

# Applied Artificial Intelligence with Python & Machine Learning

**Duration:** 10 Days

## Course overview

This course is designed to take learners from Python programming fundamentals through to applied Artificial Intelligence and Machine Learning, with no prior AI experience required. Starting with core Python concepts such as syntax, data structures, object-oriented programming, and file handling, the course progressively builds towards data analysis using Pandas and Matplotlib, before diving into the full machine learning workflow. Participants will gain hands-on experience with supervised learning techniques including regression and classification models, unsupervised learning through clustering, and Natural Language Processing for text analysis. The course concludes with an introduction to Deep Learning, covering Artificial Neural Networks and Convolutional Neural Networks applied to real-world datasets. Each day includes a practical lab exercise using industry-relevant datasets, ensuring learners can immediately apply concepts to simulate real-world AI and data science projects. Module-wise quizzes reinforce knowledge retention throughout the programme, making this course ideal for anyone looking to build a solid, end-to-end foundation in Python, Data Science, and AI.

## Prerequisites

- Logical thinking and analytical mindset
- Some idea of programming concepts (Python, Java, C#, or similar) beneficial but not mandatory

## Course Outcomes

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

- Write Python programs and apply data structures effectively
- Perform data analysis and visualization using Pandas and Matplotlib
- Understand AI concepts, machine learning workflows, and model evaluation
- Implement supervised and unsupervised learning algorithms
- Apply NLP techniques for text processing
- Build and train deep learning models (ANN, CNN)
- Execute hands-on labs using sample datasets to simulate real-world AI projects.
- Module Wise quizzes to test the knowledge.

## Table of Contents (10 Days)

### Day 1 – Python Foundations

- Python setup, syntax, and environment
  - Variables, data types, operators
  - Control flow (if/else) and loops
  - **Lab:** Write basic Python scripts and test simple logic
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### Day 2 – Functions & Data Structures

- Functions, parameters, return values
  - Lists, tuples, dictionaries, sets
  - File handling and serialization (JSON, CSV)
  - **Lab:** Build a student record management program
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### Day 3 – Object-Oriented Programming

- Classes, objects, methods, attributes
  - Encapsulation, inheritance, polymorphism
  - Regular expressions for text validation
  - **Lab:** Create a mini library management system
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### Day 4 – Working with Data

- Pandas: DataFrames creation, manipulation
  - Matplotlib: data visualization basics
  - Importing and cleaning datasets
  - **Lab:** Analyze housing price dataset
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### Day 5 – Introduction to AI & ML

- AI fundamentals: history, applications
- Machine Learning basics: supervised vs unsupervised
- Data preprocessing: cleaning, normalization

- **Lab:** Prepare customer dataset for ML
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### **Day 6 – Regression Models**

- Linear, multiple, polynomial regression
  - Decision tree & random forest regression
  - Model evaluation metrics
  - **Lab:** Predict housing prices using regression models
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### **Day 7 – Classification Models**

- Logistic regression, k-NN, Decision Tree , Random Forest
  - Model selection and evaluation
  - **Lab:** Customer churn classification project
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### **Day 8 – Clustering Techniques**

- k-Means clustering
  - Hierarchical clustering
  - Applications in segmentation
  - **Lab:** Customer segmentation project
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### **Day 9 – Natural Language Processing**

- NLP fundamentals and approaches
  - Tokenization, stemming, lemmatization
  - Classical vs deep learning NLP
  - **Lab:** Sentiment analysis on text dataset
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### **Day 10 – Deep Learning**

- Artificial Neural Networks (ANN)
- Single NN vs Dense NN
- Convolutional Neural Networks (CNN)

- Training and evaluation of models
- **Lab:** MNIST dataset modelling , Image classification project