



GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Master of Computer Applications

Level: Post Graduate

Course / Subject Code: MC03094111

Course / Subject Name: DevOps Engineering

w. e. f. Academic Year:	2025-26
Semester:	3
Category of the Course:	Elective Group-2

Prerequisite:	<p>Basic knowledge of software development life cycle (SDLC), familiarity with command-line tools, and hands-on experience with any programming language (e.g., Python, Java, or JavaScript).</p> <p>Understanding of source code version control systems (e.g., Git) is desirable but not mandatory.</p>
Rationale:	<p>In today's fast-paced digital world, software products must be developed, tested, and deployed rapidly while maintaining quality and reliability. DevOps bridges the gap between software development and IT operations, enabling faster delivery cycles, improved collaboration, and continuous improvement.</p> <p>This course introduces students to the foundational principles and tools of DevOps, equipping them with practical skills in version control, CI/CD pipelines, automation, containerization, and orchestration. Students learn to work with industry-standard tools such as Git, Jenkins, Docker, Kubernetes, and Ansible—preparing them to contribute effectively to modern agile and cloud-native development environments.</p> <p>The course emphasizes hands-on experience and real-world scenarios, making learners job-ready and responsive to evolving industry practices. It aligns with industry demands for professionals who can ensure faster time-to-market, better operational efficiency, and collaborative development practices.</p> <p>Pedagogy:</p> <p>The course follows a blended learning approach, combining interactive lectures with extensive hands-on lab sessions to reinforce practical skills. Concepts are delivered through case studies, tool demonstrations, and real-world scenarios to contextualize DevOps practices. Students engage in collaborative projects, peer learning, and problem-solving activities using tools like Git, Jenkins, Docker, and Kubernetes. Capstone tasks and mini-projects ensure experiential learning. The course also incorporates self-paced learning resources and continuous assessment through quizzes, assignments, and lab work to track progress and enhance retention.</p>



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Course Outcome:

After Completion of the Course, Student will able to:

No.	Course Outcomes	RBT Level*
1	Describe the fundamentals and need of DevOps and Agile methodologies.	UN
2	Apply version control using Git and GitHub effectively.	AP
3	Demonstrate CI/CD pipeline automation using Jenkins.	AP
4	Use containerization technologies like Docker and orchestration using Kubernetes.	AP
5	Implement DevOps tools and practices in real-world scenarios.	CR

*RM: Remember, UN: Understand, AP: Apply, AN: Analyze, EL: Evaluate, CR: Create

Teaching and Examination Scheme:

Teaching Scheme (in Hours)			Total Credits L+T+ (PR/2)	Assessment Pattern and Marks				Total Marks
L	T	PR	C	Theory		Tutorial / Practical		
				ESE (E)	PA / CA (M)	PA/CA (I)	ESE (V)	
2	0	2	4	70	30	20	30	150

Course Content:

Unit No.	Content	No. of Hours	Weightage (%)
1	Introduction to DevOps, Agile vs DevOps, DevOps lifecycle	2	6%
2	Source Code Management – Git, GitHub basics, branching strategies	2	6%
3	GitHub Actions and collaboration workflows	2	6%
4	Introduction to Continuous Integration (CI)	2	7%
5	Jenkins: Installation, configuration, and plugins	2	7%
6	Automating builds and tests with Jenkins	2	7%
7	Continuous Delivery & Continuous Deployment concepts	2	7%
8	Configuration Management: Ansible basics	2	7%
9	Containerization: Docker fundamentals, images, containers	2	7%
10	Docker Compose, DockerHub, Dockerfile	2	7%
11	Kubernetes basics: Pods, Services, ReplicaSets	2	7%



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12	Kubernetes deployment and orchestration	2	7%
13	Monitoring and Logging (e.g., ELK, Prometheus, Grafana)	2	7%
14	DevOps Security and Best Practices	2	6%
15	DevOps Capstone Discussion and Project Integration	2	6%
	Total Hours:	30	100%

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks (in %)					
R Level	U Level	A Level	N Level	E Level	C Level
10	40	30	-	-	20

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)

References/Suggested Learning Resources:

Reference Books:

- "The DevOps Handbook: How to Create World-Class Agility, Reliability, & Security in Technology Organizations" by Gene Kim, Patrick Debois, John Willis, and Jez Humble – IT Revolution Press.
- Accelerate: The Science of Lean Software and DevOps" by Nicole Forsgren, Jez Humble, and Gene Kim – IT Revolution.
- "Site Reliability Engineering: How Google Runs Production Systems" by Betsy Beyer, Chris Jones, Jennifer Petoff, and Niall Richard Murphy – O'Reilly Media.
- "Continuous Delivery: Reliable Software Releases through Build, Test, and Deployment Automation" by Jez Humble and David Farley – Addison-Wesley.
- "Learning Continuous Integration with Jenkins" by Nikhil Pathania – Packt Publishing.
- "Docker Deep Dive" by Nigel Poulton – Leanpub.
- "Kubernetes Up & Running: Dive into the Future of Infrastructure" by Brendan Burns and Joe Beda – O'Reilly Media.
- "Ansible for DevOps" by Jeff Geerling – Leanpub.

Online Courses and MOOCs:

- DevOps on Coursera – Offered by IBM, AWS, or Google Cloud on topics like CI/CD, Jenkins, Docker, Kubernetes.
- Linux Foundation's DevOps Tools and Practices – edX.org.
- YouTube Channels:
 - TechWorld with Nana



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- b. The Net Ninja
- c. freeCodeCamp

Documentation and Tool Resources:

- Git Documentation
- Jenkins Documentation
- Docker Documentation
- Kubernetes Documentation
- Ansible Documentation

Suggested Course Practical List: if any

1. Setting up Git and GitHub account, basic Git operations
2. Creating and managing branches, merge conflicts in Git
3. Writing and using GitHub Actions for automation
4. Installing and setting up Jenkins
5. Automating a simple build pipeline in Jenkins
6. Integration of Jenkins with GitHub
7. Creating a simple Ansible playbook
8. Installing Docker, creating and running Docker containers
9. Writing a Dockerfile and building a custom image
10. Using Docker Compose to run multi-container applications
11. Kubernetes: Deploying a simple app using kubectl
12. Creating and managing Kubernetes pods and services
13. Setting up Prometheus and Grafana for basic monitoring
14. Implementing security practices in DevOps pipelines
15. Capstone: End-to-end CI/CD pipeline for a sample application

CO- PO Mapping:

Semester 3	Course Name : DevOps engineering							
	POs							
Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	2	1	2	1	-	-	2
CO2	2	3	2	3	2	1	-	2
CO3	2	2	3	3	2	2	-	2
CO4	2	2	3	3	2	2	1	3
CO5	3	3	3	3	3	3	2	3

Legend: '3' for high, '2' for medium, '1' for low and '-' for no correlation of each CO with PO.

Note: The CO-PO mapping is indicative; the institute/faculty member can change as required.
