Python, Machine Learning, Generative AI & Agentic AI

Duration: 5 Days
Mode: Online Instructor-Led Training
Training Methodology: Instructor-led sessions, demonstrations, guided exercises and hands-on projects.

DAY 1 – Introduction to AI, Python Programming and Data Analysis

1. Introduction to Data Science and AI

- Introduction to Data Science and Artificial Intelligence
- Understanding Machine Learning, Generative AI and Agentic AI
- Applications of AI in Real-World Scenarios

2. Python Programming Fundamentals

- Python Syntax, Variables and Data Types
- Operators and Conditional Statements
- Lists, Tuples, Sets and Dictionaries
- Functions and Modules
- File Handling and Exception Handling

3. Python for Data Analysis

- Introduction to NumPy and Pandas
- Working with Series and DataFrames
- Reading CSV and Excel Files
- Data Selection, Filtering and Sorting
- Data Cleaning and Handling Missing Values

Hands-on Projects

1. Yelp Business Data Analysis using Pandas.
2. Business Data Cleaning and Visualization.

DAY 2 – Predictive Modeling with Machine Learning and Neural Networks

1. Introduction to Machine Learning

- Types of Machine Learning
- Supervised and Unsupervised Learning
- Machine Learning Workflow
- Data Preprocessing and Feature Selection
- Training and Testing Datasets

2. Machine Learning Algorithms

- Linear Regression
- Logistic Regression
- Decision Trees
- Random Forest and Ensemble Techniques
- K-Means Clustering
- Introduction to Neural Networks

3. Model Training and Evaluation

- Model Training and Prediction
- Classification and Regression Metrics
- Accuracy, Precision, Recall and F1-Score
- MAE, MSE and R^2 Score
- Model Performance Evaluation
- Saving and Loading Trained Models

Hands-on Project

1. Employee Attrition Prediction using Machine Learning.
2. Predictive Maintenance – Machine Failure Prediction.

DAY 3 – Generative AI for Natural Language Processing

1. Introduction to Generative AI

- Understanding Large Language Models (LLMs)
- Introduction to Generative AI Tools
- Working with LLMs using Python
- Understanding Tokens and Context Windows

2. Prompt Engineering

- Fundamentals of Prompt Engineering
- Zero-Shot, One-Shot and Few-Shot Prompting
- Role-Based and Context-Based Prompting
- Structured Output Generation
- Evaluating Generative AI Responses
- Responsible AI

3. Building Generative AI Applications

- Python Integration with Generative AI
- Document Summarization and Question Answering
- Introduction to Embeddings and Semantic Search
- Introduction to Retrieval-Augmented Generation (RAG)
- Building Basic Document-Based AI Applications

Hands-on Projects

1. AI-Powered Document Summarizer and Question Answering.
2. Company FAQ Chatbot using Generative AI.

DAY 4 – Agentic AI for Automation

1. Introduction to Agentic AI

- Understanding AI Agents and Agentic Workflows
- Generative AI vs Agentic AI
- Components of an AI Agent
- Tools, Memory and Planning

2. Building AI Agents

- Introduction to Agent Frameworks
- Creating Single-Agent Systems
- Tool Calling and Function Calling
- Integrating Python Functions with AI Agents
- Introduction to Multi-Agent Systems

3. Evaluating Agentic AI Systems

- Evaluating AI Agent Responses
- Task Execution and Performance Evaluation
- Error Handling and Reliability
- Responsible AI and Security Considerations

Hands-on Projects

1. AI Research Assistant – Generating Research Summaries and Reports.
2. AI Task Assistant – Executing Predefined Tasks using Python Functions.

DAY 5 – Deploying AI Solutions and Capstone Project

1. Deploying Machine Learning Solutions

- Introduction to ML Model Deployment
- Saving and Loading Trained Models
- Integrating ML Models into Applications
- Introduction to Model Deployment Approaches

2. Deploying Generative AI Solutions

- Deploying LLM-Based Applications
- Integrating Generative AI Solutions
- Application Testing and Evaluation
- Introduction to Cloud-Based AI Deployment

3. End-to-End Capstone Project

- Problem Identification and Solution Design
- Data Preparation and Processing
- Model or AI Application Development
- Testing and Evaluation
- Project Demonstration

Suggested Capstone Projects

1. Employee Analytics and Attrition Prediction System.
2. AI-Powered Document Assistant.

SELF-PACED LEARNING

1. Claude-Based AI Workflows
2. Masterclass on Multimodal Generative AI
3. Neural Networks for Computer Vision
4. Statistical Learning
5. Recommendation Systems
6. Introduction to SQL