

DATA SCIENCE

INTERMEDIATE

4 DAYS

# Data Science with Machine Learning

Build a strong foundation in data science and machine learning by mastering core concepts, algorithms, and data analysis techniques. Learn how to build, evaluate, and scale production ready predictive models using modern tools and frameworks for real world business applications.

## Why Machine Learning?

### Data-Driven Decision Making

Data Science with Machine Learning enables businesses to make informed decisions based on data-driven insights.

### Predictive Analytics and Forecasting

Machine learning models can be used to make accurate predictions and forecasts, empowering businesses to anticipate customer behaviour, market trends, and business outcomes.

### Improved Efficiency and Productivity

Machine Learning automates processes, enhancing efficiency and productivity. It automates repetitive tasks, performs complex calculations, and accurately analyses large datasets.

### Cost Reduction

Machine Learning can lead to cost savings by automating processes and improving efficiency.

## What you'll be able to do

- ✓ Develop a solid understanding of the core concepts of Data Science
- ✓ Gain proficiency in applying a variety of supervised and unsupervised machine learning algorithms
- ✓ Learn how to analyse and visualize data effectively using popular libraries and tools
- ✓ Acquire practical skills in building accurate predictive models using machine learning algorithms
- ✓ Understand the process of evaluating and validating machine learning models using appropriate metrics, and techniques for model selection to ensure robust and reliable results
- ✓ Learn how to develop production-level Machine-Learning models and scale them effortlessly with state-of-the-art frameworks.

## Who this is for

- Software Engineers/Developers
- Business Analysts
- IT Professionals
- Data Scientists

## Curriculum

### 01 Introduction to Data Science

- Define data science roles and delivery outcomes
- Map ML to business problem types
- Outline the lifecycle from data to deployed model
- Set project success criteria early

### 02 Data Preprocessing and Cleaning

- Handle missing values, outliers, and inconsistencies
- Standardize data quality checks before modeling
- Prevent leakage during prep
- Create a reproducible cleaning checklist

### 03 Data Exploration and Visualization

- Explore distributions and relationships visually
- Identify patterns that guide feature design
- Spot anomalies and data collection issues
- Summarize EDA findings for stakeholders

### 04 Supervised Learning Algorithms

- Apply core regression and classification algorithms
- Match algorithm families to problem constraints
- Train baselines before advanced models
- **Hands-on:** Compare two supervised approaches

### 05 Unsupervised Learning Algorithms

- Use clustering and dimensionality reduction
- Interpret unsupervised outputs carefully
- Apply unsupervised methods for discovery and features
- Validate clusters with practical business sense checks

### 06 Model Evaluation and Selection

- Evaluate models with appropriate metrics
- Compare candidates with consistent validation design
- Select models for accuracy, cost, and explainability
- Document selection rationale

## 07 Feature Engineering and Selection

- Engineer features that improve signal
- Select features to reduce noise and complexity
- Encode categoricals and time signals safely
- Maintain feature definitions for scoring parity

## 08 Time Series Analysis

- Analyze time-dependent data for forecasting
- Use time-aware validation splits
- Apply ML approaches suited to temporal patterns
- Communicate forecast confidence and limits

## 09 Model Deployment and Scalability

- Deploy models for batch or online scoring
- Plan for scale, latency, and reliability
- Version models and dependencies
- Define basic monitoring after go-live

## 10 Case Studies and Real-World Projects

- Apply ML techniques to practical business cases
- Practice scoping, modeling, and presenting results
- Review current trends and best practices in applied ML
- Capture lessons learned for future projects