



TECHNOCATION FREELANCING TRAINING INSTITUTE & SOFTWARE HOUSE

Professional Artificial Intelligence (AI) Course Outline

Module 1: Introduction to Artificial Intelligence

- What is AI? History & Evolution
- Types of AI: Narrow AI, General AI, Super AI
- Key AI Technologies: Machine Learning, Deep Learning, NLP, Robotics
- AI vs. Machine Learning vs. Data Science

Module 2: Mathematics & Statistics for AI

- Linear Algebra (Vectors, Matrices, Eigenvalues)
- Probability & Statistics (Bayes' Theorem, Gaussian Distribution)
- Calculus for Optimization (Derivatives, Gradient Descent)
- Understanding Neural Networks Mathematically

Module 3: Machine Learning Fundamentals

- Supervised vs. Unsupervised Learning
- Regression & Classification Algorithms (Linear Regression, Decision Trees, SVM)
- Clustering & Dimensionality Reduction (K-Means, PCA)
- Model Evaluation & Performance Metrics

Module 4: Deep Learning & Neural Networks

- Introduction to Neural Networks & Perceptron Model
- Activation Functions & Loss Functions
- Training Neural Networks with Backpropagation
- Deep Neural Networks (DNN) & Optimization Techniques

Module 5: Natural Language Processing (NLP)

- Text Preprocessing & Tokenization
- Sentiment Analysis & Named Entity Recognition (NER)
- Word Embeddings (Word2Vec, GloVe, BERT)
- Chatbots & AI-Powered Assistants

Module 6: Computer Vision & Image Processing

- Image Classification & Object Detection
- Convolutional Neural Networks (CNNs) & Transfer Learning
- Face Recognition & Gesture Detection
- Applications in Healthcare, Security & Retail

Module 7: AI Frameworks & Tools

- Python for AI: NumPy, Pandas, Matplotlib
- Machine Learning with Scikit-Learn
- Deep Learning with TensorFlow & PyTorch
- AutoML & Cloud AI Services

Module 8: Reinforcement Learning

- Markov Decision Processes (MDP)
- Q-Learning & Deep Q Networks (DQN)
- AI in Games: OpenAI Gym & AlphaGo
- Applications in Robotics & Finance

Module 9: AI Ethics & Responsible AI

- Bias in AI & Fairness Considerations
- AI & Data Privacy Regulations (GDPR, CCPA)
- Explainable AI (XAI) & Interpretability
- Future Trends & AI Governance

Module 10: AI Deployment & Real-World Applications

- Deploying AI Models with Flask & FastAPI
- AI in Healthcare, Finance, Marketing & Retail
- AI & IoT (Smart Devices & Automation)
- Building AI-Powered Applications & Startups

Module 11: Capstone Project & Certification Preparation

- Developing an AI Model for a Real-World Problem
- Optimizing, Deploying & Presenting AI Solutions
- Preparing for AI Certification Exams
- Career Paths & Job Market in AI