Devi Ahilya University, Indore, India Institute of Engineering & Technology				**III Year B.E. (Electronics and Instrumentation)**			
Subject Code & Name	**Instructions Hours per Week**			**Credits**			
5EIRE1	**L**	**T**	**P**	**L**	**T**	**P**	**Total**
AI & MACHINE LEARNING	**3**	**1**	**2**	**3**	**1**	**1**	**5**
Duration of Theory Paper: 3 Hours							

Course Objective:

The course is designed

1. To introduce the objectives, components, applications and current trends of Artificial Intelligence.
2. To learn about in intelligent agents, problem solving methods and knowledge & reasoning
3. To understand statistics and probability theory to develop a predictive model.
4. To impart knowledge of developing unsupervised and supervised learning models.
5. To introduce Python programming for AI algorithms and Machine Learning modules.

Prerequisite: Basic Mathematics and Programming

COURSE CONTENTS

Unit I

Introduction to artificial intelligence, objectives of AI, foundations of AI, categories of AI, components of AI, sub domains of artificial intelligence, applications of AI, current trends in artificial intelligence, Intelligent agents and environment: intelligent agents, concept of rationality, PEAS description of agents, types of environments, structure of intelligent agents: simple reflex agents, model-based reflex agents, goal-based agents and utility-based agents learning agents.

Unit II

Problem solving methods, search strategies, uninformed search strategies: breadth first search, depth first search, depth limited search, iterative deepening depth first search, uniform cost search, bidirectional search, informed search strategies, heuristics functions, greedy best first search, A* search, Local Search Algorithms and Optimization Problems, Backtracking Search, Game Playing, Optimal Decisions in Games, Alpha, Beta Pruning. Knowledge representation & Reasoning

Unit III

Probability and Statistics basics: mean, mode, median, mean squared value, standard deviation, variance. Probability distributions: Gaussian distribution, prior probabilities, Bayes rule, Bayesian networks, exact and approximate inference in Bayesian networks, standardization and normalization, Linear regression, Logistic Regression.

Unit IV

Aspects of developing a learning system: Training Data, Validation Data and Test data, Forms of learning, Supervised learning, Classification and Regression learning methods: KNN algorithm, decision tree classifier, support vector machines, Naive Bayes classifier

algorithm, Linear Regression with one variable, logistic regression, random forest regression and classifier. Confusion matrix.

Unit V

Unsupervised Learning and Reinforcement learning, Clustering and Association, K-means clustering algorithm, hierarchical clustering, Anomaly detection, Artificial Neural Networks. Implementation of AI algorithms and Machine Learning modules using Python programming.

Course Outcome:

Students earned credits will develop ability to

CO.No.	CO	PO
CO1	Ability to develop a basic understanding of Artificial Intelligence , intelligent system, AI building blocks and AI applications.	PO-1
CO2	Apply problem solving methods to understand, analyse & resolve the complex problems.	PO-1, PO-2, PO-3, PO-4
CO3	Develop a predictive model for decision-making under uncertainty.	PO-3, PO-5
CO4	Apply learning algorithms to design classification and regression model.	PO-3, PO-4, PO-5, PO-6, PO-9
CO5	Design AI algorithms and Machine Learning modules using python programming.	PO-2, PO-3, PO-4, PO-5, PO-6, PO-9

CO-PO Relationship

CO	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO1	2											
CO2	2	3	2	3								
CO3			3		3							
CO4			3	3	3	3			2			
CO5		3	3	3	3	3			2			

BOOKS RECOMMENDED:

[1]. S. Russell and P. Norvig, Artificial Intelligence: A Modern Approach, Prentice Hall, 3rd Edition, 2009

[2]. Kevin Night and Elaine Rich, Nair B., "Artificial Intelligence (SIE)", Mc Graw Hill, 2008.

[3]. David L. Poole, Alan K. Mackworth, Artificial Intelligence: Foundations of Computational Agents, Cambridge University Press, 2010.

[4]. Ethem Alpaydin, Introduction to Machine Learning (Adaptive Computation and Machine Learning series), The MIT Press; second edition, 2009

[5]. Michael Bowles, Machine Learning in Python, John Wiley & Sons, Inc., 2015

List of Practical Assignments:

1. Write a program to implement Single Player Game (Using Heuristic Function)

2. Write a program to implement Tic-Tac-Toe game problem.
3. Write a program to implement informed search
4. Write a program to implement uninformed search
5. Design a classification-based ML algorithm.
6. Design a Regression based ML algorithm.
7. Design a clustering-based algorithm.
8. Develop an application using any machine learning algorithm.
9. Case Studies on different data sets