PRAXC INFINITE

AI & TECHNOLOGY EDUCATION

PROFESSIONAL TRAINING PROGRAM

Machine Learning with Python

Beginner to Intermediate

A structured four-week program introducing Machine Learning concepts, Python-based data preparation, model training, evaluation, and practical implementation.

DURATION	LEVEL	TRAINING HOURS	FORMAT
4 Weeks	Beginner to Intermediate	30 Hours (suggested)	Instructor-Led + Practical

Course Description

Machine Learning with Python is a practical, beginner-to-intermediate training program designed to introduce learners to the principles and workflows of building predictive models with Python. The course begins with Machine Learning fundamentals and dataset preparation, then progresses through data exploration, supervised learning, introductory unsupervised learning, and model evaluation.

Participants use Python libraries such as NumPy, Pandas, Matplotlib, Seaborn, and scikit-learn to prepare datasets, train baseline models, assess model performance, and interpret results. Guided exercises and a final project help learners connect concepts with practical implementation.

The program provides a foundation for learners who wish to continue into applied Machine Learning, Artificial Intelligence, or Data Science.

Course Details

Course title: Machine Learning with Python
Duration: 4 Weeks
Level: Beginner to Intermediate
Suggested training hours: 30 Hours (adjust to your delivery plan)
Prerequisites: Basic Python knowledge recommended; basic statistics is helpful but not mandatory
Tools: Python 3, Jupyter Notebook or Google Colab
Libraries: NumPy, Pandas, Matplotlib, Seaborn, scikit-learn

Learning Outcomes

• Explain core Machine Learning concepts and distinguish major learning types.

• Load, inspect, clean, and prepare datasets using Python libraries.

• Explore data using summary statistics and visualisations.

• Train introductory regression and classification models with scikit-learn.

• Evaluate model performance using appropriate metrics.

• Explain basic clustering, overfitting, underfitting, and validation concepts.

• Follow a structured workflow from data preparation to model evaluation.

• Present model results and identify limitations.

Four-Week Detailed Syllabus

The course is organised into four progressive modules. Each module includes a description, key topics, and a practical application. The suggested 30-hour format averages approximately 7.5 hours per week.

Module 1: Introduction to Machine Learning & Python Workflow

Module description: Understand Machine Learning, how it differs from rule-based programming, and the workflow used to develop predictive models. Connect Python fundamentals with the stages of a typical ML task.

Syllabus / topics covered:

• Introduction to AI, Machine Learning, and Deep Learning

• Applications and limitations of Machine Learning

• Supervised, unsupervised, and reinforcement learning overview

• ML workflow: problem definition, data, training, evaluation, and prediction

• Python environment using Jupyter Notebook or Google Colab

• Review of essential Python concepts used in ML

• Introduction to NumPy, Pandas, and scikit-learn

Practical application: Load a small dataset, identify its features and target, and define a prediction task.

Module 2: Data Preparation, Exploration & Visualization

Module description: Learn to inspect and prepare datasets before model training. Explore data quality, summarise variables, visualise patterns, and apply basic preprocessing techniques using Python libraries.

Syllabus / topics covered:

• Loading datasets with Pandas

• Inspecting rows, columns, data types, and summary statistics

• Handling missing values and duplicate records

• Numerical and categorical features

• Exploratory data analysis fundamentals

• Visualisation using Matplotlib and Seaborn

• Correlation, distributions, and potential outliers

• Train-test split and unseen test data

• Introductory feature encoding and scaling

Practical application: Prepare a dataset for modelling and create visualisations to understand its variables.

Module 3: Supervised Learning — Regression & Classification

Module description: Build an introductory understanding of supervised learning by training regression and classification models. Learn how algorithms use labelled examples and how model performance is measured.

Syllabus / topics covered:

• Features, target variables, training data, and test data

• Regression versus classification

• Linear Regression

• Logistic Regression

• Decision Tree fundamentals

• K-Nearest Neighbours (KNN)

• Introduction to Random Forest

• Training models using scikit-learn

• Regression metrics: MAE, MSE, RMSE, and R^2

• Classification metrics: accuracy, precision, recall, F1-score, and confusion matrix

Practical application: Train and evaluate a beginner-level regression or classification model.

Module 4: Unsupervised Learning, Model Evaluation & Project

Module description: Explore introductory unsupervised learning and learn how to review model performance. Consolidate course concepts in a guided project, from data preparation through evaluation and presentation.

Syllabus / topics covered:

• Introduction to unsupervised learning

• K-Means clustering fundamentals

• Interpreting clusters and recognising limitations

• Overfitting and underfitting

• Generalisation and validation data

• Cross-validation: introductory concepts

• Model comparison and basic hyperparameter tuning

• Choosing appropriate evaluation metrics

• Project workflow, result interpretation, and presentation

Practical application: Complete a guided ML workflow covering data preparation, model training, evaluation, and presentation.

Training Methodology & Assessment

Training combines instructor-led explanations, live coding demonstrations, guided exercises, and practical assignments. Learners are encouraged to practise between sessions and review model outputs critically.

Suggested assessment components include coding exercises, a model-training task, and a final project presentation. Actual assessment criteria, attendance requirements, and certificate eligibility should be published by the training provider.

PROGRAM SUMMARY
Machine Learning with Python
4 Weeks • Beginner to Intermediate • Python • NumPy • Pandas • Matplotlib • Seaborn • scikit-learn • Model Training & Evaluation