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# DEVOPS WITH AI Cloud Certifications - Syllabus

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## Program Overview

The **AI-Assisted DevOps Engineer** program is an industry-aligned, job-ready curriculum designed to build strong DevOps foundations and progressively integrate **AI, AIOps, and Generative AI** into real-world DevOps workflows.

The curriculum balances: - **Conceptual clarity** - **Hands-on labs** - **Real-world use cases** - **AI-assisted automation**

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## **MODULE 1: DEVOPS FOUNDATIONS, CLOUDs LINUX BASICS**

### Learning Objectives

- Understand the evolution of software development models
  - Learn DevOps culture, principles, and metrics
  - Gain cloud and virtualization fundamentals
  - Build strong Linux skills required for DevOps and AI tooling
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### 1.1 DevOps Fundamentals

#### 1.1.1 What is DevOps?

- Definition and industry perspective
- Why DevOps emerged
- Business problems solved by DevOps

#### 1.1.2 Evolution of Software Development

- Waterfall model: limitations
- Agile methodology and benefits
- DevOps as an extension of Agile

### 1.1.3 DevOps Culture C Principles

- Collaboration between Dev C Ops
- Shift-left mindset
- Continuous feedback loops

### 1.1.4 CALMS Framework

- Culture
- Automation
- Lean
- Measurement
- Sharing

### 1.1.5 DevOps Toolchain Overview

- Source Code Management
- Continuous Integration
- Continuous Deployment
- Infrastructure as Code
- Containers C Orchestration
- Monitoring C Observability
- Security C Compliance

### 1.1.6 DevOps Metrics C KPIs

- Lead Time
  - Deployment Frequency
  - Change Failure Rate
  - Mean Time to Recovery (MTTR)
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## 1.2 Cloud s Virtualization Basics

### 1.2.1 Virtualization Concepts

- What is virtualization?
- Type-1 vs Type-2 hypervisors
- KVM, Xen overview

### 1.2.2 Cloud Computing Fundamentals

- Cloud definition
- Characteristics of cloud computing

### 1.2.3 Cloud Service Models

- Infrastructure as a Service (IaaS)
- Platform as a Service (PaaS)
- Software as a Service (SaaS)

### 1.2.4 Cloud Deployment Models

- Public Cloud
- Private Cloud
- Hybrid Cloud
- Multi-cloud strategy

### 1.2.5 AWS Overview

- Regions C Availability Zones
  - EC2 concepts
  - S3 basics
  - IAM users, roles C policies
  - VPC fundamentals
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## 1.3 Linux Essentials for DevOps

### 1.3.1 Linux Architecture

- Kernel C user space
- Common Linux distributions

### 1.3.2 Linux Command Line Interface

- File and directory commands
- Viewing and editing files
- Searching and filtering data

### 1.3.3 Linux File System Structure

- /, /etc, /var, /home, /opt

### 1.3.4 Users, Groups C Permissions

- User management
- File permissions
- sudo and security best practices

### 1.3.5 Package C Service Management

- apt, yum, dnf

- systemctl C service lifecycle

### 1.3.6 Linux Networking Basics

- IP addressing
  - DNS concepts
  - Ports and firewalls
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## Hands-On Labs - Module 1

- Launch EC2 instance on AWS
  - SSH into Linux VM
  - Configure users C permissions
  - Install Apache/Nginx
  - Host a static website
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## MODULE 2: VERSION CONTROL WITH GIT s GITHUB

### Learning Objectives

- Master Git fundamentals
  - Collaborate using GitHub
  - Prepare repositories for AI-driven automation
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### Topics Covered

#### 2.1 Git Fundamentals

- What is version control?
- Centralized vs Distributed VCS
- Git architecture (working tree, staging, repository)

#### 2.2 Core Git Operations

- git init, clone, status, add, commit
- git log, diff, reset, revert

#### 2.3 Branching Strategies

- Feature branching
- Git Flow
- Trunk-based development

## 2.4 GitHub Collaboration

- Pull Requests
  - Code reviews
  - Branch protection rules
  - GitHub Issues C Projects
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## Hands-On Labs - Module 2

- Create Git repositories
  - Branching C merging
  - Conflict resolution
  - Fork C Pull Request workflow
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# MODULE 3: CONTAINERIZATION WITH DOCKER

## Learning Objectives

- Build and optimize Docker images
  - Secure containerized applications
  - Prepare workloads for AI-assisted pipelines
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## Topics Covered

### 3.1 Docker Fundamentals

- Container vs Virtual Machine
- Docker architecture

### 3.2 Docker Images C Containers

- Dockerfile instructions
- Image layers
- Multi-stage builds

### 3.3 Docker Compose

- Multi-container applications
- Networking C volumes

### 3.4 Docker Security

- Image scanning
  - Least privilege containers
  - Secrets management
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### Hands-On Labs - Module 3

- Dockerize a To-Do application
  - Optimize Dockerfile
  - Push image to Docker Hub
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## MODULE 4: CI/CD WITH JENKINS

### Learning Objectives

- Build CI/CD pipelines
  - Integrate AI into pipeline stages
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### Topics Covered

- Jenkins architecture
  - Jenkins installation
  - Declarative vs Scripted pipelines
  - Jenkinsfile
  - GitHub webhooks
  - Docker build C deployment
  - Jenkins security C JCAsC
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### Hands-On Labs - Module 4

- CI pipeline for Docker app
  - Automated deployment using Jenkinsfile
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# MODULE 5: KUBERNETES - ORCHESTRATION s SCALING

## Learning Objectives

- Deploy and manage containerized workloads
  - Enable intelligent scaling
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## Topics Covered

- Kubernetes architecture
  - Pods, Deployments, Services
  - Rolling updates C rollbacks
  - ConfigMaps C Secrets
  - Helm basics
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## Hands-On Labs - Module 5

- Deploy application to Kubernetes
  - Scaling C rolling updates
  - Helm-based deployment
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# MODULE 6: INFRASTRUCTURE AS CODE s AUTOMATION

## Terraform

- IaC fundamentals
- Providers, state C modules
- Terraform with Git C Jenkins

## Ansible

- Configuration management
  - Playbooks, roles C variables
  - Application deployment automation
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## Hands-On Labs - Module 6

- Provision AWS infrastructure with Terraform
  - Deploy applications using Ansible
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## MODULE 7: INTRODUCTION TO AI-ASSISTED DEVOPS (AIOPS)

- What is AIOps?
  - DevOps vs AIOps
  - ML concepts for DevOps
  - AI in CI/CD, monitoring C incidents
  - AIOps tools overview
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## MODULE 8: GENERATIVE AI FOR DEVOPS ENGINEERS

- Introduction to LLMs
  - Prompt engineering for DevOps
  - AI-assisted code generation
  - Documentation C runbook automation
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## MODULE 6: AI-DRIVEN MONITORING s INCIDENT MANAGEMENT

- AI-based anomaly detection
  - Alert correlation
  - Root cause analysis
  - CloudWatch C AI insights
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## MODULE 10: AI-ENHANCED DEVSECOPS

- DevSecOps fundamentals
- AI-based code C container scanning

- Secrets detection
  - Policy-as-Code with AI
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