

UNIVERSITY OF PETROLEUM & ENERGY STUDIES

2022-26 Batch

	DevOps	L	T	P	C
		3	0	0	3
Pre-requisites/Exposure	Basic Knowledge Linux operating system				
Co-requisites					

Course Objectives

The objective of this course are

1. To learn fundamental of DevOps.
2. To get the knowledge of DevOps applications.
3. To learn DevOps principles, lifecycles and tools.
4. To know testing, deployment, monitoring, issue tracking and workflow for DevOps based solutions.

Course Outcomes

On completion of this course, the students will be able to

- CO1. Explain the DevOps fundamentals and business applications.
- CO2. Apply the DevOps tools for real world problem solving.
- CO3. Apply the high-throughput and data intensive applications programming.
- CO4. Apply testing, deployment, monitoring, issue tracking and workflow for DevOps based solutions.

Catalog Description

This course is designed with an aim to provide the knowledge in DevOps, the open source framework that reduces the gap between software engineers and operations. It provides details in continuous delivery, agile development, configuration management, automation, fast deployment, or team collaboration etc. and use using various DevOps tools.

Course Outline

Unit 1 Introduction to DevOps

5 Lecture Hours

What is DevOps? How DevOps works, Benefits of DevOps, Why DevOps matters, how to adopt a DevOps model, DevOps practice explained, DevOps practices, DevOps history: How it starts? DevOps tools: Phase 1 - Continuous development, Phase 2: Continuous integration, Phase 3: Continuous testing, Phase 4: Continuous deployment, Phase 5: Continuous monitoring, DevOps: Why is it popular? Agile vs DevOps, Introduction to kanban, Types of kanban board, create a kanban board, Kanban with IBM tools, Scrum application delivery pipeline and support team,

an orchestration framework for continuous delivery, Software release plan, Feedback and learning from feedback and improving the delivery, DevOps toolchain, DevSecOps, DevOps vs SRE.

Unit 2 Business needs for DevOps**4 Lecture Hours**

Business needs for DevOps, Why DevOps is needed? DevOps benefits, what is the driving factor? Why an industry can follow this new process? Silos in the world of software development and their role in project delivery, DevOps teams and cross functioning of teams, Application team v/s. Platform team, System admins and other stakeholders, Continuous integration vs continuous deployment vs continuous delivery, DevOps tools for agile practices, Differences between Agile and DevOps, Case study: Problem with Silos development.

Unit 3 DevOps Adoption**4 Lecture Hours**

DevOps adoption. Deming, lean manufacturing, and Kaizen, Lean manufacturing, Lean standards of manufacturing, DevOps: IBM view, Four DevOps adoption paths, Steer adoption path, Develop and test adoption path, Collaborative development, Continuous testing, Way to deployment, Continuous customer feedback and optimization, Six explanations why more companies should implement DevOps within 2020, Why DevOps impact developers, How DevOps impact operations, Steps to a successful DevOps adoption, Challenges of DevOps adoption, Monolithic V/s microservices development, DevOps architecture and resilience, Cloud resiliency, DevOps resiliency, The 4 stages of the resilience process, Step 1: Detect, DevOps style, Step 2: Alert with a cloud and DevOps mindset, Step 3: Respond & recover using automation and appropriate failover strategy, Step 4: Refine & test, achieving incremental improvements, Achieving pragmatic resiliency.

Unit 4 DevOps Principles and LifeCycle**6 Lecture Hours**

DevOps principles and lifecycle, Play 1: Develop the team culture, principles, and roles, Principles and culture, New DevOps roles, Play 2: Practices of DevOps, Practice 1: Configuration management, Gitflow workflow, Practice 2: Continuous integration, Practice 3: Automated testing, Section 508 manual test, Practice 4: Infrastructure as code, Practice 5: Continuous delivery, Practice 6: Continuous deployment, Practice 7: Continuous monitoring, Play 3: Assess your DevOps maturity level and define a roadmap, Play 4: Create a DevOps pipeline, Play 5: Learn and improve through metrics and visibility, Metrics tools, What is DevOps lifecycle? What is digital transformation? Digital transformation role of DevOps.

Unit 5 Common Tools for DevOps**6 Lecture Hours**

How to select the right tool for DevOps, Docker, Kubernetes, Puppet, Ansible, Other tools, DevOps monitoring tools, Version control, Code repository, IBM case study: CI/CD technique.

Unit 6 Testing, Automated Deployment and Monitoring**6 Lecture Hours**

Introduction to testing, Verification and validation, Types of software testing, White box testing, Manual testing, Different categories of manual testing, Software build process, Device for monitoring of version control, Manual testing tools, Write test cases, Automation testing, Test tool selection, Automation tool best practices, Automation testing tools, Open source tool for DevOps automation testing, Manual deployment vs. automated deployment, DevOps monitoring using open source tools, DevOps alerting tools, Metrics storage tools, Visualization tools of DevOps, Setting up automated testing with an open source automated test tool, IBM DevOps: Continuous testing, IBM case study: Use DevOps to drive quality assurance and testing.

Unit 7 Issue Tracking and Workflow

5 Lecture Hours

Issue tracking and workflow, how are issue tracking tools used? What functionality consumers would aim for in a problem-tracking solution? What are issue trackers used for? What do we need from an issue tracker? Problems with issue tracker proliferation, Bugzilla, the tracker for GitLab, Jira, DevOps issue tracking tools, Types of issues or bugs, Classification of software errors, Types of software bugs, Open-source issue trackers tools, What Is the biggest bug producer? Top software bugs 2020, Difference between defect, error, bug, failure and fault, Workflow configuration, Why DevOps and TOSCA now, DevOps with emerging technologies: Big data, DevOps with emerging technologies: IOT.

Text Book

- DevOps (IBM ICE Publications)

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Examination Scheme:

Components	Internal	Mid Term	ESE	Total
Weightage (%)	30%	20%	50%	100%

Relationship between the Course Outcomes (COs), Program Outcomes (POs) and Program Specific Outcomes (PSOs)

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1		2		2						1			2	1
CO2	1	2	2		2						1			2	1
CO3	1		2		2						1			2	1

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CO4	1		2		2					1			2	1
Average	1	2	2		2					1			2	1

1=weak

2= moderate

3=strong

	AIML	L	T	P	C
		3	0	0	3