

# Mathematics for Machine Learning with Python

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**Course Number: WA3839**

**Duration: 3 days**

## Overview

### Course Description

This ML with Python course provides a comprehensive foundation in the mathematical and computational principles that underpin modern machine learning. Learners will develop a strong understanding of linear algebra, calculus, probability, and statistics, and apply these concepts using Python to solve real-world problems. Through a combination of theoretical instruction, hands-on Python exercises, and practical case studies, the course bridges mathematical intuition with applied machine learning techniques. By the end of the course, learners will be able to understand, implement, and evaluate machine learning models with confidence.

### Skills Gained

- Apply core linear algebra concepts such as vectors, matrices, and decompositions in machine learning contexts
- Use calculus concepts including derivatives and gradient descent to support model optimization
- Explain and apply probability concepts, distributions, and Bayesian inference

- Perform statistical analysis using descriptive and inferential methods and hypothesis testing
- Use Python, NumPy, Pandas, and Matplotlib for mathematical computing and data analysis
- Implement supervised and unsupervised machine learning techniques
- Evaluate and select models using appropriate performance metrics and real-world case studies

## **Who Can Benefit**

- Software developers
- IT architects
- Technical and product managers
- Designers
- Data analysts
- Data engineers

## **Audience**

## **Course Details**

### **Linear Algebra**

- Vectors and Matrices
- Eigenvalues and Eigenvectors
- Matrix Decompositions

### **Calculus**

- Derivatives and Integrals
- Differential Equations
- Gradient Descent

### **Probability**

- Basic Probability Concepts
- Discrete and Continuous Probability Distributions
- Bayesian Inference

### **Statistics**

- Descriptive Statistics
- Inferential Statistics
- Hypothesis Testing

## **Python for Mathematics**

- Python Basics
- NumPy and Pandas for Data Manipulation
- Matplotlib for Visualization

## **Machine Learning Techniques**

- Supervised Learning
- Unsupervised Learning
- Model Evaluation and Selection

## **Case Studies and Applications**

- Real-World Machine Learning Projects
- Application of Mathematical Concepts
- Hands-On Python Exercises