

Advance Python with AI

Duration: 20 Hours (10 Days × 2 hrs/day)

1. Participants' Knowledge Pre-requisites:

- Basic knowledge of Python programming (variables, loops, functions, OOP concepts)
- Familiarity with mathematics for AI (linear algebra, probability, statistics basics)
- Conceptual understanding of AI/ML workflows
- Interest in applying Python for real-world AI solutions

2. Course Content (Day-wise – 2 hrs/day):

Day 1

- Advanced Python concepts: decorators, generators, context managers
- Hands-on: Write Python scripts with advanced features

Day 2

- Data handling with NumPy & Pandas
- Lab: Implementing matrix operations and data preprocessing

Day 3

- Data visualization using Matplotlib & Seaborn
- Lab: Build visual insights from AI datasets

Day 4

- Introduction to Scikit-learn and ML pipeline basics
- Lab: Simple regression task using Scikit-learn

Day 5

- Supervised learning: Regression models (Linear, Logistic)
- Lab: Predict house prices using Linear Regression

Day 6

- Classification techniques and model evaluation (Confusion matrix, AUC, ROC)
- Lab: Build a classification model for customer churn

Day 7

- Unsupervised learning: Clustering (K-Means, DBSCAN)
- Lab: Customer segmentation project

Day 8

- Dimensionality Reduction (PCA, t-SNE)
- Lab: Apply PCA for feature reduction in dataset

Day 9

- Deep Learning introduction (TensorFlow/Keras)
- Build a simple ANN model
- Lab: Handwritten digit recognition with MNIST

Day 10

- AI project workflow: Data preprocessing → Model building → Evaluation
- Final Capstone: End-to-end AI model (choose regression/classification dataset)

3. Lab Requirements:

- Python 3.x (Anaconda preferred)
- Jupyter Notebook / VS Code setup
- Libraries: NumPy, Pandas, Matplotlib, Seaborn, Scikit-learn, TensorFlow/Keras
- Sample datasets (MNIST, Iris, Boston Housing, custom CSV datasets)
- GPU-enabled system (optional for deep learning)

4. Outcome of the Program:

- Master advanced Python features for AI projects
- Handle, pre-process, and visualize datasets effectively
- Implement machine learning models using Scikit-learn
- Build and evaluate supervised & unsupervised learning models
- Gain hands-on exposure to deep learning basics with TensorFlow/Keras
- Transition from conceptual knowledge to practical AI implementation