

Machine Learning with Python

Build, evaluate and explain machine learning models in Python that solve real business problems.

DURATION

5 days · 40 hours

LEVEL

Intermediate

CURRICULUM

14 modules · 11 labs

DELIVERY

Live online, Onsite,
Corporate

Course overview

Machine learning is most useful when it is built carefully: the right problem framing, honest evaluation and models that people can understand and trust. This five-day course teaches the practical workflow that data scientists use, using Python and scikit-learn.

Day one covers the machine learning workflow, problem framing and preparing data — feature engineering, encoding, scaling and building reproducible pipelines. Day two focuses on supervised learning for regression and classification, from linear and logistic regression to decision trees, and on avoiding data leakage.

Day three introduces ensemble methods such as random forests and gradient boosting, cross-validation, hyperparameter tuning and the right metrics for imbalanced problems. Day four covers unsupervised learning — clustering, dimensionality reduction and anomaly detection — plus model explainability with feature importance and SHAP, and the fairness and privacy questions every model raises.

Day five is a capstone project: you frame a business problem, build and compare models, explain the result and package the final model behind a simple API, with an introduction to experiment tracking and monitoring.

This is an original Ace Skills course with no vendor exam. On completion you receive an Ace Skills Consulting course completion certificate. It builds on our Python for Data Science course and leads naturally into Generative AI and agentic AI training.

Highlights

- 40 hours of live, trainer-led sessions
- scikit-learn pipelines from day one
- Proper validation, tuning and model evaluation
- Explainability and responsible AI practices
- Capstone: an end-to-end model served as an API

What's included

- Complete ML workflow from framing to deployment
- Reusable scikit-learn pipelines
- Cross-validation and hyperparameter tuning
- Gradient boosting with XGBoost or LightGBM
- Explainability with SHAP
- Responsible AI checklist
- Capstone project served as an API
- Course completion certificate from Ace Skills Consulting

Who this course is for

Who should attend

- Data analysts moving into data science
- Software engineers adding ML to their skills
- Python for Data Science graduates
- Business intelligence professionals
- Technical managers leading data teams

Prerequisites

- Working knowledge of Python and pandas
- Basic statistics: mean, variance, correlation
- Our Python for Data Science course or equivalent

Detailed curriculum — 5 days, 40 hours, 14 modules, 11 hands-on labs

Day 1 ML Workflow and Data Preparation

8 hours

1.1 Foundations

- What machine learning can and cannot do
- Framing a business problem
- Supervised vs unsupervised learning
- Train, validation and test splits

1.2 Exploratory analysis

- Target and feature exploration
- Spotting leakage early
- Data quality checks

LAB Explore a customer churn dataset · 40 min

1.3 Feature engineering

- Encoding categorical data
- Handling missing values
- scikit-learn pipelines and ColumnTransformer
- Scaling and transformation
- Date and text features

LAB Build a reusable preprocessing pipeline · 50 min

Day 2 Supervised Learning: Regression and Classification

8 hours

2.1 Regression

- Linear regression
- Regression metrics
- Regularisation: ridge and lasso

LAB Predict house prices with regularised regression · 45 min

2.2 Classification

- Logistic regression
- Decision trees
- k-nearest neighbours
- Probability thresholds

LAB Predict churn with three classifiers · 45 min

2.3 Evaluating classifiers

- Confusion matrix
- ROC and PR curves
- Precision, recall and F1
- Choosing a metric for the business

Day 3 Ensembles, Validation and Tuning

8 hours

3.1 Ensemble methods

- Bagging and random forests
- XGBoost and LightGBM
- Gradient boosting

LAB Compare random forest and gradient boosting · 45 min

3.2 Validation and tuning

- k-fold and stratified cross-validation
- Learning curves
- Grid and randomised search
- Overfitting and underfitting

LAB Tune a model with cross-validated search · 45 min

3.3 Imbalanced data

- Class weights
- Cost-sensitive evaluation
- Resampling techniques

LAB Build a fraud detector on imbalanced data · 45 min

Day 4 Unsupervised Learning and Responsible AI

8 hours

4.1 Clustering

- k-means
- DBSCAN
- Hierarchical clustering
- Evaluating clusters

LAB Segment customers with clustering · 45 min

4.2 Dimensionality reduction and anomalies

- PCA
- Isolation forest for anomaly detection
- Visualising high-dimensional data

4.3 Explainability and responsible AI

- Global and local explanations
- Fairness checks
- Permutation importance and SHAP
- Privacy and documentation with model cards

LAB Explain and audit the churn model · 45 min

Day 5 Deployment Basics and Capstone

8 hours

5.1 From notebook to service

- Saving and loading models
- Experiment tracking with MLflow
- Serving predictions with FastAPI
- Monitoring for drift

LAB Serve a model behind a REST API · 50 min

5.2 Capstone project

- Problem framing
- Explaining results to stakeholders
- Model building and comparison

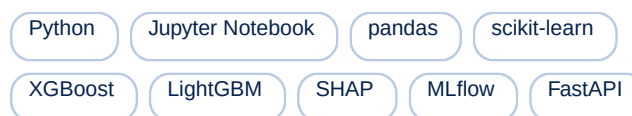
LAB End-to-end capstone with presentation · 150 min

Skills and tools

Skills you will build



Tools used in class



Frequently asked questions

Is there an exam?

No. This is an original Ace Skills course with no vendor exam; you receive an Ace Skills course completion certificate.

How much maths do I need?

School-level algebra and basic statistics are enough. Intuition is emphasised over formulas.

Does this cover deep learning?

It introduces where deep learning fits but focuses on classical machine learning, which solves most tabular business problems.

Will I deploy a model?

Yes. The final day packages your capstone model behind a simple API and introduces tracking and monitoring.

Is this useful for cloud ML certifications?

Yes. The concepts underpin cloud ML exams such as the AWS Machine Learning Engineer – Associate, which we also teach.

Book a batch or talk to an advisor

Course page: aceskillsconsulting.com/course/machine-learning-with-python · Email: info@aceskillsconsulting.com

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