contents	Workload in Hrs		
		<i>Theory</i>	<i>Lab</i>	<i>Assess</i>
1	Basics of Artificial Intelligent Systems: Fundamentals of artificial intelligence. Intelligent control approaches and architecture. Types of AI Agent, Concept of Rationality, nature of environment, structure of agents. Turing Test in AI.	09	04	
2	Problem Solving Algorithms: Search Algorithms in artificial intelligence, types of search algorithms, problem reduction. Constraint satisfaction problem: Interference in CSPs; Back tracking search for CSPs, Local Search for CSPs, structure of CSP Problem. Beyond classical Search: local search algorithms and optimization problems.	09	04	
3	Introduction to Fuzzy Logic Control System: Fuzzy sets, fuzzy relations, basic fuzzy set operations, properties of fuzzy sets. Fuzzy logic controller.	09	06	
4	Foundations of Machine Learning: Machine learning techniques. AI & ML, dataset for ML, data pre-processing, training versus testing, positive and negative Class, cross-validation.	09	06	
5	Types of Learning: Supervised, Unsupervised and semi-Supervised learning. Supervised Learning, types of supervised machine learning algorithms, types of unsupervised learning algorithm, dimensionality reduction, subset selection, and introduction to principal component analysis	09	10	