



INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal - 500 043, Hyderabad, Telangana

COURSE CONTENT

MACHINE LEARNING AND ARTIFICIAL INTELLIGENCE								
IV Semester: MBA								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
CMBE62	Elective	L	T	P	C	CIA	SEE	Total
		2	-	-	2	40	60	100
Contact Classes: 20	Tutorial Classes: Nil	Practical Classes: Nil			Total Classes: 20			
Prerequisite: Business Analytics								
SDGs Mapped: SDG 9 (Industry, Innovation and Infrastructure), SDG 8 (Decent Work & Economic Growth)								

I. COURSE OVERVIEW:

This course introduces the concepts and applications of machine learning and artificial intelligence (AI) with a focus on supervised and unsupervised learning techniques, recommender systems, decision tree classification, and problem-solving methods in AI. Students will gain both theoretical knowledge and hands-on experience through case studies in employee churn prediction, movie recommendations, and credit risk analysis. The course also explores the foundations of AI, intelligent agents, and classical as well as modern problem-solving approaches.

II. OBJECTIVES:

The students will try to learn:

- I. The machine learning concepts, types, and algorithms with real-world applications.
- II. The building recommender systems using user-based, item-based, and matrix factorization techniques.
- III. The construct and evaluate decision tree models for classification problems.
- IV. The foundations, history, and role of intelligent agents in AI.
- V. The problem-solving strategies including search methods, optimization, adversarial search, and constraint satisfaction problems.

III. COURSE OUTCOMES:

At the end of the course students should be able to:

- CO1 Explain the types of machine learning algorithms and apply supervised learning methods such as KNN, Random Forest, and Boosting.
- CO2 Build and evaluate recommender systems using similarity measures and matrix factorization techniques.
- CO3 Construct, visualize, and assess decision tree classifiers using different criteria on real-world datasets.
- CO4 Describe the foundations of artificial intelligence, intelligent agents, and their applications in problem-solving.
- CO5 Apply classical and informed search strategies, heuristic approaches, and optimization methods to solve AI problems.
- CO6 Analyze and design AI-driven solutions such as chatbots, adversarial search models, and constraint satisfaction systems for decision-making.

IV. COURSE CONTENT:

MODULE-I-MACHINE LEARNING: (08)

What is Machine Learning; Types of Machine Learning Algorithms-Supervised, Unsupervised and Reinforcement Learning. Supervised Learning-K Nearest Neighbors, Random Forest and Boosting
Case Study: Predicting Employee Churn Using KNN, RF and Boosting.

MODULE -II-RECOMMENDER SYSTEMS USING MACHINE LEARNING: (10)

User Based Similarity-Calculating Cosine Similarity Between Users, Filtering Similar Users, Challenges with User Based Similarity. Item Based Similarity-Calculating Cosine Similarity between Movies, Finding Most Similar Movies. Matrix Factorization

MODULE -III-DECISION TREE CLASSIFICATION: (09)

Introduction to Decision Tree; Building Decision Tree Classifier using Gini Criteria; Measuring Test Accuracy; Displaying the Tree; Building Decision Tree Classifier using Entropy Criteria; Finding Optimal Criteria;

Maximum Depth of the Tree and Benefits and Disadvantages of Decision Tree
Case Study: Applying Decision Tree Classification on German Credit Data.

MODULE -IV-ARTIFICIAL INTELLIGENCE: (10)

Introduction-Meaning and Foundations of AI, History of AI, Intelligent Agents-Agents and Environments, Concept of Rationality, Nature of Environments, The Structure of Agents, AI: The present and Future.
Problem Solving-I: Solving Problems by Searching-Problem Solving Agents, Searching for Solutions, Uninformed Search Strategies, Informed Search Strategies, Heuristic Functions.

MODULE -V-PROBLEM SOLVING: (08)

Beyond Classical Search-Local Search Algorithms and Optimization Problems, Beyond Classical Search, Adversarial Search, Constraint Satisfaction Problems, Chabot –Introduction, Characteristics and its importance

V. TEXT BOOKS:

1. Sergio's Theodoratos, Elsevier "Machine Learning A Bayesian and Optimization Perspective ", 1st edition, 2020.
2. Dr. Dheeraj Mehrotra "Basics of Artificial Intelligence & Machine Learning ", 3rd edition, 2019.
3. Wei- Meng Lee, "Python Machine Learning", Wiley, 3rd edition, 2019.
4. David L. Poole, Alan K. Mackworth "Artificial Intelligence", 2nd edition, 2018.

VI. REFERENCE BOOKS:

1. Paul Deitel, Harvy Deitel, "Python for Programmers- with introductory AI Case Studies", 1st edition, Pearson Education, 2019.
2. Puneet Mathur, "Machine Learning Applications Using Python: Cases Studies from Healthcare, Retail, and Finance", 1st edition, Apress, 2019.
3. Joshua Eckroth, "Python AI Projects for Beginners", 1st edition, Packt Publishers, 2018.

VII. WEB REFERENCES:

1. https://www.amazon.in/dp/B00LPGBV60/ref=cm_sw_r_apan_glt_MS59JPFTKSCVQMHFG9PF.
2. https://www.amazon.in/dp/B07F63RMSW/ref=cm_sw_r_apan_glt_1TZMKKBJ2RDBMZY2J2SX

VIII. E-TEXT BOOKS:

1. https://www.amazon.in/dp/B00LPGBV60/ref=cm_sw_r_apan_glt_MS59JPFTKSCVQMHFG9PF