

## **Virtualization**

- 1. Course number and name:** 020VRTES4 Virtualization
- 2. Credits and contact hours:** 4 ECTS credits, 2x1:15 contact hours
- 3. Name(s) of instructor(s) or course coordinator(s):** Jihane Sayah
- 4. Instructional materials:** Course handouts, Powerpoint slides
- 5. Specific course information**
  - a. Catalog description:**

Introduction to virtualization and its fundamental principles; advantages and disadvantages of virtualization; hardware virtualization: the role and components of a hypervisor, types of virtualization (full virtualization, paravirtualization, hardware-assisted virtualization, partitioning), review of existing solutions such as Xen, ESXi, KVM, OpenVz, etc.; network virtualization (NFV and SDN), storage virtualization and SAN, software virtualization and containers, virtualization and cloud: OpenStack.
  - b. Prerequisites:** None
  - c. Selected Elective for CCE students**
- 6. Educational objectives for the course**
  - a. Specific outcomes of instruction:**
    - Understand the concept of virtualization and its fundamental principles.
    - Analyze the advantages and disadvantages of virtualization in various computing environments.
    - Identify the role and components of a hypervisor in hardware virtualization.
    - Differentiate between various types of virtualization, including full virtualization, paravirtualization, hardware-assisted virtualization, and containerization.
    - Evaluate different virtualization solutions such as Xen, ESXi, KVM, and OpenVz based on their features and suitability for specific use cases.
    - Examine the concepts of network function virtualization (NFV) and software-defined networking (SDN) in the context of virtualized networks.
    - Explore the virtualization of storage and storage area networks (SANs) and their implications for data management and accessibility.
    - Compare and contrast software-based virtualization with containerization, understanding their respective advantages and use cases.
    - Analyze the integration of virtualization technologies with cloud computing platforms, with a focus on OpenStack as a popular open-source cloud infrastructure solution.

**b. PI addressed by the course:**

<b>PI</b>	2.1	2.2	2.4	2.5
<b>Covered</b>	x	x	x	x
<b>Assessed</b>				

**7. Brief list of topics to be covered**

- Introduction to virtualization and its principles
- Advantages and disadvantages of virtualization
- Hardware virtualization: role and components of a hypervisor
- Types of virtualization: full, paravirtualization, hardware-assisted, partitioning
- Review of virtualization solutions: Xen, ESXi, KVM, OpenVz, etc.
- Network virtualization: NFV (Network Function Virtualization) and SDN (Software-Defined Networking)
- Storage virtualization and SAN (Storage Area Network)
- Software virtualization and containers
- Virtualization and cloud computing, focusing on OpenStack