

<b>Course Title:</b>	<b>Virtualisation et cloud computing</b>
<b>Course Code:</b>	CSE522
<b>Program:</b>	Master Degree In Computer Engineering
<b>Department:</b>	Computer Engineering
<b>Course coordinator:</b>	Mr. Mounir TELLI
<b>Institution:</b>	Private Higher School of Engineers of Gafsa (ESIP)

#### A. Course Identification

<b>1. Credit hours:</b>	3 (3-0-1.5)
<b>2. Course type</b>	<p>a. College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/></p> <p>b. Fundamental <input checked="" type="checkbox"/> Transversal <input type="checkbox"/> Optional <input type="checkbox"/></p>
<b>3. Level/year at which this course is offered:</b>	3.5/3
<b>4. Pre-requisites for this course (if any):</b>	Networking Fundamentals, Operating Systems: Foundational Knowledge of Computer Science
<b>5. Co-requisites for this course (if any):</b>	

#### 1. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Self-study	Total workload
1	Traditional classroom	30	14.5	44.5
2	Blended			
3	E-learning	.....		
4	Distance learning	.....		
5	Other ()	.....		

#### 2. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	15
2	Laboratory/Studio	8
3	Tutorial	7
4	Others (specify)	-
	<b>Total</b>	<b>30</b>

## B. Course Objectives and Learning Outcomes

### Course Description

This course introduces students to virtualization, cloud computing, and data center management, blending theory with hands-on practice. Students will explore virtual machine deployment, network and storage virtualization, cloud services, and high-availability solutions. Through lectures, labs, and real-world case studies, students will learn how to set up and manage virtualized environments using VMware ESXi, vCenter, AWS, and Azure. The course also covers key concepts like cloud infrastructure management, performance monitoring, and disaster recovery.

### Course Main Objective

By the end of this course, you'll be able to:

- Understand the fundamentals of virtualization, including how hypervisors work and why resource isolation is important.
- Differentiate between cloud service models (IaaS, PaaS, SaaS) and deployment models (Public, Private, Hybrid).
- Set up and manage virtual machines (VMs) in VMware environments.
- Configure virtual networks and storage systems for optimized performance.
- Monitor and optimize virtualized infrastructure using tools like vRealize Operations.
- Implement high-availability (HA) and fault tolerance (FT) solutions to prevent downtime.

## 1. Course Learning Outcomes

CLOs		Aligned PLOs
1	<b>Knowledge and Understanding</b>	
1.1	✓ Demonstrate an advanced understanding of virtualization, cloud computing, and datacenter principles, theories, and practices. Apply this knowledge to solve complex industry challenges in these fields.	PLO.K1
2.1	✓ Conduct independent research in virtualization and cloud computing, identify performance bottlenecks, design experimental setups, collect and analyze performance data, and contribute to advancements through innovative cloud or virtualization projects.	PLO.K2
2	<b>Skills</b>	
2.1	✓ Apply critical thinking to solve complex cloud infrastructure problems, design efficient virtualized environments, and optimize cloud and datacenter solutions using emerging technologies.	PLO.S1
3.1	✓ Demonstrate strong organizational skills, teamwork, and project management abilities in real-world cloud deployment scenarios and virtual infrastructure projects.	PLO.S3
4.1	✓ Master the integration of virtualized environments with IoT infrastructures, making informed decisions on the usefulness and optimization of these systems in various contexts	PLO.S4
5.1	✓ Analyze and evaluate the performance of cloud and virtualized systems, demonstrating awareness of real-life performance and scalability challenges in cloud infrastructure.	PLO.S5

CLOs		Aligned PLOs
7.1	✓ Design, develop, and implement robust software solutions within virtualized environments, considering system scalability, budget constraints, and evolving industry requirements.	PLO.S7

### C. Course Content

No	List of Topics	Contact Hours
1	<ul style="list-style-type: none"> <li>• <b>Chapter1: Fundamental Concepts of Virtualization</b> <ul style="list-style-type: none"> <li>○ Introduction to Virtualization</li> <li>○ Operating System Virtualization</li> <li>○ Storage Virtualization</li> <li>○ Network Virtualization</li> </ul> </li> </ul>	4
2	<ul style="list-style-type: none"> <li>• <b>Chapter2: Cloud Computing</b> <ul style="list-style-type: none"> <li>○ Introduction to Cloud Computing</li> <li>○ Cloud Resource Management</li> <li>○ Cloud Security</li> </ul> </li> </ul>	5
3	<ul style="list-style-type: none"> <li>• <b>Chapter 3 : Datacenter and Virtualized Infrastructures</b> <ul style="list-style-type: none"> <li>○ Introduction to Datacenters</li> <li>○ VMware vSphere: Overview and Installation</li> <li>○ Network and Virtual Storage Management</li> <li>○ Monitoring and Resource Management</li> </ul> </li> </ul>	6
4	Pratical works <ul style="list-style-type: none"> <li>○ Lab 1: Installing a VMware infrastructure</li> <li>○ Lab 2: Provisioning and managing VMs in a virtualized environment .</li> <li>○ Lab 3: Setting up a virtualized network infrastructure</li> <li>○ Lab 4: Snapshot and backup management in vSphere</li> </ul>	15
<b>Total</b>		<b>30</b>

### D. Teaching and Assessment

#### 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	<b>Knowledge and Understanding</b>		
PLO.K1	✓ Demonstrate an advanced understanding of the principles, theories, and practices of virtualization, cloud computing, and	<ul style="list-style-type: none"> <li>• Lectures</li> <li>• Hands-On Labs</li> </ul>	<ul style="list-style-type: none"> <li>• Exam, Quizzes, Homework assignments</li> </ul>

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
	datacenters. Apply this knowledge to solve complex problems in these areas.	<ul style="list-style-type: none"> <li>Group Discussions</li> <li>Research Projects</li> </ul>	Practical Work
PLO.K2	✓ Demonstrate strong organizational skills, teamwork, and project management abilities in real-world cloud deployment scenarios and virtual infrastructure projects.		
<b>3.0</b>	<b>skills</b>		
PLO.S2	✓ Apply critical thinking to solve complex cloud infrastructure problems, design efficient virtualized environments, and optimize cloud and datacenter solutions using emerging technologies.	<ul style="list-style-type: none"> <li>✓ Lectures</li> <li>✓ Hands-On Labs</li> <li>✓ Group Discussions</li> <li>Research Projects</li> </ul>	<ul style="list-style-type: none"> <li>▪ Exam, Quizzes, Homework assignments</li> <li>▪ Practical Work</li> </ul>
PLO.S3	✓ Demonstrate strong organizational skills, teamwork, and project management abilities in real-world cloud deployment scenarios and virtual infrastructure projects.		
PLO.S4	✓ Master the integration of virtualized environments with IoT infrastructures, making informed decisions on the usefulness and optimization of these systems in various contexts		
PLO.S5	✓ Analyze and evaluate the performance of cloud and virtualized systems, demonstrating awareness of real-life performance and scalability challenges in cloud infrastructure		
PLO.S7	✓ Design, develop, and implement robust software solutions within virtualized environments, considering system scalability, budget constraints, and evolving industry requirements.		

## 2. Assessment Tasks for Students

	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Practical Work (written or oral)	Weekly	00 %
2	Quizzes, Homework assignments	Random	00 %
3	Final Exam	11	100 %

### E. Student Academic Counselling and Support

**Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice:**

- 1- Office hours
- 2- Blackboard interface

### F. Learning Resources and Facilities

#### 1. Learning Resources

<b>Required Textbooks</b>	<ol style="list-style-type: none"> <li>1. Matthew Portnoy – <i>Virtualization Essentials</i>, 2nd Edition, Wiley, 2020.</li> <li>2. Thomas Erl – <i>Cloud Computing: Concepts, Technology &amp; Architecture</i>, Prentice Hall, 2013</li> <li>3. Jim Doherty &amp; Neil Anderson – <i>Networking for VMware Administrators</i>, Cisco Press, 2014</li> </ol>
<b>Essential References Materials</b>	NA
<b>Electronic Materials</b>	<ul style="list-style-type: none"> <li>• VMware vSphere Official Documentation – <i>Setup, configuration, and management guides</i></li> <li>• YouTube Channels: <i>VMware Hands-on Labs, AWS Training &amp; Certification, Azure DevOps, and Cloud Guru</i></li> </ul>
<b>Other Learning Materials</b>	NA

#### 2. Facilities Required

Item	Resources
<b>Accommodation</b> (Classrooms, laboratories, demonstration rooms/labs, etc.)	<b>classroom board software ...</b>
<b>Technology Resources</b> (AV, data show, Smart Board, software, etc.)	<b>data show;</b>

### G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching and assessment.	Students, Faculty, Program Leaders, Peer Reviewer	Direct/Indirect
Extent of achievement of course learning outcomes.	Faculty, Program Leaders, Peer Reviewer	Direct, Indirect
Quality of Learning resources	Faculty, Program Leaders, Peer Reviewer	Direct, Indirect
Teaching and learning quality and effectiveness.	Students, Faculty Program Leaders, Peer Reviewer	Direct, Indirect

### H. Specification Approval Data

<b>Council / Committee</b>	Computer Engineering Council
<b>Date</b>	11/09/2024