⭐ **DevOps**

Module 1: Introduction to DevOps

- What is DevOps?
- Traditional SDLC vs DevOps
- Agile + DevOps
- DevOps Lifecycle & Stages
- CI/CD, Infrastructure as Code, Automation, Monitoring
- DevOps job roles: DevOps Engineer, SRE, Cloud Engineer
- DevOps ecosystem & tools overview

Module 2: Linux Fundamentals for DevOps

- Linux architecture
- File system hierarchy
- Basic & advanced commands
- Users, groups, permissions
- SSH & key management
- Package management (apt/yum)
- Shell scripting basics
- Cron jobs & automation

Hands-on Labs:

- Create users
- Write automation scripts
- Manage services (systemctl)

Module 3: Git & GitHub – Version Control

- Introduction to Git
- Repositories, Commits, Branches
- Merge, Rebase
- Git workflows (Git Flow, Trunk-based)
- Resolving merge conflicts
- GitHub, GitLab, Bitbucket overview
- GitHub Actions basics

Hands-on Labs:

- Create repo
- Branching strategy
- Pull requests
- Use GitHub Actions to automate builds

Module 4: Build Tools (Maven / Gradle / npm)

- What are build tools?
- Maven: pom.xml, dependencies, build lifecycle
- Gradle basics
- npm/yarn for Node.js apps

Module 5: Continuous Integration (CI)

- What is CI?
- CI best practices
- Jenkins vs GitHub Actions vs GitLab CI
- Build automation
- Test automation
- CI pipeline creation

Hands-on Labs:

- Install Jenkins on Linux
- Configure plugins
- Create Jenkins freestyle project
- Pipeline for Java/Node app

Module 6: Jenkins – Advanced CI/CD

- Jenkins pipeline as code
- Multibranch pipelines
- Webhooks with GitHub
- Parameterized builds
- Distributed builds (Master–Agent architecture)

Hands-on Labs:

- Write Jenkinsfile
- Set up automatic builds on code push
- Run pipelines on an agent node

Module 7: Containerization with Docker

- Why Docker?
- Containers vs VMs
- Docker architecture & components
- Images, Containers, Volumes, Networks
- Dockerfile
- Docker Compose
- Container Registry (DockerHub, ECR)

Hands-on Labs:

- Build Docker images
- Run containers
- Docker Compose for multi-container apps (Nginx + App + DB)

Module 8: Kubernetes (K8s) – Container Orchestration

- What is Kubernetes?
- Kubernetes architecture
- Pods, Deployments, ReplicaSets
- Services: ClusterIP, NodePort, LoadBalancer
- ConfigMaps & Secrets
- Ingress Controller
- Helm Chart basics

- Auto-scaling with HPA

Hands-on Labs:
- Deploy app on local Kubernetes (Minikube)
- Expose service
- Scale Pods
- Deploy using Helm

📘 Module 9: Infrastructure as Code (IaC) – Terraform
- What is IaC?
- Terraform vs CloudFormation
- Terraform syntax & modules
- Variables, outputs
- Provisioning AWS resources using Terraform
- Terraform best practices

Hands-on Labs:
- Create EC2, VPC using Terraform
- Store state in remote backend

📘 Module 10: Configuration Management – Ansible
- What is configuration management?
- Push vs Pull automation
- Ansible architecture
- Inventory, Playbooks, Roles
- Ansible for application deployment
- Ansible for AWS automation

Hands-on Labs:
- Install Ansible
- Write playbooks
- Automate server configuration

📘 Module 11: Monitoring & Logging
Monitoring Tools
- Prometheus
- Grafana
- CloudWatch (AWS optional)

Logging Tools
- ELK Stack (Elasticsearch, Logstash, Kibana)
- Fluentd
- Loki

Hands-on Labs:
- Monitor container metrics
- Create Grafana dashboard
- Set up alerts

📘 Module 12: CI/CD End-to-End Pipeline Project
Students will build a **full DevOps pipeline**:
✔ Source Code → GitHub
✔ CI → Jenkins Pipeline
✔ Build → Maven / npm
✔ Dockerize the application
✔ Push image to DockerHub/ECR
✔ Deploy on Kubernetes
✔ Infrastructure provisioning → Terraform
✔ Monitoring → Grafana

📘 Module 13: Cloud Integration (AWS)
- EC2 for Jenkins
- S3 for artifact storage
- ECR for container registry
- EKS basics (Kubernetes on AWS)
- VPC creation with Terraform

📘 Module 14: DevOps Security (DevSecOps Basics)
- Secrets management
- IAM roles
- Vulnerability scanning (Trivy, Snyk)
- Secure CI/CD pipelines

📘 Module 15: DevOps Interview Preparation
- Top 100 interview questions
- Hands-on tasks
- Troubleshooting scenarios
- Resume preparation for DevOps roles

⭐ Resources
- PDF notes (Complete DevOps guide)
- 25+ Hands-on labs
- Real CI/CD pipeline project
- Docker, Kubernetes, Terraform templates
- Interview preparation module
- Resume templates