**Machine Learning Operations (MLOps)**

**Course Duration**: 30 Hours

**Prerequisites**:

- Basic understanding of Python programming

- Familiarity with machine learning concepts

- Basic knowledge of Docker and Kubernetes

- Understanding of version control with Git

**Python for MLOps**

* Fundamentals of Python tailored for MLOps
* Streamlining and enhancing ML processes using Python
* Effective MLOps practices with Python

**Python for Data Science**

* Python in the context of Data Science
* Data manipulation and analysis techniques using Python
* Enhancing the data science lifecycle with Python

**Git and GitHub Fundamentals**

* Essentials of version control with Git
* Collaborative development with GitHub in MLOps
* Managing and tracking changes in MLOps projects

**Model Development and Training**

* Building a Machine Learning model
* Overview of common algorithms and techniques
* Data preprocessing and feature engineering
* Training the ML model
* Model evaluation and validation
* Metrics and cross-validation
* Creating reproducible environments
* Best practices for versioning and tracking models
* Preparing models for deployment

**Docker for Machine Learning**

* Introduction to Docker
* Containerization
* Docker builds
* Docker Images
* Docker Containers
* Docker Registry
* Dockerfile
* Building and deploying Docker containers for ML projects

**Kubernetes**

* Introduction to Kubernetes
* Concepts and architecture
* Kubernetes Pods
* Kubernetes Services
* Deployments
* ReplicaSets
* ConfigMaps
* Secrets
* Volumes
* PersistentVolumes
* PersistentVolumeClaims

**Kubeflow for MLOps**

* Introduction to Kubeflow
* Installing and setting up Kubeflow on Kubernetes
* Kubeflow Pipelines
* Building and running ML workflows
* Hyperparameter tuning with Katib
* Model serving with KFServing
* Integration of Kubeflow components for end-to-end MLOps

**Managing ML Experiments with MLflow**

* Introduction to MLflow
* Overview of MLflow and its components
* Installing and setting up MLflow
* Tracking Experiments with MLflow
* Logging parameters, metrics, and artifacts
* Comparing and visualizing experiments
* Managing experiment lifecycle
* MLflow Models
* Saving and loading models
* Packaging models for deployment
* Model registry and versioning
* MLflow Projects
* Combining MLflow with CI/CD pipelines

**Continuous Monitoring with Prometheus**

* CI/CD for Machine Learning
* CI/CD pipelines in the context of MLOps
* Automating development
* Testing
* Deployment of ML models
* Building robust CI/CD workflows for ML projects
* Working with Jenkins
* Introduction to Jenkins
* Setting up
* Configuring Jenkins
* Automating MLOps workflows
* Enhancing CI/CD with Jenkins in MLOps

**Continuous Monitoring with Prometheus and Kibana**

* Introduction to Prometheus and Kibana
* Installing Prometheus
* Prometheus Concepts
* Configuring Prometheus
* Monitoring ML Applications
* Visualizing Metrics with Grafana
* Installing Grafana
* Integrating Grafana with Prometheus
* Creating Dashboards in Grafana
* Alerting with Grafana