# MLOps Engineering on AWS Training

Duration: **3 Day**

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The **MLOps Engineering on AWS Training** course helps organisations automate the development, training, deployment, and operational management of machine learning models using AWS services and modern MLOps practices. By combining **DevOps principles** with **Machine Learning Operations (MLOps)**, the course promotes effective collaboration between data engineers, data scientists, developers, and operations teams.

Participants will learn how to design and automate end-to-end machine learning workflows using **Amazon SageMaker**, **AWS CodeBuild**, **Apache Airflow**, **Kubernetes**, and other MLOps technologies. Key topics include model development, **Continuous Training**, **CI/CD for Machine Learning**, model deployment, performance monitoring, **Data Drift and Model Drift detection**, governance, and production-grade ML operations.

Through hands-on labs and real-world scenarios, learners will gain practical experience building scalable, secure, and reliable machine learning pipelines while applying industry best practices for managing ML workloads in production environments.

## Prerequisites

### Required

- **AWS Technical Essentials**
- **DevOps Engineering on AWS** or equivalent experience
- **Practical Data Science with Amazon SageMaker** or equivalent experience

### Recommended

- **The Elements of Data Science**
- **Machine Learning Terminology and Process**
- Familiarity with Python and machine learning concepts

## Who Should Attend

This course is designed for:

- **MLOps Engineers**
- **Machine Learning Engineers**
- **ML Platform Engineers**
- **Data Engineers**
- **DevOps Engineers**
- **Cloud Engineers**
- **Data Scientists**
- Technical teams responsible for operationalising machine learning models

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## What You Will Learn

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

- Explain the principles of **Machine Learning Operations (MLOps)**.
- Understand the key differences between DevOps and MLOps.
- Design end-to-end machine learning workflows.
- Build automated ML pipelines using **Amazon SageMaker**.
- Automate model training, testing, deployment, and retraining.
- Implement model packaging and deployment strategies.
- Monitor machine learning models in production.
- Detect **Data Drift** and **Model Drift**.
- Monitor and mitigate **Model Bias**.
- Implement **Human-in-the-Loop AI** review processes.

## Training Outline

### Day 1

### Module 0: Welcome

- Course Introduction
- AWS AI & ML Ecosystem Overview
- MLOps Fundamentals

### Module 1: Introduction to MLOps

#### Machine Learning Operations Fundamentals

- What is **MLOps**?
- MLOps Goals
- Data, Code, and Model Management
- Enterprise AI Operations

#### From DevOps to MLOps

- DevOps vs MLOps
- Machine Learning Lifecycle
- MLOps Workflows
- Cross-Team Collaboration

#### MLOps Use Cases

- Production AI Systems
- Enterprise Machine Learning Projects
- Operational Challenges and Solutions

### Module 2: MLOps Development

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### Building Machine Learning Models

- Model Development
- Model Training
- Model Evaluation
- Security and Governance

### Automation and Workflow Management

- **Apache Airflow**
- **Kubernetes Integration**
- Workflow Automation
- CI/CD for Machine Learning

### Amazon SageMaker for MLOps

- **Amazon SageMaker**
- SageMaker Pipelines
- Automated ML Lifecycle Management

### Hands-On Labs

- Bring Your Own Algorithm (BYOA)
- Building MLOps Pipelines
- Serving Models with AWS CodeBuild

## MLOps Action Plan Workshop

- Organisational MLOps Strategy
- Transformation Planning

## Day 2

## Module 3: MLOps Deployment

### Model Deployment

- Deployment Operations
- Model Packaging
- Version Control

### Inference Strategies

- Batch Inference
- Real-Time Inference
- Asynchronous Inference

### SageMaker Production Variants

- Canary Deployments
- Blue/Green Deployments
- Shadow Deployments

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### Edge AI Deployment

- Deploying ML Models to Edge Devices
- Edge AI Use Cases

### Hands-On Labs

- Production Deployment
- A/B Testing
- Deployment Validation

## Day 3

## Module 4: Model Monitoring and Operations

### Monitoring Machine Learning Models

- Performance Monitoring
- Observability
- Operational Metrics

### Data Drift and Model Drift

- Detecting Data Changes
- Model Performance Degradation
- Drift Management Strategies

### Monitoring Model Bias

- Fair AI Principles
- Bias Detection and Mitigation

### Amazon SageMaker Monitoring Tools

- **Amazon SageMaker Model Monitor**
- Model Registry
- Feature Store
- Pipeline Observability

### Human-in-the-Loop AI

- Human Review Processes
- Model Validation Workflows

### Hands-On Labs

- Pipeline Troubleshooting
- Model Monitoring
- Drift Detection
- Bias Analysis

## Module 5: Wrap-Up

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- Course Review
- Enterprise MLOps Strategy
- Best Practices
- Future of AI Operations