

Azure + DevOps Tools Covered – Duration 3 months

- Linux (Ubuntu)
- Git (Git CLI, GitHub)
- Azure (VM, App Service, AKS, VNet, Storage, Azure AD, Key Vault, Monitor)
- Jenkins
- Terraform
- Docker
- Kubernetes (AKS)
- Ansible
- Prometheus
- Grafana
- Trivy
- Python

Linux Syllabus

1. File System Management

- Linux directory structure (/etc, /var, /home, /opt)
- File operations (ls, cp, mv, rm, rsync)
- File permissions (chmod, chown, umask, ACLs)
- Links (hard link, soft link)
- File search (find, locate, grep)

2. Process & Service Management

- Process commands (ps, top, htop)
- Process control (kill, nice, renice, pkill)
- Background & foreground jobs (jobs, fg, bg)
- systemctl (start, stop, enable, disable)
- Log inspection (journalctl, /var/log)

3. Disk & Storage Management

- Disk listing (lsblk, fdisk -l)
- Mounting (mount, umount, /etc/fstab)
- File systems (ext4, xfs)
- Disk usage (df, du)
- LVM basics (pvcreate, vgcreate, lvcreate)

4. Networking & Remote Access

- IP configuration (ip, ifconfig)
- Port checks (ss, netstat)
- Connectivity (ping, traceroute, curl)
- SSH setup (key-based authentication)
- Firewall basics (ufw, iptables)

5. Shell Scripting

- Variables and arguments (\$1, \$@, \$#)
- Conditional logic (if, case)
- Loops (for, while)
- Functions and exit codes
- Scheduling (cron, crontab)

Networking Syllabus

1. Networking Fundamentals

- IP addressing (IPv4, CIDR)
- Subnetting basics
- Private vs public IP
- Ports and protocols
- NAT concepts

2. DNS & Name Resolution

- DNS flow (client → resolver → server)
- Record types (A, AAAA, CNAME, MX, TXT)
- Tools (nslookup, dig)
- DNS caching issues
- Split DNS concepts

3. HTTP/HTTPS

- HTTP methods (GET, POST, PUT, DELETE)
- Status codes (2xx, 4xx, 5xx)
- Headers and cookies
- TLS/SSL basics (certificates, handshake)
- HTTPS debugging (curl, browser tools)

4. Load Balancing & Traffic Flow

- L4 vs L7 load balancing
- Reverse proxy (Nginx)
- Health checks
- Sticky sessions
- Traffic routing basics

5. Network Troubleshooting

- Connectivity issues (timeout vs refused)
- DNS failures
- Latency debugging
- Port blocking issues
- End-to-end request tracing

Git Syllabus

1. Core Git Operations

- Repository setup (init, clone)
- Staging and commits (add, commit)
- Viewing history (log, diff)
- Undo changes (restore, reset)
- Remote operations (push, pull, fetch)

2. Branching & Merging

- Branch creation (branch, checkout, switch)
- Merge strategies (merge, rebase)
- Conflict resolution
- Branch cleanup
- Tagging releases

3. Collaboration Workflows

- Pull requests (GitHub)
- Code reviews
- Trunk-based development
- Feature branching
- Release versioning

4. Advanced Git Usage

- Cherry-pick
- Revert vs reset
- Stashing changes
- Hooks (pre-commit)
- Git ignore strategies

Azure Syllabus

1. Compute Services

- Virtual Machines (creation, scaling)
- VM extensions and custom scripts
- App Services (deployment slots)
- Azure Container Registry (ACR)
- AKS cluster basics

2. Networking

- Virtual Networks (VNet, subnets)
- Network Security Groups (NSG rules)
- Azure Load Balancer
- Application Gateway
- Private endpoints and DNS

3. Storage

- Blob storage (containers, access tiers)
- Managed disks
- File shares
- Storage security (SAS, access keys)
- Lifecycle management

4. Identity & Access

- Azure AD users and groups
- Role-based access control (RBAC)
- Managed identities
- Service principals
- Access policies (Key Vault)

5. Monitoring & Logging

- Azure Monitor
- Log Analytics workspace
- Metrics vs logs
- Alerts configuration
- Diagnostic settings

CI/CD Syllabus (Jenkins)

1. Pipeline Fundamentals

- Pipeline stages (build, test, package, deploy)
- Pipeline triggers (commit, PR)
- Artifacts and versioning
- Environment variables
- Secrets handling

2. Jenkins Pipelines

- Job types (freestyle, pipeline)
- Jenkinsfile (declarative pipeline)
- Agents and distributed builds
- Plugin management
- Build triggers

3. Pipeline Integration

- Git integration (webhooks)
- Maven build integration
- Docker build and push
- Deployment to Kubernetes (AKS)
- Pipeline debugging (logs, failures)

4. Deployment Workflow

- Multi-stage pipelines (dev, stage, prod)
- Manual approvals
- Environment-specific configurations
- Rollback handling
- Notifications and reporting

Terraform Syllabus

1. Core Concepts

- Providers and resources
- Variables and outputs
- State file management
- Execution workflow (init, plan, apply)
- Dependency handling

2. State Management

- Remote backend (Azure Storage)
- State locking
- State security and access control
- State drift detection
- Importing existing resources

3. Modular Design

- Module structure
- Reusable infrastructure modules
- Environment separation (dev/prod)
- Variable management
- Code organization

4. Azure Provisioning

- VNet and subnet creation
- VM provisioning
- AKS provisioning
- Storage accounts
- IAM roles and policies

Docker Syllabus

1. Container Basics

- Images vs containers
- Docker CLI (build, run, ps, exec)
- Image layers and caching
- Container lifecycle
- Docker architecture

2. Image Creation

- Dockerfile instructions
- Multi-stage builds
- Image optimization
- Tagging and versioning
- Build context management

3. Networking & Storage

- Container networking basics
- Port mapping
- Volumes and bind mounts
- Data persistence
- Environment variables

4. Registry & Distribution

- Azure Container Registry (ACR)
- Image push/pull
- Authentication and access control
- Image versioning strategy
- Image scanning basics

Kubernetes Syllabus

1. Core Components

- Cluster architecture (control plane, nodes)
- Pods and containers
- Deployments and ReplicaSets

- Services (ClusterIP, NodePort)
- Namespaces

2. Workload Management

- Scaling (manual, HPA basics)
- Rolling updates
- Rollbacks
- Resource limits and requests
- Health checks (liveness, readiness)

3. Networking

- Service discovery
- Ingress controllers
- DNS inside cluster
- Network policies
- Traffic routing

4. Storage

- Persistent volumes (PV, PVC)
- Storage classes
- Stateful workloads
- Volume mounts
- Data persistence

5. Helm Package Management

- Helm charts structure
- Values.yaml configuration
- Helm install, upgrade, rollback
- Managing releases and versions
- Environment-specific configurations

6. Troubleshooting

- kubectl commands (logs, describe, exec)
- Debugging pod failures
- CrashLoopBackOff analysis
- Resource exhaustion issues

- Network connectivity debugging

Ansible Syllabus

1. Core Concepts

- Inventory management
- Ad-hoc commands
- Playbook structure
- Modules usage
- YAML syntax

2. Configuration Management

- Package installation
- Service management
- File and directory management
- User and group management
- Environment setup

3. Advanced Usage

- Roles and reuse
- Variables and templates (Jinja2)
- Handlers
- Conditional execution
- Tags

4. Execution & Control

- Running playbooks
- Parallel execution
- Error handling
- Idempotency
- Debugging playbooks

Monitoring Syllabus (Prometheus & Grafana)

1. Metrics Monitoring

- Prometheus architecture
- Metrics scraping and targets

- Exporters (node, application)
- PromQL queries
- Alert rules configuration

2. Visualization

- Grafana dashboards
- Panel configuration
- Data source integration
- Alerts setup
- Dashboard variables

3. Alerting

- Threshold-based alerts
- Alert routing
- Notification channels
- Alert tuning
- Incident signals

Logging Syllabus (ELK Stack)

1. Log Collection

- Filebeat configuration
- Log sources (application, system)
- Log forwarding
- Log formats and structure
- Centralized logging setup

2. Log Processing

- Logstash pipelines
- Filters and parsing
- Data transformation
- Handling structured logs
- Error handling in pipelines

3. Log Storage & Search

- Elasticsearch indexing
- Query DSL basics

- Index lifecycle management
- Search and filtering
- Performance optimization

4. Visualization

- Kibana dashboards
- Log visualization
- Saved searches
- Alerts and watchers
- Correlating logs with metrics

DevSecOps Syllabus

1. Secrets Management

- Azure Key Vault usage
- Secret injection in applications
- Access policies and RBAC
- Secret rotation
- Secure storage practices

2. Pipeline Security

- Secure variables in Jenkins
- Credential management
- Access control policies
- Least privilege enforcement
- Audit logging

3. Container Security

- Image scanning (Trivy)
- Vulnerability assessment
- Base image hardening
- Runtime security basics
- Image version control

4. Dependency Security

- Dependency scanning
- CVE tracking

- Patch updates
- Version pinning
- Security reporting

Release Strategies Syllabus

1. Deployment Strategies

- Blue-green deployment
- Canary releases
- Rolling updates
- Recreate strategy
- Traffic shifting

2. Rollback Mechanisms

- Version rollback
- Deployment history
- Health-based rollback
- Automated rollback triggers
- Manual rollback

3. Traffic Management

- Load balancer routing
- Feature flags basics
- Gradual rollout
- A/B testing basics
- Failure isolation

End-to-End DevOps Workflow

1. Source to Build

- Git workflow (branching, commits)
- Webhook triggers to Jenkins
- Maven build process
- Artifact generation and versioning
- Build validation

2. Build to Containerization

- Docker image creation
- Multi-stage build usage
- Image tagging strategy
- Push to Azure Container Registry
- Image version management

3. Deployment to Kubernetes

- Kubernetes manifests
- Helm chart deployment
- Environment-specific values
- Rolling deployment
- Service exposure (Ingress)

4. Infrastructure & Configuration

- Terraform provisioning (Azure resources)
- State management
- Ansible configuration setup
- Environment consistency
- Infrastructure updates

5. Monitoring, Logging & Debugging

- Metrics monitoring (Prometheus)
- Visualization (Grafana dashboards)
- Log aggregation (ELK stack)
- Alert handling
- End-to-end failure debugging