

# COURSE DATA

Data Subject			
Code	44824		
Name	Cloud Computing		
Cycle	Master's degree		
ECTS Credits	4.0		
Academic year	2019 - 2020		
Study (s)			
Degree		Center	Acad. Period year
2234 - Master's Degree in Web Technology, Cloud Computing and Mobile Applications		School of Engineering	1 Second term
Subject-matter			
Degree		Subject-matter	Character
2234 - Master's Degree in Web Technology, Cloud Computing and Mobile Applications		1 - Infrastructure and Infrastructure Management	Obligatory
Coordination			
Name		Department	
GUTIERREZ AGUADO, JUAN		240 - Computer Science	

## SUMMARY

This course presents the cloud computing infrastructures. These are complex systems that require the coordination of different components distributed in the different nodes of the data center. It will show which are these components, how they are coordinated, what happens in the infrastructure since the user requests a certain resource until he has access to it. It will also show patterns for the development and execution of applications in this type of infrastructure. The goal is to provide a deep insight to be able to address modifications in the infrastructure or to design applications running on them.



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# PREVIOUS KNOWLEDGE

#### Relationship to other subjects of the same degree

There are no specified enrollment restrictions with other subjects of the curriculum.

#### **Other requirements**

Prior knowledge in data centers, virtualization and server-side programming is required.

# COMPETENCES (RD 1393/2007) // LEARNING OUTCOMES (RD 822/2021)

#### 2234 - Master's Degree in Web Technology, Cloud Computing and Mobile Applications

- Students should apply acquired knowledge to solve problems in unfamiliar contexts within their field of study, including multidisciplinary scenarios.
- Students should be able to integrate knowledge and address the complexity of making informed judgments based on incomplete or limited information, including reflections on the social and ethical responsibilities associated with the application of their knowledge and judgments.
- Students should communicate conclusions and underlying knowledge clearly and unambiguously to both specialized and non-specialized audiences.
- Students should demonstrate self-directed learning skills for continued academic growth.
- Students should possess and understand foundational knowledge that enables original thinking and research in the field.
- Ability to apply acquired knowledge and solve problems in new or little-known environments within broader and multidisciplinary contexts, being able to integrate this knowledge.
- To foster, in academic and professional contexts, technological, social or cultural advancement within a society based on In knowledge and respect for: a) fundamental rights and equal opportunities between men and women; b) principles of equal opportunities and universal accessibility of persons with disabilities; and, c) the values of a culture of peace and democratic values.
- Ability to model, design, define the architecture, implement, manage, operate, and maintain applications, systems, services, networks and content in the field of Web technologies, cloud computing and mobile applications.
- Ability to analyze the storage needs that arise in an environment and to carry out the implantation of a solution in the fields of Web technologies, cloud computing and mobile applications.



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- Ability to design and evaluate servers, applications and systems based on distributed computing.
- Ability to know the architecture, deploy and manage virtualization-based infrastructures and deploy applications in them.
- Ability to assess risk and security issues in systems and applications and take measures to mitigate them in the fields of Web technologies, cloud computing and mobile applications.

# LEARNING OUTCOMES (RD 1393/2007) // NO CONTENT (RD 822/2021)

- Specify and complete computer tasks that are complex, incompletely defined or unfamiliar
- Describe and explain techniques and methods applicable to their particular area of study and identify their limitations
- Organize your own work independently, demonstrating initiative and exercising personal responsibility
- Perform bibliographic searches and reviews using databases and other sources of information
- Learning and improving personal performance as the basis for lifelong learning and professional development
- Communicate effectively both verbally and through other media to a variety of audiences and preferably in a second language
- Know the different models of services in the cloud and its suppliers
- Describe essential components in a cloud computing system
- Explain how the network is managed in cloud computing systems and create topologies tailored to the needs
- Create and launch images on a cloud computing infrastructure
- Know, configure and use storage services in cloud computing infrastructures
- Understand and use application deployment patterns in cloud computing infrastructures
- Know and apply policies, technologies and controls to protect data, applications and infrastructure in the cloud.

## **DESCRIPTION OF CONTENTS**



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#### 1. Cloud computing infrastructures and applications

The essential properties of cloud computing infrastructures and the applications that run on these infrastructures will be reviewed.

Application load patterns will be analyzed.

The service models in the cloud will be described (laaS, PaaS, SaaS, etc)

Deployment architectures of cloud computing infrastructures will be displayed.

#### 2. Patterns for computation, storage and networking

#### 3. Cloud computing infrastructure analysis

The architecture and main components of a cloud computing infrastructure will be analyzed: networking, computing, authentication and authorization, creation and storage of images, templates, load balancers, etc.

The main storage types will be shown: blocks and objects.

#### 4. Containers and services

The containers will be analyzed, the provisioning of virtual machines for the execution of containers, the definition of services defined by different containers and the service orchestrators.

Microservices will be developed and encapsulated in containes.

Container deployments will be made in virtual machines in a cloud computing infrastructure.

## WORKLOAD

ACTIVITY	Hours	% To be attended
Theoretical and practical classes	40,00	100
Development of group work	6,00	0
Study and independent work	35,00	0
Preparation of practical classes and problem	16,00	0
Resolution of online questionnaires	3,00	0
TOTAL	100,00	

# **TEACHING METHODOLOGY**

- Theory class
- Problem resolution
- Project-oriented learning



### **VNIVERSITATÖDVALÈNCIA**

## **EVALUATION**

The assessment modalities used in this subject are:

The assesment	modalities used in this subject are:
SE1	Online assessment and/or degree of participation
SE2	Assessment of problems, works, reports and/or memories
SE6	Assessment of laboratory
SE4	Exam or face-to-face assessment

First call: In the first call the note will be obtained as follows:

SE1\*0.1+SE2\*0.3+SE6\*0.3+SE4\*0.3

SE6 is not recoverable for the second call.

Second call:

SE6\*0.3+SE4\*0.6

The grading system is specified at the following link:

http://www.uv.es/uvweb/universidad/es/estudios-postgrado/informacion-administrativapostgrado/permanencia-calificaciones/calificaciones-1285897761928.html

The applicable regulations can be found at the following link:

http://www.uv.es/uvweb/universidad/es/estudios-grado/informacion-academicaadministrativa/normativas/normativas-universidad-valencia-1285850677111.html

# REFERENCES



# Vniver§itatö́dValència

#### Basic

#### https://docs.openstack.org/

Cloud Computing Patterns: Fundamentals to Design, Build, and Manage Cloud Applications; Christoph Fehling, Frank Leymann, Ralph Retter, Walter Schupeck, Peter Arbitter, ISBN: 978-3-7091-1567-1 (Print) 978-3-7091-1568-8 (Online)
https://link.springer.com/book/10.1007%2E078-3-7091-1568-8

https://link.springer.com/book/10.1007%2F978-3-7091-1568-8

 OpenStack Cloud Computing Cookbook - Fourth Edition. By: Kevin Jackson; Cody Bunch; Egle Sigler; James Denton. Publisher: Packt Publishing Pub. Date: January 29, 2018. Print ISBN-13: 978-1-78839-876-3

http://proquest.safaribooksonline.com/9781788398763

# **ADDENDUM COVID-19**

This addendum will only be activated if the health situation requires so and with the prior agreement of the Governing Council

1. Contents

The contents of the subject will not be modified and will be taught in its entirety.

2. Volume of work and teaching schedule

Since the students can work autonomously and collaboratively through the tools provided, the dedication in hours by ECTS is not modified.

#### 3. Teaching methodology

The University of Valencia (UV) has made different tools available for teachers and students to hold videoconferences synchronously. In this subject the Teams tool has been chosen.

This tool allows the creation of channels in which it can be grouped in pairs. In this way, each couple has a private space that allows them to:

- Make video conferences without interfering with other couples
- Share documents
- Raise doubts

With this tool, the students can carry out the laboratory practices from their place of residence collaboratively with their practice partner using their resources (laptop and internet connection).

The UV has a virtual classroom (Aula Virtual) that is used by all the teachers of the master. On this platform is the class material (notes, laboratory statements, workshops, etc.) and it operates with absolute normality during the second semester. In addition, it offers a multimedia server where teachers can upload video recordings of the material they deem appropriate and can make it available to students.



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Taking advantage of the resources made available to us, the following actions have been carried out in this subject:

- videos have been recorded explaining the theory material,
- new questionnaires have been developed in the Aula Virtual to reinforce continuous evaluation,
- new presentations have been prepared to facilitate the explanation of the workshops,
- a virtual space has been created in Teams for the subject in which all the students have been included and channels have been created to facilitate remote work to carry out practices in pairs,
- students have been notified that in class hours they must connect to the team created for this subject.

During class hours the teacher will connect to the videoconferencing tool and may choose to:

- Solve doubts
- Instruct students to watch a video with the material that would be worked on in the corresponding face-to-face class.
- Hold a workshop synchronously
- Request to perform a questionnaire in Aula Virtual based on the material provided.
- Explain the practice to be developed and let the students work autonomously, solving any doubts that may arise in each of the channels created for each couple.

The objective is that in the hours of class of the subject almost the same tasks are carried out that would be carried out in the equivalent classroom.

In addition, the master has a cloud computing infrastructure that allows to carry out the practices remotely and will be operational throughout the second semester, therefore the learning results linked to the practices they do not undergo any modification.

The tutorials will be carried out by email and through the Teams tool that offers the possibility of using different types of chats: a chat for the subject to deal with general topics, chats in pairs to answer questions related to the practices and individual chats.

#### 4. Assessment

The activities and their weight in the evaluation are indicated below:

- Practices (memories, code evaluation, scripts delivered in Aula Virtual): 35%
- Continuous assessment questionnaires in Aula Virtual: 30%
- Final work (code, scripts, memory and individual presentation by videoconference): 35%

This criterion will be valid for both calls.

#### 5. Bibliography

The recommended bibliography is available online so it is not modified.