

**2020-1-HR01-KA226-HE-094713**

**O3 - Distance learning curricula in Cloud Computing**

**Curricula description**

October 2022

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**CODEIN**

Cloud cOmputing for Digital Education INnovation

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**Identification Sheet**

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| **Project Code** | **2020-1-HR01-KA226-HE-094713** |
| **Project Acronym** | **CODEIN** |
| **Project Full Title** | **Cloud cOmputing for Digital Education INnovation** |

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| **Abstract** |  |

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## INTRODUCTION

**Name of the Curriculum:** Cloud Computing

**Duration of the program:** 150 hrs

The emergence of distance teaching and learning, also due to the recent COVID-19 pandemic, calls for a transformation in how we think about learning. To participate and thrive in a distance learning framework, it is widely believed that students must be right at the center of the learning process and become power learners. This entails developing multifaceted skills that enable them to properly cope with complexity and embrace dynamicity, thus becoming real learners.

The Cloud Computing course will provide education and training in object storage, data egress, and additional essential building blocks needed to create applications on top of autonomous databases. In addition, students will be introduced to the techniques and tools required to design, develop and deploy responsive, database-driven cloud applications. Practical work will be project-based, with projects being derived from real-life examples from the ICT industry, enabling students to learn the basics of project management while designing, implementing, and demonstrating a database-driven web application solution for a business or organization.

## INTEGRATED COMPETENCIES (LEARNING OUTCOMES)

1. Learn the fundamentals of cloud computing (shared responsibility model, consumption-based model)
2. Describe the benefits of using cloud services
3. Define cloud service types
4. Learn to implement computing and networking services
5. Learn to implement storage services
6. Apply identity, access, and security services
7. Describe cost management in cloud computing
8. Learn to work as a team, improve writing skills (written reports) and speaking skills (project presentation)

## SURVEY ON INDUSTRY PARTNERS (EMPLOYERS)

A survey [1] was conducted among twelve (12) Oracle industry partners to gather feedback on the Cloud Computing curriculum. The survey aimed to determine the relevance and necessity of various curriculum components in the context of technology and labor market trends. The processed questionnaire results provided insightful feedback. Here's a summary of the results:

**Geographical representation**: The responses came primarily from Poland, Croatia and Slovenia.

**Company size**: The majority of respondents work in large companies with more than 250 employees and an annual turnover of more than EUR 50 million.

**Respondents' positions:** The respondents held various positions, including Product Manager, Project Manager, and Executive Board Member, providing diverse perspectives from different managerial and executive levels within the companies.

**Work experience:** The work experience with the current employer ranged from 1 to 8 years, while the total work experience in the field varied from 12 to 23 years, demonstrating a mix of mid to senior-level professionals.

**Qualification levels**: The most common qualification level for jobs incorporating curriculum knowledge was Level 6 (undergraduate studies) followed by Level 7.1 (professional/graduate studies).

**Appropriateness of qualification level:** According to the survey results, most of the respondents think that the current level of qualification that covers the curriculum knowledge is suitable for employment in their respective companies. However, it is acknowledged that certain job roles may require a higher level of qualification for better performance.

**Curriculum components evaluation:**

* Fundamentals of cloud computing: Strong belief in the necessity of understanding the shared responsibility model and consumption-based model.
* Benefits of using cloud services: A clear trend towards the need for full understanding, emphasizing the importance of articulating cloud benefits.
* Cloud service types: A preference for detailed knowledge of cloud service types, with a majority viewing it as needed for the most part.
* Implementing compute and networking services: Balanced views but leaning towards the necessity of practical skills in implementing these services.
* Implementing storage services: Strong indication that knowledge in implementing storage services is needed, with a focus on practical application.
* Applying identity, access, and security services: A significant lean towards the importance of understanding and applying these services in cloud computing.
* Cost management in cloud computing: Responses indicated a balanced but clear necessity to understand cost management within cloud environments.
* Soft skills (teamwork, writing, speaking): Acknowledged the importance of soft skills, with a slight lean towards the necessity of developing teamwork, writing, and speaking skills for project presentations and reports.

## COURSE DURATION AND IMPLEMENTATION

This course comprises 30 hours of lectures, 30 hours of practical exercises and assessments, and 90 hours of independent learning. This course can be elective and worth 4 ECTS points. This curriculum is not copyrighted. It has open access and is available for use by any educational institution or individual interested in independent learning (its open access quarantines transferability).

## PREREQUISITES

**Required**

* Basic understanding of computing and networking, including IP addressing, virtual machine and database use

**Suggested**

* Previous experience with either database or programming fundamentals and knowledge of networking devices, including gateways

## TARGET AUDIENCES

**Educators**

* Universities that teach computer science, information communications technology (ICT), data science, business, or a related subject

**Students**

* Students who wish to gain a foundational knowledge of cloud computing
* Novice and advanced-level programmers, database administrators, developers and network architects wishing to learn about utilizing technology in a cloud environment
* Students interested in architecture, operations, or development roles in IT

## LESSON-BY-LESSON TOPICS

### Getting started with cloud infrastructure

* Video
* Cloud infrastructure overview
* The global footprint of the cloud infrastructure
* The components of a cloud region
* Physical network
* Cloud infrastructure services overview
* Cloud platform offers

### Virtual (cloud) network

* Video
* CIDR (classes inter-domain routing) basics
* Virtual Cloud Network (VCN) concepts
* IP Addresses
* Gateways and routing
* Peering
* Transit routing
* Security
* Default VCN, internal DNS (Domain Name System)
* Putting It all together
* Hands-On Lab

### Connectivity to on-premises networks

* Video
* IPsec VPN
* Connectivity demo

### Compute

* Video
* Bare Metal, VM (Virtual Machine) and Dedicated Hosts
* Bare Metal
* VM
* Scaling
* Container Engine
* Functions
* Hands-On Lab

### Block (disk) storage

* Video
* Block (disk) storage basics
* Designing storage and application requirements
* Cloning and policy-based backups
* Block (disk) storage capabilities
* Hands-On Lab

### File storage

* Video
* File storage service
* File storage use cases
* File storage capabilities
* File storage security

### Object storage

* Video
* Object storage service
* Object storage use cases
* Object storage capabilities
* Hands-On Lab

### Load balancing

* Video
* Overview of load balancing
* Public load balancer
* Private load balancer
* Policies, health checks
* Hands-On Lab

### Data migration

* Video
* Overview of data migration
* Online and offline transport
* Data transfer service
* Storage gateway capabilities and use cases
* Storage gateway demo

### Database

* Video
* Database systems available with cloud
* Database as a service concept
* Features of database service
* Hands-On Lab

## REFERENCES

[1] Europian Union, Europass, *The European Qualifications Framework*, Accessed: 18.09.2022. [Online]. Available: https://europa.eu/europass/en/europass-tools/european-qualifications-framework