DevOps Engineering & Automation [120–130 Hrs]

DevOps and Automation focus on **faster, reliable, and repeatable software delivery** by combining **development (Dev)**, **operations (Ops)**, and **automated processes**.

Module-wise Syllabus and Hours

Module 1: Introduction to DevOps – 6 Hours

- DevOps concepts and principles
- Traditional IT vs DevOps
- DevOps lifecycle
- Agile and DevOps
- DevOps roles and tools overview

Module 2: Linux & Operating System Fundamentals – 12 Hours

- Linux architecture
- File system structure
- Essential Linux commands
- Users, groups, permissions
- Process management
- Shell scripting basics

Practical: Linux command practice, basic shell scripts

Module 3: Networking & Version Control (Git) – 10 Hours

- Networking basics (TCP/IP, DNS, HTTP/HTTPS, ports)
- Version control concepts
- Git architecture
- Git commands (clone, commit, push, pull, branch, merge)
- GitHub workflow

Practical: GitHub repository and branching

Module 4: Build Tools & Dependency Management – 8 Hours

- Build lifecycle
- Build automation concepts
- Maven / Gradle / npm
- Dependency and artifact management

Practical: Build a sample application

Module 5: Continuous Integration (CI) – 10 Hours

- Continuous Integration concepts
- Jenkins architecture
- Jenkins installation and configuration
- Jobs and pipelines

- Webhooks and triggers

Practical: CI pipeline using Jenkins

Module 6: Continuous Testing & Code Quality – 6 Hours

- Types of testing
- Automated testing basics
- Unit testing overview
- Code quality and static analysis

Tools: JUnit, Selenium (intro), SonarQube

Module 7: Containers & Docker – 12 Hours

- Virtualization vs containers
- Docker architecture
- Images and containers
- Dockerfile
- Docker Compose

Practical: Dockerize an application

Module 8: Container Orchestration with Kubernetes – 14 Hours

- Kubernetes architecture
- Cluster components
- Pods, services, deployments
- ReplicaSets, ConfigMaps, Secrets

Practical: Deploy application on Kubernetes

Module 9: Configuration Management with Ansible – 8 Hours

- Configuration management concepts
- Ansible architecture
- Inventory and playbooks
- Roles and automation

Practical: Automated server configuration

Module 10: Infrastructure as Code (Terraform) – 8 Hours

- Infrastructure as Code concepts
- Terraform architecture
- Providers and resources
- State files and provisioning

Practical: Provision cloud infrastructure using Terraform

Module 11: Cloud Computing for DevOps – 8 Hours

- Cloud computing models
- AWS / Azure overview
- Compute, storage, IAM basics
- DevOps practices on cloud

Module 12: Monitoring & Logging – 6 Hours

- Monitoring concepts
- Metrics and logging
- Application and infrastructure monitoring

Tools: Prometheus, Grafana, ELK Stack

Module 13: DevSecOps – 6 Hours

- DevSecOps principles
- Security in CI/CD
- Vulnerability scanning
- Secrets management

Tools: Trivy, OWASP ZAP, SonarQube

Module 14: Capstone Project – 16 Hours

- End-to-end DevOps pipeline
- Git to Jenkins automation
- Docker and Kubernetes deployment
- Cloud hosting and monitoring

Assessment & Evaluation

- Quizzes (Module-wise)
- Practical assignments
- Mini project / case study
- Final exam