Kubernetes roadmap

**📌 Module 1: Introduction to Kubernetes**

✔ What is Kubernetes?  
✔ Why use Kubernetes?  
✔ Traditional vs Containerized Deployments  
✔ Kubernetes vs Docker Swarm  
✔ Kubernetes Architecture Overview (Master & Worker Nodes)  
✔ Key Kubernetes Components (API Server, Scheduler, Controller Manager, Kubelet, etc.)  
✔ Installing Kubernetes (Minikube, Kind, K3s, Kubeadm)  
✔ First Kubernetes Deployment

**📌 Module 2: Kubernetes Core Components**

✔ Understanding **Nodes, Pods, and Clusters**  
✔ What is a Pod?  
✔ Creating and Managing Pods (kubectl run, kubectl get pods)  
✔ Understanding ReplicaSets and Deployments  
✔ Labels, Selectors, and Annotations  
✔ Taints & Tolerations, Affinity & Anti-Affinity

**📌 Module 3: Kubernetes Configuration & Management**

✔ Working with YAML files  
✔ Creating and Managing Deployments (kubectl apply -f)  
✔ Understanding **ConfigMaps & Secrets**  
✔ Managing **Environment Variables** in Kubernetes  
✔ Init Containers & Sidecar Containers

**📌 Module 4: Kubernetes Networking**

✔ Kubernetes Networking Model  
✔ Understanding **ClusterIP, NodePort, LoadBalancer, and Ingress**  
✔ Using Ingress Controllers (NGINX Ingress)  
✔ Network Policies in Kubernetes  
✔ Service Discovery in Kubernetes  
✔ DNS & CoreDNS in Kubernetes

**📌 Module 5: Kubernetes Storage & Data Management**

✔ What is Persistent Storage?  
✔ Understanding **Persistent Volumes (PV) & Persistent Volume Claims (PVC)**  
✔ Kubernetes Storage Classes & Dynamic Provisioning  
✔ Stateful Applications in Kubernetes  
✔ Using **Local Storage, NFS, AWS EBS, GCE Persistent Disks, and Azure Disks**

**📌 Module 6: Kubernetes Workload Management**

✔ What is a StatefulSet?  
✔ Difference between **Deployments vs StatefulSets**  
✔ Understanding **DaemonSets**  
✔ Understanding **Jobs & CronJobs** (Scheduled Tasks)  
✔ Horizontal Pod Autoscaler (HPA) & Vertical Pod Autoscaler (VPA)  
✔ Kubernetes Resource Requests & Limits

**📌 Module 7: Kubernetes Security & RBAC**

✔ Role-Based Access Control (RBAC) in Kubernetes  
✔ Creating **Roles and RoleBindings**  
✔ Service Accounts in Kubernetes  
✔ Securing Secrets & Sensitive Data  
✔ Network Policies & Pod Security Policies  
✔ Using Security Contexts in Pods  
✔ Image Scanning & Security Best Practices

**📌 Module 8: Kubernetes Logging & Monitoring**

✔ Monitoring Kubernetes Clusters  
✔ Using kubectl logs & kubectl describe for debugging  
✔ Setting up **Prometheus & Grafana** for Cluster Monitoring  
✔ Using ELK Stack (Elasticsearch, Logstash, Kibana) for Log Management  
✔ Understanding Liveness & Readiness Probes

**📌 Module 9: Kubernetes Service Mesh**

✔ What is a Service Mesh?  
✔ Introduction to **Istio & Linkerd**  
✔ Setting up Istio in Kubernetes  
✔ Traffic Management with Istio  
✔ Security & Observability in Istio

**📌 Module 10: Kubernetes CI/CD & GitOps**

✔ CI/CD Pipelines in Kubernetes  
✔ Using **Jenkins, GitHub Actions, GitLab CI/CD with Kubernetes**  
✔ Introduction to **GitOps (ArgoCD, FluxCD)**  
✔ Automating Kubernetes Deployments with Helm  
✔ Using Helm Charts for Application Deployment

**📌 Module 11: Kubernetes in Cloud (AWS, Azure, GCP)**

✔ Kubernetes on Google Cloud (GKE)  
✔ Deploying Cloud-Native Applications  
✔ Scaling & Load Balancing in Cloud Kubernetes

**📌 Module 12: Kubernetes Troubleshooting & Debugging**

✔ Common Kubernetes Errors & How to Fix Them  
✔ Debugging Pods, Deployments, and Services  
✔ Using kubectl logs, kubectl exec, kubectl describe  
✔ Diagnosing Node & Network Issues  
✔ Best Practices for Debugging Kubernetes Issues