



Universitat de Lleida

DEGREE CURRICULUM  
**SYSTEMS ADMINISTRATION  
AND VIRTUALIZATION**

Coordination: MATEO FORNES, JORDI

Academic year 2022-23

## Subject's general information

<b>Subject name</b>	SYSTEMS ADMINISTRATION AND VIRTUALIZATION			
<b>Code</b>	102378			
<b>Semester</b>	1st Q(SEMESTER) CONTINUED EVALUATION			
<b>Typology</b>	<b>Degree</b>	<b>Course</b>	<b>Character</b>	<b>Modality</b>
	Bachelor's degree in Digital Interaction and Computing Techniques	3	COMPULSORY	Attendance-based
<b>Course number of credits (ECTS)</b>	6			
<b>Type of activity, credits, and groups</b>	<b>Activity type</b>	PRALAB		TEORIA
	<b>Number of credits</b>	3		3
	<b>Number of groups</b>	1		1
<b>Coordination</b>	MATEO FORNES, JORDI			
<b>Department</b>	COMPUTER SCIENCE AND INDUSTRIAL ENGINEERING			
<b>Teaching load distribution between lectures and independent student work</b>	<p>Globally, the subject has 150 hours of work spread over 60 hours and 90 hours of individual student work.</p> <p>6 ECTS = 25 * 6 = 150 hours of work</p> <p>40% -&gt; 40 face-to-face hours</p> <p>60% -&gt; 90 hours of autonomous student work</p>			
<b>Important information on data processing</b>	Consult <a href="#">this link</a> for more information.			
<b>Language</b>	Catalan (in Spanish if any student shows difficulties with Catalan). The material of the subject in English.			

Teaching staff	E-mail addresses	Credits taught by teacher	Office and hour of attention
MATEO FORNES, JORDI	jordi.mateo@udl.cat	6	

## Subject's extra information

To study this subject it is recommended to have some experience in **Linux or Unix** environments. It must have a basis for the main functions of the **Operating System** (*What is it? How does it work? How is it structured? ... How the Operating System looks and feels from the user's perspective*). Therefore, this course is a continuation of the **Operating Systems** course and it is recommended to have passed the subject, as well as to have the key concepts, as they are the starting point (base) for the **Systems Administration**. It is also recommended to have experience working in **text mode** and with **scripting** languages, without the need for GUI applications.

In this subject I will take the first steps in real cloud systems (**Amazon Web Services**).

## Learning objectives

- Gain a basic knowledge of Systems Administration.
  - Design systems according to user requirements.
  - Install
  - Configuration
  - Maintain
  - Protect systems and information
- Identify threats and plan strategies to prevent them and to build emergency and contingency plans.
- Gain a basic knowledge of resource virtualization and its relationship with Systems Administration.
- Know the basics of cloud systems.
- Be able to use and manage cloud platforms (AWS).
- Be able to do research on technologies and determine which technology is best suited to the needs of the user.

## Competences

### Basic:

- CB3: That students have the ability to gather and interpret relevant data (usually within their area of study) to make judgments that include a reflection on relevant social, scientific or ethical issues.

### Transversals:

- CT3: Acquire training in the use of new technologies and information and communication technologies.
- CT6: Apply the gender perspective to the tasks of the professional field.

### Generals:

- CG3: Capacity to use appropriate hardware and software platforms for the development and execution of interactive digital applications.

### Specific:

- CE3: Basic knowledge of the use and programming of computers, operating systems and databases, and their use in the development of interactive applications.

- **CE7:** Know, manage and maintain systems, services and interactive applications.
- **CE11:** Knowledge of the characteristics, functionalities and structure of operating systems and design and implement applications based on their services.

## Subject contents

### Topic 1: Introduction

- What is a Systems Administrator?
- Where to start
- Historical evolution
- Methodology
- Regulations and Policies
- TIPS and recommendations

### Topic 2: Basic Administration

- Root user
- AWK + SED
- Process control: The file system / proc
- Pathnames
- Organization and Hierarchy
- File Types and Attributes
- ACL
- Booting
- Service management
- Software management and installation
- User management

### Topic 3: Storage

- Discs
- Partitions
- Logical volumes
- Hierarchy
- RAIDS
- Backups

### Topic 4: Basic Security

- Access Control
- Basic cryptography
- SSH
- Firewalls
- Encryption with LUKS

### Topic 5: Basic Maintenance

- Periodic processes
- Logging
- Monitoring

### Topic 6: Virtualization

- Concepts and need
- Types of virtualization
- Hypervisors
- KVM
- Docker

## Cloud Computing - AWS:

- M1 - Introduction to Cloud Computing and AWS
- M2 - Economy in the cloud
- M3 - AWS infrastructure
- M4 - Cloud security
- M5 - Virtual networks
- M6 - Cloud computing
- M7 - Cloud storage
- M8 - Cloud databases
- M9 - Architecture in the cloud
- M10 - Automatic monitoring and scaling.

## Methodology

### Theory

- In these sessions, the theoretical contents of the subject will be explained, accompanied by illustrative examples.
- An active methodology is used where the student is the protagonist (**HandsOn**).
- The slides on the subject will be used as support material.

### Practices

- **Blended Learning.** An active and asynchronous methodology allows students to progress and learn at their own pace. Through **HandsOn** and **CodeLabs**, the teacher guides and accompanies students in solving activities. This content is self-sufficient; the teacher only encourages discussion and helps resolve doubts.
- These sessions take place on the AWS platform.

### Self-employment

- The **Flipped Classroom** methodology will be applied where the student must review resources before the sessions.
- Completion of complementary activities and problems.
- A scientific conference (**TIDIC-CLOUDOPS**) will be promoted where students in groups will have to work on a disruptive and very current technology related to *Cloud*, *SECDEVOPS*, or *Virtualization*. At the beginning of the course, the students will be given a list of topics to select. They must present some conference proceedings explaining the subject and complement them with a state-of-the-art revision. A comparison should also be made with the advantages and disadvantages of technology, and a real situation should be recommended in which it should be used. Afterwards, each group will make a public presentation on the topic, and a **HandsOn** demonstration of the technology will have to be prepared.

This course will enable students to take the official **AWS Cloud Practitioner** certification.

## Development plan

Week	Theory	Lab (Face-to-Face)	Homework
1	<b>Topic 1:</b> Presentation / Introduction	Cloud Computing - AWS (M1)	Activities HandsOn CloudOps
2	<b>Topic 2:</b> Basic Administration	Cloud Computing - AWS (M2)	
3	<b>Topic 2:</b> Basic Administration	Cloud Computing - AWS (M3)	
4	<b>Topic 3:</b> Storage	Cloud Computing - AWS (M4)	
5	<b>Topic 3:</b> Storage	Cloud Computing - AWS (M5)	
6	<b>Topic 4:</b> Basic security	Cloud Computing - AWS (M6)	
7	<b>Topic 4:</b> Basic security	Cloud Computing - AWS (M6)	
8	<b>Topic 5:</b> Basic Maintenance	Cloud Computing - AWS (M7)	
9	<b>1<sup>st</sup> Exam</b>		
10	<b>Topic 6:</b> Virtualization	Cloud Computing - AWS (M8)	
11	<b>Topic 6:</b> Virtualization	Cloud Computing - AWS (M9)	
12	<i>Project</i>	Cloud Computing - AWS (M10)	
13	<i>Project</i>	<b>HOLIDAYS</b>	
14	<b>CloudOps</b>	<b>CloudOps</b>	
15	<b>CloudOps</b>	<b>CloudOps</b>	
16	<b>2<sup>nd</sup> Exam</b>		
17	<b>2<sup>nd</sup> Exam</b>		
18			
19	<b>Recovery</b>		

## Evaluation

Evaluation Activities	Weight	Minimum Mark	Groups	Recoverable
Partials ( <b>E</b> )	20%	NO	NO	YES
<i>Project</i> ( <b>P</b> )	15%	NO	YES	NO

Evaluation Activities	Weight	Minimum Mark	Groups	Recoverable
Activities (A)	20%	NO	YES	NO
HandsOn (H)	30%	NO	YES	YES
TIDIC-CLOUDOPS (TCO)	15%	NO	YES	NO
<b>FINAL MARK: 20% E + 15% P + 20% A + 30% H + 15% TCO</b>				
<b>Considerations:</b>				
<ul style="list-style-type: none"> <li>• To pass the course, the <b>FINAL MARK</b> must be <i>greater than or equal to 5</i>.</li> <li>• Attendance at sessions, student participation in classroom discussions, <i>slack</i> channels, and keeping personal notes about their learning on <i>github</i> will earn up to <b>0.5 points</b> in their final grade.</li> <li>• In case of plagiarism, the mark of that activity (<b>E,P,A,H,TCO</b>) is <b>0</b>.</li> <li>• The presentation of activities with retard represents a weighting of 75% on the weighting of that activity, for example, if the activity has a weighting of 10% in the final grade, it will have a weighting of 7.5%. Therefore, these activities are not recoverable, since they can be delivered throughout the course but with a 25% penalty.</li> <li>• Partials (<b>E</b>) and HandsOn (<b>H</b>) are <b>retrievable</b> through a make-up exam.</li> <li>• The partial exams (E) and the recovery exam are carried out on a computer and the consultation of notes is allowed, both the practical and theoretical content of the subject are evaluated.</li> </ul>				

## Bibliography

- Gancarz, Mike . Linux and the Unix Philosophy. Boston: Digital Press, 2003.
- Nemeth, Evi,Snyder, Garth,Hein, Trent R.,Whaley, Ben,Mackin, Dan. UNIX and Linux System Administration Handbook. Pearson Education.
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- Turnbull, James. The Docker Book. [www.dockerbook.com](http://www.dockerbook.com).
- Wittig, Andreas, and Michael Wittig. Amazon Web Services In Action. Manning Publications, 2015.
- Amazon . [youtube.com/AmazonWebServices](https://youtube.com/AmazonWebServices) . Conference talks and other video content from AWS.
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