Artificial Intelligence (AI) and Machine Learning (ML)

Course Duration: 40 Hours **Course code: AI-ML**

1. Course Overview

The Artificial Intelligence (AI) and Machine Learning (ML) course is designed to provide a strong foundation in intelligent systems that can analyze data, learn patterns, and make data-driven decisions. This course combines theoretical concepts with practical implementation, enabling learners to understand how AI and ML technologies are applied across industries such as healthcare, finance, retail, manufacturing, and cybersecurity.

2. What you'll learn?

By the end of this course, learners will be able to:

- Understand the core concepts of Artificial Intelligence and Machine Learning
- Differentiate between AI, ML, and Deep Learning
- Apply supervised, unsupervised, and reinforcement learning techniques
- Build, train, and evaluate machine learning models
- Perform data preprocessing and feature engineering
- Use Python and ML libraries for implementation
- Understand ethical, responsible, and explainable AI
- Deploy and monitor AI/ML solutions in real-world scenarios

3. Target Audience

This course is ideal for:

- Students and fresh graduates aspiring to enter AI/ML roles
- Software developers transitioning to intelligent systems
- Data analysts and data scientists
- IT professionals and engineers
- Business analysts and technology leaders

- Researchers and academic professionals
- Professionals preparing for AI/ML certifications

4. Pre-Requisites

To get the most out of this course, learners should have:

- Basic understanding of programming concepts (preferably Python)
- Fundamental knowledge of mathematics and statistics
- Familiarity with data handling and analytical thinking
- Interest in AI-driven problem-solving

5. Course content

Module 1: Introduction to Artificial Intelligence

- Definition and scope of AI
- History and evolution of AI
- Types of AI and real-world applications
- AI vs traditional programming

Module 2: Machine Learning Fundamentals

- What is Machine Learning?
- Types of ML: supervised, unsupervised, reinforcement
- ML workflow and lifecycle
- Common ML use cases

Module 3: Data Preparation and Exploration

- Data collection and understanding
- Data cleaning and preprocessing
- Exploratory data analysis (EDA)
- Feature selection and transformation

Module 4: Supervised Learning Algorithms

- Linear and logistic regression
- Classification techniques (KNN, Naive Bayes)
- Decision trees and random forests
- Model training and evaluation

Module 5: Unsupervised Learning Algorithms

- Clustering techniques (K-Means, DBSCAN)
- Dimensionality reduction (PCA)
- Anomaly detection
- Practical business applications

Module 6: Model Evaluation and Optimization

- Performance metrics and validation
- Overfitting and underfitting
- Bias-variance tradeoff
- Hyperparameter tuning

Module 7: Introduction to Deep Learning

- Neural networks fundamentals
- Activation functions and backpropagation
- Overview of CNNs and RNNs
- Deep learning use cases

Module 8: Reinforcement Learning Basics

- Reinforcement learning concepts
- Agents, environments, and rewards
- Policy and value-based approaches
- Real-world applications

Module 9: AI Tools, Frameworks, and Ethics

- Python ecosystem for AI/ML
- Scikit-learn, TensorFlow, PyTorch overview
- Responsible and ethical AI
- Explainable AI (XAI) concepts

Module 10: Deployment and Real-World Applications

- Model deployment strategies
- Monitoring and maintaining ML models
- Industry case studies
- Capstone project and practical implementation