COURSE PLAN

UPES/Course Plan/Theory & lab/Ver 10/ Effective December 2025

Name of School

Name of the Faculty	Prateek Raj Gautam
Designation	Assistant Professor Senior Scale
Cluster	CSO
Program	B.Tech.
Course	Containerization and DevOps Lab
Course Code	CSDV3118P
No. of credits	1
Semester	VI
Session	Jan – May
Academic Year	2025-26

Signature of Faculty Member

Name: _____

Designation: _____

Date: _____

Signature of Cluster Head

Name: _____

Designation: _____

Date: _____

COURSE PLAN

Prerequisite	Cloud Computing Architecture and Deployment Models Lab - CSVT3129P	
Credit	1	
Lecture	Tutorial	Practical
0	00	2

A. The expected Program Outcome are:

PO1	**Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	**Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	**Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	**Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	**Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6	**The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	**Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	**Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9	**Individual and teamwork:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	**Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	**Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	**Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

B. Expected Program specific Outcome are:

PSO1	Perform system and application programming using computer system concepts, the principles of data structures, algorithm development, problem-solving, and optimization techniques.
PSO2	Apply software development and project management methodologies, integrating principles from both front-end and back-end development, and effectively utilize contemporary tools and technologies.
PSO3	Exhibit a commitment to ethical practices, societal responsibilities, and continuous learning, contributing to the advancement of technology and addressing challenges in diverse computing domains.

C. The expected Course Outcomes are:

Lab	
CO 1	**Execute** Docker container operations and **analyze** performance differences from virtual machines.
CO 2	**Configure** and **manage** multi-container applications using orchestration tools like Docker Compose.
CO 3	**Design** and **implement** CI/CD pipelines using DevOps tools for automated testing and deployment.
CO 4	**Evaluate** code quality and infrastructure automation using appropriate DevOps toolchains.

D. CO-PO Relationship Matrix

Indicate the relationships by1- Slight (low) 2- Moderate (Medium) 3-Substantial (high)

Program Outcomes / Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO 11	PO 12	PSO 1	PSO 2	PSO3
CO 1	2	2	1	3	3	--	--	1	1	1	--	2	2	3	1
CO 2	3	2	2	2	3	--	--	--	2	2	1	1	3	3	1
CO 3	3	3	3	3	3	1	--	1	3	3	3	2	2	3	2
CO 4	2	3	2	3	3	2	1	2	2	2	2	3	1	3	3
Average	2.50	2.50	2.00	2.75	3.00	1.50	1.00	1.33	2.00	2.00	2.00	2.00	2.00	3.00	1.75

E. Course Outcomes assessment plan:

a) Mapping of Course Outcomes with assessment tools

Components / Course Outcomes	Assignment	Test/Quiz	Mid Semester	End Semester	Viva
CO 1	☐	☑	☐	☐	☑
CO 2	☐	☑	☐	☐	☑
CO3	☐	☑	☐	☐	☑
CO4	☐	☑	☐	☐	☑

b) Assessment plan and Analysis: Lab

	Assessment Tools	Planned	Actual	Highest (Score)	Lowest (Score)
CIA	Viva- Voce				
	Lab Records				

F. Course Syllabus Template:

Syllabus Template for lab

Experiment Number	Content
1	Introduction to Dockers: a) Setup & Running Container; b) Performance evaluation of Virtual box machine deployment and Docker deployment.
2	Docker Installation, configuration, Running Images
3	Deploying web applications with Docker
4	Dockerfile - Containerizing application, Building Images, Tagging, Publishing
5	Docker - Volumes, Env, Monitoring (Docker stats), Docker Networks
6	Docker Compose - Installation, Creating Compose files, Running Images using Docker-compose
7	Create a CI/CD pipeline for deploying web application using Jenkins
8	Ansible
9	Chef
10	Install, setup and run SonarQube for a local scan
11	Orchestration using Docker compose on multi container applications
12	Study and Analyse container orchestration using Kubernetes

PERIODIC MONITORING- LAB

Actual date of completion and remarks, if any

Components		From	To	From	To	From	To
Duration (Mention from and to dates)		15 Jan	15 March	16 March	20 April		
Percentage of Experiment covered		0 %	55%	55%	100%		
Experiment	Planned	0	6	7	12		
	Taken						
Viva-Voice/Test/quizzes	Planned		1 Quiz + 1 Viva		1 Quiz+ 1Viva		
	Taken						
	CO's Addressed		CO1,CO2		CO3,CO4		
	CO's Achieved						
Any other(please specify)	Planned						
	Taken						
	COs Addressed						
	Cos						

Observations(If any)_____

_____

_____

Signature of Faculty **Signature of Head**

Date **Date**

PLANNING FOR REMEDIAL CLASSES

Sl. No.	Name of Student	Roll No.	Sap ID	Mid Sem Marks	Remedial Classes Held							Class test based on Remedial Classes	End Sem Marks	Improvement (Y/N)
					Date									
					Venue									
					Time									

Signature of Faculty **Signature of Head**

G. Target

Target	50% (marks)
Level-1	40% (population)
Level-2	50% (population)
Level-3	60% (population)

H. Method of Evaluation*

UG/PG (Indicative)	
Quizzes/Tests, Assignments (50%)	
Mid Examination (20%)	
End examination (30%)	

*It can be revised as per the assessment scheme of the respective School/Course & In case of the courses running under continuous assessment this scheme is not applicable.

I. Passing Criteria

Scale	PG	UG
Out of 10point scale	SGPA – "6.00" in each semester CGPA – "6.00" Min. Individual Course Grade – "C" Course Grade Point – "4.0"	SGPA – "5.0" in each semester CGPA – "5.0" Min. Individual Course Grade – "C" Course Grade Point – "4.0"

*for PG, passing marks are 40/100 in a paper (Composite)

*for UG, passing marks are 35/100 in a paper (Composite)

J. References:

Text Books	IBM ICE Publications
	The Docker Book: Containerization is the new virtualization by James Turnbull, Shroff Publishers, First Edition, 2019
	Docker: A Project-Based Approach to Learning by Jason Cannon, **September 2021**
	DevOps Tools from Practitioner's Viewpoint, by Deepak Gaikwad, Viral Thakkar, Wiley, Jan 2019
Web resources	

Journals	
Reference books	Ian Miell, and Aidan Hobson Sayers, “Docker in Practice”, 2nd Edition , Manning Publications, 2019.
MOOCs, Online courses	

SUGGESTIONS FOR FACULTY

- Faculty should keep track of the students with low attendance and counsel them regularly.
- The course coordinator will arrange to communicate the short attendance (as per UPES policy) cases to the students and their parents monthly.
- Topics covered in each class should be recorded in the table of RECORD OF CLASS TEACHING (Suggested Format).
- Internal assessment marks should be communicated to the students twice in a semester.
- The file will be audited by respective IQAC members for theory as well as for lab as per schedule.
- The faculty is required to maintain these files for a period of at least three years.
- This register should be handed over to the head of department, whenever the faculty member goes on long leave or leaves the Colleges/University.
- For labs, continuous evaluation format (break-up given in the guidelines for result preparation in the same file) should be followed.
- The department should monitor the actual execution of the components of continuous lab evaluation regularly.
- Instructor should maintain record of experiments conducted by the students in the lab weekly.
- Instructor should promote students for self-study and to make concept diary, due weightage in the internal should be given under faculty assessment for the same.
- Course outcome assessment: To assess the fulfilment of course outcomes two different approaches have been decided. Degree of fulfillment of course outcomes will be assessed in different ways through direct assessment and indirect assessment. In Direct Assessment, it is measured through quizzes, tests, assignment, Mid-term and/or End-term examinations. It is suggested that each examination is designed in such a way that it can address one or two outcomes (depending upon the course completion). Indirect assessment is done through the student survey which needs to be designed by the faculty (sample format is given below) and it shall be conducted towards the end of course completion. The evaluation of the achievement of the Course Outcomes shall be done by analyzing the inputs received through Direct and Indirect Assessments and then corrective actions suggested for further improvement.
- At the completion of the course, course attainment and other documents should be shared with the program coordinator for computation of Program attainment.
- At the completion of the course Faculty members are suggested to share the innovative teaching techniques along with the course plan (format provided by IQAC).
- Faculties are encouraged to share the master/expert classes evidence (as per the event report format)
- Faculties are also encouraged to include MOOCs,,SWAYAM any other online content and share the evidence of MOOCs courses /online courses referred (as per the event report format).
- Faculties are encouraged to share the evidence related to interventions or initiatives focusing the unique/slow and Fast Leaners along with Course Completion files.

INDIRECT ASSESSMENT

Sample format for Indirect Assessment of Course outcomes:

NAME:
ENROLLMENT NO:
SAP ID:
COURSE:
PROGRAM:

Please rate the following aspects of course outcomes of ----------.

Use the scale 1-3*

Course Outcomes	Statement	1	2	3
CO 1	**Execute** Docker container operations and **analyze** performance differences from virtual machines.			
CO 2	**Configure** and **manage** multi-container applications using orchestration tools like Docker Compose.			
CO 3	**Design** and **implement** CI/CD pipelines using DevOps tools for automated testing and deployment.			
CO 4	**Evaluate** code quality and infrastructure automation using appropriate DevOps toolchains.			

* 1 → Low level of attainment

2 → Moderate level of attainment

3 → High level of attainment