**React, Docker, Kubernetes, Azure (21 Days TOC)**

🧩 **Goal**: Deep, structured, hands-on learning across all 4 topics (React, Docker, Kubernetes, Azure) for a mixed-experience audience.

**React (Frontend Essentials)**

* **Day 1**  
  🔹 Introduction to React  
  🔹 Environment Setup  
  🔹 JSX & Functional Components
* **Day 2**  
  🔹 Props and State  
  🔹 Lifecycle Methods  
  🔹 Hands-on: Simple React Component

**React (Advanced + Mini Project)**

* **Day 3**  
  🔹 React Router Basics  
  🔹 Hooks: useState, useEffect  
  🔹 Conditional Rendering
* **Day 4**  
  🔹 Forms & Validation  
  🔹 Event Handling  
  🔹 Hands-on: Controlled Form Components

**React Project + Docker**

* **Day 5**  
  🔹 Advanced Hooks (useContext, useRef)  
  🔹 State Management using Context API  
  🔹 Mini Project Brief: Build a CRUD App
* **Day 6**  
  🔹 Introduction to Docker  
  🔹 Installation & Docker CLI  
  🔹 Creating & Managing Containers  
  🔹 Hands-on: Dockerizing React App

**Docker (Intermediate) + Kubernetes Intro**

* **Day 7**  
  🔹 Dockerfile  
  🔹 Volumes & Networking  
  🔹 Docker Compose  
  🔹 Hands-on: Full Stack App using Compose
* **Day 8**  
  🔹 Kubernetes Overview & Architecture  
  🔹 Minikube Setup  
  🔹 Pods & ReplicaSets

**Kubernetes (Advanced)**

* **Day 9**  
  🔹 Deployments  
  🔹 Services & Ingress  
  🔹 Hands-on: Deploy Multi-container App
* **Day 10**  
  🔹 Azure Fundamentals  
  🔹 Azure Portal & CLI  
  🔹 Resource Groups, App Services  
  🔹 Hands-on: Create App Service

**Azure (Deployment & CI/CD)**

* **Day 11**  
  🔹 Azure Container Registry  
  🔹 Container Instances  
  🔹 Push/Pull Docker Images
* **Day 12**  
  🔹 CI/CD Pipeline with GitHub Actions  
  🔹 Deploy Containerized App to Azure  
  🔹 Final Wrap-Up & Q&A

**Day 13**

Introduction to Docker (architecture, containers vs VMs)

* Docker CLI & Dockerfile essentials
* Multi-stage Docker builds (React + Spring Boot examples)
* Image layers, build caching, .dockerignore, minimal base images
* Hands-on:
  + Build multi-stage Dockerfiles for React/Spring Boot
  + Optimize image size and build time

Day 14

* Docker security best practices (user permissions, capabilities)
* Managing secrets:
  + Docker Secrets (Swarm)
  + HashiCorp Vault integration
  + Azure Key Vault with Spring Boot
* Image scanning: Trivy, Docker Bench
* Hands-on:
  + Store secrets in Azure Key Vault
  + Inject secrets into Spring Boot app
  + Scan container image for vulnerabilities

**Day 15**

Docker logging drivers and log routing

* Centralized logging: Fluentd/Filebeat to ELK
* Structured logging in Spring Boot
* Azure Monitor Logs + Application Insights overview
* Hands-on:
  + Configure Spring Boot for JSON logging
  + Route container logs to ELK
  + Integrate Azure Monitor + App Insights

**Day 16**

* Metrics overview: cAdvisor, node\_exporter
* Prometheus architecture for containers
* Grafana dashboards for container health
* Azure-native monitoring comparison
* Hands-on:
  + Deploy Prometheus + Grafana with Docker Compose
  + Create container performance dashboards

**Day 17**

* Overview of Jenkins/GitLab CI
* Docker in CI/CD:
  + Docker-in-Docker setup
  + CI YAML basics
  + Automated builds with tagging
* Hands-on:
  + Build & push image to ACR from GitLab CI/Jenkins
  + Version images using commit SHA or tags

**Day 18**

* Overview of Azure Container Registry (ACR)
* Authenticating CI tools with ACR
* Docker layer caching in CI pipelines
* Hands-on:
  + Setup ACR
  + Configure GitLab/Jenkins to use ACR
  + Optimize Docker builds with cache and multi-stage strategies

**Day 19**

IaaS vs PaaS vs SaaS on Azure

* Azure services for JavaScript and Java apps:
  + Azure App Service
  + Azure Static Web Apps
  + Azure Kubernetes Service (AKS)
* Deployment decision-making
* Hands-on:
  + Deploy React app to Azure Static Web Apps
  + Deploy Spring Boot to Azure App Service

**Day 20**

AKS overview, architecture, and cost considerations

* Containerized deployment to AKS via Helm or kubectl
* Scaling options: HPA, cluster autoscaler
* Hands-on:
  + Build AKS cluster
  + Deploy React + Spring Boot Docker images
  + Enable autoscaling & resource limits

**Day 21**

Debugging apps in containerized Azure environment

* Setup logging + tracing in AKS using Azure Monitor
* Performance tuning (JVM, resource requests/limits)
* Azure cost optimization strategies (B-series VMs, auto-scale)
* Hands-on:
  + Monitor app with Application Insights
  + Enable tracing & live debugging for Spring Boot
  + Analyze Azure cost report and optimize deployment