

Mastering MLOps: From Model Creation to Production

200 academic hours

Who is MLOps Engineer:

In today's rapidly evolving technological landscape, the profession of **MLOps Engineer (Machine Learning Operations)** has become immensely relevant and critical.

The journey from developing machine learning models to deploying it in real-world applications can be complex and challenging. This is where MLOps professionals come into play. Whether you're an aspiring data scientist, a software engineer, or an IT professional, understanding MLOps is essential to efficiently deploy, monitor, and manage machine learning models at scale.

By enrolling in our course, you'll gain hands-on experience with cutting-edge tools and best practices, enabling you to streamline the development and deployment of machine learning solutions.

Course Overview:

Unlock the power of **Machine Learning Operations (MLOps)** with this comprehensive course designed for professionals eager to integrate AI seamlessly into their development pipelines. Through a combination of practical exercises, case studies, and theoretical knowledge, students will be empowered with the skills to build, deploy, and manage machine learning models efficiently.

This MLOps course takes you on a journey from the fundamentals of machine learning to deploying production-ready models in the cloud.

Covering essential topics such as **Python coding**, machine learning algorithms, and popular **ML frameworks**, learn how to structure and manage MLOps projects efficiently, incorporating collaboration tools and version control.

Dive into model deployment strategies, monitoring, and real-time processing, while implementing **Continuous Integration and Continuous Deployment (CI/CD) pipelines**.

Discover the world of **containers**, **GPU acceleration**, and **feature stores**, gaining hands-on experience in leveraging these technologies for efficient machine learning workflows.

Finally, explore cloud based MLOps using **AWS services** like Amazon SageMaker, AWS Lambda, Amazon S3, and more.

Put your knowledge to the test with a final MLOps project that showcases your skills in action.

This course equips you with the expertise needed to navigate the ever-evolving landscape of MLOps, enabling you to develop, deploy, monitor, and manage machine learning solutions with confidence.

Join us in this journey to master MLOps and drive impactful AI solutions in real-world scenarios.

Who Should Attend:

Data Scientists, ML Engineers, DevOps Engineers, Data Engineers, and IT professionals keen on bridging the gap between ML model development and deployment.

Required Skills:

- Advanced Python proficiency
- Basic understanding of databases and SQL
- Basic understanding of ML concepts
- Familiarity with cloud platforms will be beneficial

NAYA College

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Course Contents:

Machine Learning fundamentals

- **Recap**
 - Code fundamentals and libraries like Pandas for data manipulation
- **Understanding Machine Learning**
 - Machine learning fundamentals, including Supervised, Unsupervised
 - Key concepts such as features, models, training, and prediction
 - The role of machine learning in various industries and applications
- **Machine Learning Algorithms**
 - Machine learning algorithms: regression, classification, clustering, and neural networks
 - Mathematics and principles behind the algorithms
- **Tools and Frameworks for ML**
 - Machine learning tools and frameworks: TensorFlow and Scikit-learn

MLOps Project Structure and Management

- **MLOps Introduction**
 - The lifecycle of machine learning projects
 - The alignment of machine learning with DevOps principles
- **Project Structuring**
- **Collaboration and Management**
 - Project management tools and collaboration practices
 - Version control, issue tracking, and project documentation
- **Version Control and Code Quality (Git)**
 - Git
 - Strategies, merging, conflict resolution, and pull requests
- **Data Management in MLOps**
 - Managing and versioning data in machine learning projects
 - The challenges related to data consistency, reproducibility, and collaboration
- **Introduction to Data Version Control (DVC)**
 - DVC as a solution for data versioning
 - DVC for tracking changes, sharing data, and reproducing experiments

Model Deployment and Monitoring:

- **Model Deployment Strategies**
 - Deployment strategies for machine learning models including Batch and Real-time
- **Monitoring and Logging**
 - Monitoring model performance, system metrics, and logs
 - Monitoring tools
- **Understanding Batch Processing**
 - Batch processing in the context of machine learning
 - Implementing Batch Jobs
 - Tools and frameworks (Apache Spark) for distributed batch processing
- **Introduction to CI/CD in MLOps**
 - Principles of Continuous Integration and Continuous Deployment in MLOps
 - Implementing CI/CD Pipelines
 - Testing, building, and deployment into automated workflows
 - Creating an end to end Batch processing with CI/CD

- **Real-time Processing in ML**
 - Fraud detection and recommendation systems
 - The principles of real-time data streaming
 - Real-time Processing Technologies (Kafka/Flink)
- **Testing in MLOps**
 - Testing methodologies including unit testing, integration testing, and performance testing
 - Automated Testing Frameworks (pytest)
- **Deployment and Monitoring Project**

MLOps Infrastructure:

- **Understanding Containers**
 - Overview of containerization platforms like Docker
 - Creating and Managing Containers
 - Container Orchestration - Kubernetes
- **Understanding GPU and CPU Computing**
 - The role of GPUs and CPUs in machine learning computations
 - The differences, advantages, and limitations of GPU and CPU computing
 - Leveraging GPU Acceleration
 - Best practices for optimizing GPU utilization
- **Introduction to Feature Stores**
 - Essential in managing features for machine learning models
 - The benefits of centralizing feature management
 - Using Feature Stores - Feast

LLM:

- **LLM introduction**
- **LLM prompt engineering**
- **LLM RAG**

Cloud MLOps:

- **Introduction to Cloud MLOps**
 - Overview - AWS, Azure, and GCP and MLOps services
- **AWS MLOps services**
 - Amazon SageMaker: A fully managed service for building, training, and deploying machine learning models.
 - AWS Lambda: For serverless computing, enabling automation and integration in MLOps pipelines.
 - Amazon S3: For storing and managing data, model artifacts, and pipeline artifacts.
 - Amazon CloudWatch: For monitoring and logging of your MLOps processes and infrastructure
 - Amazon ECR (Elastic Container Registry): To store and manage Docker containers for model deployment.
- **Cloud-based Machine Learning Pipelines**
 - Implementing end-to-end machine learning pipelines in the cloud
 - Integration of various cloud services for data storage, computation, and deployment



MLOps Final Project



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