DevOps Course Curriculum by 10Pie

👉 Whether you want to start your IT career or looking for guidance on how to plan your future career path, 10Pie is your learning hub for tech career knowledge.

Here's a DevOps course syllabus at a glance:

Sl. No.	Module Name	Subjects with Highlights	Projects
1	**Introduction to DevOps**	Key Principles of DevOps (CALMS, CAMS), DevOps Lifecycle, Benefits of DevOps Adoption, DevOps vs. Traditional Software Development, Understanding the DevOps Delivery Pipeline	-DevOps Pipeline Setup for a Simple Web Application -DevOps Benefits Analysis for a Real-World Organization
2	**Version Control with Git**	Basic Git Commands (clone, commit, push, pull), Branching and Merging Strategies, Advanced Git Commands (rebase, cherry-pick, stash), Git Workflows (Feature Branching, Git Flow), Collaboration with GitHub and Pull Requests, Managing Merge Conflicts	-Git Branching Strategy for a Sample Project -Git Collaboration for a Team Project
3	**Continuous Integration and Continuous Deployment (CI/CD)**	CI/CD Concepts, CI/CD and its Importance, Jenkins and Automation, Setting Up Jenkins for CI/CD, Creating and Managing Jenkins Pipelines, Integrating Git with Jenkins, Automated Testing with Jenkins, Monitoring and Reporting in Jenkins, Continuous Deployment Strategies	-Jenkins Pipeline Setup for a Sample Application -Automated Testing with Jenkins for a Sample Application
4	**Containerization with Docker**	Docker Basics, Understanding Containers vs. Virtual Machines, Installing Docker and Managing Containers, Creating and Managing Docker Images, Docker Networking and Orchestration, Docker Networking Concepts, Introduction to Docker Compose, Challenges of Containerization, Overview of Docker Swarm	-Docker Image Creation for a Sample Application -Docker Networking for a Sample Application
5	**Orchestration with Kubernetes**	Kubernetes Architecture, Pods, Nodes, Clusters, Kubernetes Clusters, Kubernetes Networking and Services, Deployments and StatefulSets, Rolling Updates and Rollbacks, Helm for Kubernetes Package Management,	-Kubernetes Deployment for a Sample Application -Kubernetes Networking for a Sample Application

		Monitoring Kubernetes with Prometheus and Grafana	
6	**Infrastructure as Code (IaC)**	IaC Concepts, Fundamentals of Infrastructure as Code, Best Practices for IaC, Tools for IaC, Terraform for Infrastructure Management, Automating Infrastructure Deployment, AWS CloudFormation, Azure Resource Manager	-Terraform Infrastructure Deployment -AWS CloudFormation
7	**Configuration Management**	Configuration Management Tools, Ansible, Puppet, and Chef, Automation Strategies, Writing Ansible Playbooks, Managing Configuration with Puppet, Using Chef for Infrastructure Automation, Best Practices for Configuration Management	-Ansible Playbook Creation -Puppet Configuration Management
8	**Monitoring and Logging**	Monitoring Tools, Using Prometheus for Monitoring, Setting Up Grafana for Visualization, Logging Strategies, Implementing ELK Stack, Alerting and Notification Strategies, Troubleshooting with Logs	-Prometheus Monitoring, -ELK Stack Implementation
9	**Cloud Computing Fundamentals**	Cloud Service Models, Overview of Cloud Computing, Major Cloud Providers, Understanding AWS, Azure, and Google Cloud, Cloud Security Best Practices, Deploying Applications in the Cloud, Managing Cloud Resources with IaC	-Cloud Provider Comparison -Cloud Security Best Practices
10	**Advanced Topics in DevOps**	Microservices Architecture, Understanding Microservices and Their Benefits, Implementing a Microservices Architecture, DevSecOps, Integrating Security into the DevOps Pipeline, Tools and Practices for Security Automation	-Microservices Architecture -DevSecOps Pipeline

Module 1: Introduction to DevOps

Overview of DevOps

- Key Principles of DevOps(CALMS, CAMS)
- DevOps Lifecycle
- Benefits of DevOps Adoption
- DevOps vs. Traditional Software Development
- Understanding the DevOps Delivery Pipeline

⭐ **Hands-on projects to practice:**

- **DevOps Pipeline Setup for a Simple Web Application:** Set up a simple DevOps pipeline using Jenkins or GitLab CI/CD to automate the build, test, and deployment of a simple web application.
- **DevOps Benefits Analysis for a Real-World Organization:** Research and analyze the benefits of DevOps adoption in a real-world organization and create a report highlighting the key benefits and challenges.

Module 2: Version Control with Git

Git Fundamentals

- Basic Git Commands (clone, commit, push, pull)

Branching and Merging Strategies

- Advanced Git Commands (rebase, cherry-pick, stash)
- Git Workflows (Feature Branching, Git Flow)
- Collaboration with GitHub and Pull Requests
- Managing Merge Conflicts

⭐ **Hands-on projects to practice:**

- **Git Branching Strategy for a Sample Project:** Implement a Git branching strategy (e.g., feature branching, Git Flow) for a sample project and demonstrate how to manage merges and conflicts.
- **Git Collaboration for a Team Project:** Collaborate with a team member on a Git project, using pull requests and code reviews to manage changes.

Module 3: Continuous Integration and Continuous Deployment (CI/CD)

CI/CD Concepts

- CI/CD and its Importance

Jenkins and Automation

- Setting Up Jenkins for CI/CD
- Creating and Managing Jenkins Pipelines
- Integrating Git with Jenkins
- Automated Testing with Jenkins
- Monitoring and Reporting in Jenkins
- Continuous Deployment Strategies

⭐ **Hands-on projects to practice:**

- **Jenkins Pipeline Setup for a Sample Application:** Set up a Jenkins pipeline to automate the build, test, and deployment of a sample application.
- **Automated Testing with Jenkins for a Sample Application:** Implement automated testing using Jenkins and demonstrate how to integrate testing with the CI/CD pipeline.

Module 4: Containerization with Docker

Docker Basics

- Containers vs. Virtual Machines
- Installing Docker and Managing Containers(Docker Swarm, Docker Compose)
- Creating and Managing Docker Images(Docker Hub, Docker Registry)

Docker Networking and Orchestration

- Docker Networking Concepts
- Introduction to Docker Compose
- Challenges of Containerization
- Overview of Docker Swarm

⭐ **Hands-on projects to practice:**

- **Docker Image Creation for a Sample Application:** Create a Docker image for a sample application and demonstrate how to manage containerization.
- **Docker Networking for a Sample Application:** Implement Docker networking concepts (e.g., bridge, host, none) and demonstrate how to manage container communication.

Module 5: Orchestration with Kubernetes

Kubernetes Architecture

- Pods(ReplicaSet, Deployment)
- Nodes
- Clusters(Control Plane)

Kubernetes Clusters

- Kubernetes Networking and Services(LoadBalancer, ClusterIP, NodePor)
- Deployments and StatefulSets
- Rolling Updates and Rollbacks

- Helm for Kubernetes Package Management
- Monitoring Kubernetes with Prometheus and Grafana

⭐ **Hands-on projects to practice:**

- **Kubernetes Deployment for a Sample Application:** Deploy a sample application using Kubernetes and demonstrate how to manage pods, nodes, and clusters.
- **Kubernetes Networking for a Sample Application:** Implement Kubernetes networking concepts and demonstrate how to manage service discovery.

Module 6: Infrastructure as Code (IaC)

IaC Concepts

- Fundamentals of Infrastructure as Code
- Best Practices for IaC

Tools for IaC

- Terraform for Infrastructure Management(Terraform Modules, Terraform State)
- Automating Infrastructure Deployment
- AWS CloudFormation
- Azure Resource Manager

⭐ **Hands-on projects to practice:**

- **Terraform Infrastructure Deployment:** Deploy infrastructure using Terraform, and demonstrate how to manage infrastructure as code.
- **AWS CloudFormation:** Deploy infrastructure using AWS CloudFormation, and demonstrate how to manage cloud resources.

Module 7: Configuration Management

Configuration Management Tools

- Ansible, Puppet, and Chef

Automation Strategies

- Writing Ansible Playbooks
- Managing Configuration with Puppet
- Using Chef for Infrastructure Automation
- Best Practices for Configuration Management

⭐ **Hands-on projects to practice:**

- **Ansible Playbook Creation:** Create an Ansible playbook to manage configuration for a sample application, and demonstrate how to automate deployment.
- **Puppet Configuration Management:** Implement configuration management using Puppet, and demonstrate how to manage infrastructure configuration.

Module 8: Monitoring and Logging

Monitoring Tools

- Using Prometheus for Monitoring
- Setting Up Grafana for Visualization

Logging Strategies

- Implementing ELK Stack (Elasticsearch, Logstash, Kibana)
- Alerting and Notification Strategies
- Troubleshooting with Logs

⭐ **Hands-on projects to practice:**

- **Prometheus Monitoring:** Implement monitoring using Prometheus, and demonstrate how to collect and visualize metrics.
- **ELK Stack Implementation:** Implement the ELK Stack for logging and visualization, and demonstrate how to manage log data.

Module 9: Cloud Computing Fundamentals

Cloud Service Models

- Overview of Cloud Computing (IaaS, PaaS, SaaS)

Major Cloud Providers

- Understanding AWS, Azure, and Google Cloud
- Cloud Security Best Practices(IAM, encryption))
- Deploying Applications in the Cloud
- Managing Cloud Resources with IaC

⭐ **Hands-on projects to practice:**

- **Cloud Provider Comparison:** Compare and contrast different cloud providers and create a report highlighting their strengths and weaknesses.
- **Cloud Security Best Practices:** Implement cloud security best practices and demonstrate how to manage cloud security.

Module 10: Advanced Topics in DevOps

Microservices Architecture

- Understanding Microservices and Their Benefits
- Implementing a Microservices Architecture

DevSecOps

- Integrating Security into the DevOps Pipeline
- Tools and Practices for Security Automation(Snyk, Aqua Security, Fortify)

⭐ **Hands-on projects to practice:**

- **Microservices Architecture:** Implement a microservices architecture for a sample application, and demonstrate how to manage service communication and deployment.
- **DevSecOps Pipeline:** Implement a DevSecOps pipeline to integrate security into the DevOps workflow, and demonstrate how to automate security testing and deployment.

B.Sc. in IT (Software Engineering and DevOps) Syllabus

This program combines foundational concepts in software engineering with the principles and practices of DevOps, enabling students to develop robust, scalable, and efficient software systems.
Students must complete their 10+2 or equivalent examination from a recognized Board/University with a minimum of 50% marks in aggregate .
The fees for the BSc in IT (Software Engineering and DevOps) program vary depending on the institution and the location. However, the average fees for the program range from INR 1.5 lakhs to INR 3 lakhs per year.

Here's a DevOps B.sc course syllabus at a glance:

Semester	Subject	Topics Covered
1	**Introduction to DevOps**	Definition and Principles of DevOps, History and Evolution of DevOps, Benefits and Challenges of DevOps
	DevOps Tools	Introduction to DevOps Tools, Jenkins, Git, Docker, Kubernetes
	Computer Systems and Networking	Introduction to Computer Systems, Networking Fundamentals, Network Protocols and Architecture
2	**Agile and Scrum Fundamentals**	Agile Methodologies, Scrum Framework, Roles and Responsibilities in Scrum, Agile Estimation and Planning
	Agile Project Management	Agile Project Planning, Agile Project Monitoring and Control, Agile Project Closure
	Operating System Concepts	Introduction to Operating Systems, Process Management, Memory Management, File Systems
3	**Version Control Systems**	Introduction to Version Control, Git Fundamentals, Git Workflow and Branching, Git Tools and Best Practices
	Containerization using Docker	Introduction to Containerization, Docker Fundamentals, Docker Images and Containers, Docker Networking and Volumes
	Database Management Systems	Introduction to Database Systems, Database Design, Database Normalization, SQL and NoSQL Databases
4	**Container Orchestration using Kubernetes**	Introduction to Container Orchestration, Kubernetes Fundamentals, Kubernetes Architecture and Components, Kubernetes Deployment and Management
	Continuous Integration and Continuous Deployment (CI/CD)	Introduction to CI/CD, CI/CD Tools (Jenkins, Travis CI, CircleCI), CI/CD Pipelines and Workflows, CI/CD Best Practices and Challenges
	Web Development Fundamentals	Introduction to Web Development, HTML, CSS, JavaScript, React or Angular Frameworks
5	**Infrastructure as Code (IaC) using Terraform**	Introduction to IaC, Terraform Fundamentals, Terraform Configuration and State, Terraform Modules and Workspaces

	Monitoring and Logging	Introduction to Monitoring and Logging, Monitoring Tools (Prometheus, Grafana), Logging Tools (ELK Stack, Fluentd), Monitoring and Logging Best Practices
	Cloud Computing Fundamentals	Introduction to Cloud, Cloud Providers (AWS, Azure, GCP), Cloud Security, Cloud Cost Optimization
6	**DevOps for Cloud Computing**	Cloud-based DevOps, Cloud-native Applications, Cloud Migration and Deployment
	Observability	Introduction to Observability, Observability Tools (New Relic, Datadog), Observability Best Practices
	DevSecOps	Introduction to DevSecOps, DevSecOps Principles, DevSecOps Tools (OWASP ZAP, SonarQube), DevSecOps Best Practices

DevOps course subjects and topics to learn

- ### Version control system

These systems help DevOps engineers to keep track of the changes made in their coding over time. Whenever you edit a code, this system takes a snapshot of the files and saves them permanently so that the version history can be recalled later when needed.

One popular version control system that you must learn is Git. It ensures your code changes are well-managed and documented for collaborative workflows. Learn the basics of Git version control, including commit, push, pull, and merge functions, branching and merging strategies, managing repositories, and knowledge of collaborative workflows, including pull requests and code reviews.

- ### Continuous integration and continuous deployment (CI/CD)

Continuous integration allows developers to merge their code changes into a central repository that assists in the automated testing of applications. The next phase is Continuous Delivery, where the developer performs several fixes and decides on what is to be deployed to end users and when.

Continuous deployment gives you the power to automate the release of any code changes from the central repository to the production. It ensures all changes made to the product are passed on to every stage of the production process and are efficiently released to end users.

Knowledge of CI/CD helps DevOps engineers detect issues early, enhance code quality, streamline the deployment process, minimize manual work, and ensure faster delivery of features to end users. The basic things to learn are CI/CD principles, tools (like Jenkins, Travis CI, GitLab CI, Spinnaker, etc.), and setting and managing CI/CD pipelines.

- ## Containerization and Orchestration

It is the process of packaging or encapsulation of an application with its required libraries, frameworks, and other configuration files to run on different computing environments. While containers provide a consistent runtime environment for DevOps engineers, Orchestration tools like Kubernetes manage containerized applications at scale.

You must learn the basic concepts of containerization including Docker and Kubernetes, and how to convert applications into containers for smooth deployment, scalability, and container management.

- ## Configuration management tools

Configuration management tools are essential for DevOps engineers to maintain the consistency of systems and software. They ensure that you don't have to confirm or hope that the configuration of servers, storage, networking, and software is current. Software configuration management is a system engineering process that helps track and monitor changes to software system configuration metadata.

Some of the common configuration management tools include Red Hat Ansible, Chef, and Puppet. These are used alongside the version control system and CI/CD infrastructure.

- ## Infrastructure as Code

IAC assists in managing IT infrastructure with automatic scripts. It is an essential part of the DevOps software development approach, allowing engineers to completely automate deployment and configuration and ensure continuous delivery.

Without IAC, DevOps engineers would manually configure the infrastructure for each deployment. Over time, the environment that was required to be identical becomes inconsistent, making it harder to configure and slowing down deployment. But Infrastructure as Code tools automate your administrative tasks. You must learn the concepts of IAC, manage infrastructure with Terraform, create reusable modules, and integrate them into the CI/CD pipeline.

- **Continuous monitoring**

Continuous monitoring and logging techniques are essential to identify and diagnose potential and real-time issues in application and system infrastructure. They ensure better system health and performance and faster issue resolution.

In DevOps, you mainly perform three types of monitoring: infrastructure monitoring, application monitoring, and network monitoring. There are also others, like configuration monitoring, database, middleware, third-party, batch, data, and security monitoring.

- **Security in DevOps**

Security is a trending skill among DevOps engineers that requires you to remove all the barriers between application development and IT operations. You especially need to learn about security measures as you often use third-party programs, frameworks, libraries, and SDKs (Software Development Kits) to develop applications, which may contain security vulnerabilities that might have been missed.

You must also be aware of DevSecOps, which integrates automated security measures into software development.

Additionally, knowledge of vulnerability management is needed to uncover and address errors in codes in the production stage before releasing an application to end users.

DevOps course fees and duration 2024

Course name	Course provider	Course duration	Course price	Training mode
DevOps Training in India	Besant Technologies	30+ hours	₹25,000	Online

DevOps Course Training with Certification	StarAgile	4.5 months	₹49,999	Online
DevOps Training Course in India	IntelliPaat	40+ hours	₹22,743	Online
Basic DevOps	Koenig	40+ hours	₹37,550	Online
DevOps certification training	Skillogic	10 days	₹29,900	Online
Certificate Program in DevOps Course Training in India	360DigiTMG	60+ hours	₹29,500	Classroom and online
DevOps Training course	DevOps School	60 hours	₹24,999	Online and offline

What is the course fee for DevOps courses?

The course fee for DevOps courses ranges between ₹20,000 and ₹50,000. However, these fees may vary depending on the institution offering, course type, and delivery mode. Sometimes, the location of the institution and its reputation impact the course fees.

For example, if an institute is located in a tier-1 city, its DevOps course charges will be higher than those of an institute in tier-2 or tier-3 cities.

DevOps Course Duration

The DevOps course duration is usually between 3 months to 1 year. However, there are short-term courses that are completed within 10-30 days or in 30-40 hours. Similarly, self-paced courses give you the flexibility to choose learning hours and pace. So you can complete it as per your learning abilities.

The DevOps course duration depends on several factors like the type of course, training hours, number of practical sessions or live projects to complete, depth of the syllabus, and course offerings.

Who is eligible for DevOps courses?

Eligibility for DevOps courses typically includes:

- **Educational Background:** Candidates with a degree in Computer Science, Information Technology, Software Engineering, or related fields are often preferred.

However, individuals from other disciplines with a strong interest in technology may also be eligible.

- **Basic Knowledge:** Familiarity with programming languages, version control systems, and an understanding of software development processes can be beneficial.

Options for DevOps Training:

- **Online Courses:** Platforms like Coursera, Udacity, and edX provide courses on DevOps practices, tools, and methodologies that can be taken alongside university studies.
- **Certification Programs:** Many institutions offer certification programs in DevOps, which can enhance a student's qualifications and practical skills.
- **University Electives:** Very few universities may offer elective courses in DevOps as part of their Computer Science or Information Technology programs.

Apply for DevOp Courses with 10Pie

If you want to become an expert in DevOps, you can enroll for a certificate or a degree course in India. We, at 10pie, after thorough market research, have developed this guide to provide you with a standard DevOps syllabus.

Not only learning theory will help you get a good job, but you need to have sufficient hands-on practice. We have also listed some of the project works in our syllabus to help you understand what you need to do to attract the attention of potential recruiters immediately after the course completion. With us, your search for the right DevOps course becomes easier.