

DEVOPS COURSE OUTLINE (BEGINNER → ADVANCED)

Beginner Level (40 Hours)

Module 1: Introduction to DevOps (3 hrs)

- Evolution of Software Development (Waterfall → Agile → DevOps)
- DevOps principles and lifecycle
- Key tools overview (Git, Jenkins, Docker, Kubernetes, Ansible, Terraform, Monitoring)

Module 2: Linux Fundamentals for DevOps (5 hrs)

- Basic Linux commands (file system, permissions, process management)
- Shell scripting basics
- User & group management
- Package management (apt, yum, dnf)

Module 3: Version Control with Git & GitHub (6 hrs)

- Git architecture, Git workflow (clone, commit, push, pull, merge)
- Branching strategies (Git Flow, trunk-based development)
- GitHub features: Issues, Pull Requests, Actions basics
- Secret scanning with **Gitleaks**

Module 4: Build Automation with Maven/Gradle (4 hrs)

- Build lifecycle & dependency management
- Creating and packaging applications
- Integration with CI/CD

Module 5: Containerization with Docker (7 hrs)

- Docker architecture (images, containers, volumes, networks)
- Dockerfile creation & optimization
- Pushing/pulling from Docker Hub
- Secure image best practices

Module 6: Continuous Integration with Jenkins (5 hrs)

- Jenkins installation & pipeline basics
- Jenkins master-agent setup
- Job configuration & parameterized builds
- Integration with Git

Module 7: Automated Testing with Selenium & JUnit (5 hrs)

- Introduction to automated testing
- Writing test cases with Selenium
- Maven integration with testing
- Headless browser testing

□ Intermediate Level (45 Hours)

Module 8: Container Orchestration with Kubernetes (8 hrs)

- Kubernetes architecture (nodes, pods, deployments, services)
- ConfigMaps, Secrets, StatefulSets, DaemonSets
- Autoscaling (HPA, VPA)
- Ingress & LoadBalancer setup

Module 9: Configuration Management with Ansible & Puppet (6 hrs)

- Ansible: Playbooks, roles, dynamic inventory
- Puppet: Manifests, modules, agents
- Configuring cloud servers (AWS EC2 examples)

Module 10: Infrastructure as Code with Terraform (6 hrs)

- Terraform basics (providers, resources, state, variables, outputs)
- AWS provisioning: VPC, EC2, S3
- Modules, workspaces & security best practices

Module 11: Continuous Delivery with GitLab CI/CD (5 hrs)

- GitLab runners (shared vs self-hosted)
- Stages, jobs, caching, artifacts

- Docker integration in GitLab pipelines
- Deployments to AWS (ECR, ECS, EC2)

Module 12: Continuous Monitoring (6 hrs)

- Prometheus: setup, metrics, PromQL queries
- Grafana: dashboard creation, alerts
- ELK Stack (Elasticsearch, Logstash, Kibana) basics

Module 13: Generative AI in DevOps (2 hrs)

- GitHub Copilot for code suggestions
- Automating scripts and error handling
- AI-assisted documentation

Module 14: Security Basics in DevOps (4 hrs)

- DevSecOps introduction
- Static Application Security Testing (SAST)
- Dynamic Application Security Testing (DAST)
- Dependency scanning

□ Advanced Level (55 Hours)

Module 15: Advanced Kubernetes & Security (8 hrs)

- RBAC & Network Policies
- Pod Security Standards
- Image scanning & runtime protection
- Kubernetes auditing & monitoring

Module 16: AWS EKS & Cloud Native Workloads (6 hrs)

- Provisioning AWS EKS with Terraform
- Cluster autoscaler setup
- Add-ons (ALB Ingress Controller, ExternalDNS)
- Compliance checks

Module 17: Service Mesh with Istio (6 hrs)

- Istio architecture
- mTLS, ingress & egress
- Traffic management (blue-green, canary)
- Observability with Istio dashboards

Module 18: Policy-as-Code with OPA Gatekeeper (4 hrs)

- OPA fundamentals
- Constraint templates & policies
- Integrating OPA into CI/CD pipelines

Module 19: Secrets Management (4 hrs)

- Vault basics (KV secrets, policies, tokens)
- AWS Secrets Manager
- Kubernetes External Secrets Operator

Module 20: GitOps with ArgoCD & Kustomize (6 hrs)

- GitOps fundamentals
- Declarative deployments with ArgoCD
- Application rollback & sync waves
- Using Kustomize for environment overlays

Module 21: DevSecOps & Compliance (6 hrs)

- End-to-end security integration in pipelines
- DefectDojo for vulnerability management
- Compliance frameworks (CIS, NIST, PCI-DSS)

Real-World Projects:-

1. **Banking:** Secure CI/CD pipeline with Jenkins & Vault integration
2. **Healthcare:** Deploy EHR application on Kubernetes with monitoring
3. **E-Commerce:** Scalable microservices architecture with Docker + Kubernetes
4. **Streaming App:** Deploy Netflix-like platform with autoscaling & CDN integration
5. **Retail:** Infrastructure automation with Terraform on AWS (multi-tier setup)
6. **Insurance:** Real-time monitoring dashboards with Prometheus & Grafana
7. **AI-Powered DevOps:** GitHub Copilot-assisted CI/CD pipeline
8. **Media:** Logging & centralized monitoring with ELK stack
9. **Supply Chain:** Secure Kubernetes workloads with Istio & OPA policies
10. **Capstone Mega Project:** Full-fledged DevOps pipeline (Git → Jenkins/GitLab → Docker → Kubernetes → ArgoCD → Monitoring → Security Scanning)

Tools to Master

