

## CI/CD & Containerization (3 Months)

**Duration:** 3 Months (~120 Hours)

**Mode:** Live Online / Classroom

**Tools & Technologies:** Jenkins, Docker, Kubernetes, GitHub Actions, GitLab CI

**Certifications Prepared:** Docker Certified Associate (DCA), Certified Kubernetes Administrator (CKA)

## Syllabus

### Week 1: CI/CD Concepts

- Introduction to Continuous Integration and Continuous Delivery
- Benefits and practices of CI/CD pipelines
- Hands-on: Setup simple CI pipeline
- Assignment

### Week 2: Jenkins Advanced Features

- Pipeline-as-Code with Jenkinsfile
- Shared libraries in Jenkins
- Hands-on: Jenkinsfile for build and test pipeline
- Assignment

### Week 3: Docker Fundamentals

- Installing and configuring Docker
- Docker images, containers, volumes, and networks
- Hands-on: Build and run Docker containers
- Assignment

### Week 4: Advanced Docker Usage

- Docker Compose for multi-container applications
- Best practices for Dockerfiles
- Hands-on: Deploy multi-tier app using Docker Compose
- Assignment
- Mock Interview 1

### Week 5: Kubernetes Fundamentals

- Kubernetes architecture: nodes, pods, deployments, services

- kubectl basics
- Hands-on: Deploy simple app on Kubernetes cluster
- Assignment

### **Week 6: Kubernetes Advanced**

- ConfigMaps, Secrets, Ingress, Persistent Volumes
- Scaling and rolling updates
- Hands-on: Scale app with Kubernetes deployments
- Assignment

### **Week 7: GitHub Actions & GitLab CI**

- Build CI/CD pipelines using GitHub Actions
- Introduction to GitLab CI/CD pipelines
- Hands-on: Automate testing and deployment with GitHub Actions
- Assignment

### **Week 8: Capstone Project & Interview Prep**

- Project: CI/CD pipeline deploying Dockerized app to Kubernetes
- Assignment
- Mock Interview 2

### **Learning Outcomes**

- Design and implement CI/CD pipelines with Jenkins, GitHub Actions, and GitLab CI
- Deploy and manage containers using Docker
- Orchestrate containerized applications with Kubernetes
- Apply advanced deployment strategies (Blue-Green, Canary)
- Prepare for Docker Certified Associate (DCA) and Certified Kubernetes Administrator (CKA)