

**COURSE DATA****Data Subject**

<b>Code</b>	44832
<b>Name</b>	Relational and Non-Relational Data Persistence
<b>Cycle</b>	Master's degree
<b>ECTS Credits</b>	4.0
<b>Academic year</b>	2019 - 2020

**Study (s)**

<b>Degree</b>	<b>Center</b>	<b>Acad. year</b>	<b>Period</b>
2234 - Master's Degree in Web Technology, Cloud Computing and Mobile Applications	School of Engineering	1	Second term

**Subject-matter**

<b>Degree</b>	<b>Subject-matter</b>	<b>Character</b>
2234 - Master's Degree in Web Technology, Cloud Computing and Mobile Applications	4 - Information and Content Management and Processing	Obligatory

**Coordination**

<b>Name</b>	<b>Department</b>
CERVERON LLEO, VICENTE	240 - Computer Science
VALVERDE GIROME, FRANCISCO	240 - Computer Science

**SUMMARY**

In the context of enterprise application development, the persistence layer is the fundamental component to guarantee the integrity of the information. The objective of this course is to present the methodologies, good practices and patterns that have been defined in the industrial context in order to build a quality persistence layer. When defining persistence, relational databases are still the most used option because they are widely tested and adapted to a wide variety of use cases. Nonetheless, non-relational solutions, also called non-SQL, are gaining acceptance in these environments, especially for dealing with large volumes of data or semi-structured or non-structured information. Therefore, different non-relational alternatives will also be introduced to provide an overview of the options available to build a persistence layer.



## PREVIOUS KNOWLEDGE

### Relationship to other subjects of the same degree

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

### Other requirements

Basic knowledge on relational databases and Java development 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.
- Ability to design and evaluate servers, applications and systems based on distributed computing.

## **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
- Apply a methodological vision to build a layer of persistence based on relational technologies
- Configuring and Using Business Relational Data Persistence Frameworks (ORM, JPA)
- Configure and use non-relational databases
- Configure and use distributed memory storage

## **DESCRIPTION OF CONTENTS**

### **1. Análisis, diseño e implementación de bases de datos relacionales**

### **2. Implementation of the persistence layer in enterprise environments: The JPA standard**

### **3. Persistence Layer Design Patterns**

**4. Building an API for the persistence layer****5. Concepts and types of NoSQL databases: document, column and graph oriented****6. Databases distributed in memory (Redis)****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
<b>TOTAL</b>	<b>100,00</b>	

**TEACHING METHODOLOGY**

- Theory class: Development of the concepts of the subject by encouraging the participation of students in the resolution of specific issues
- Resolution of practical exercises in team: Development of exercises oriented to put into practice the concepts of theoretical activities and encourage teamwork
- Project-oriented learning: Presentation of a case study drawn from a real context for the elaboration of a project based on the contents of the subject.

**EVALUATION**

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  
SE4: Exam or face-to-face assessment  
SE6: Assessment of laboratory



There will be a practical bulletin for each subject of the subject that will be evaluated individually and orally in the class itself, although they can be done in pairs.

The final project will be evaluated at the end of the course comprising a memory, software developed and an oral defense before the teacher.

The final grade will be obtained by weighting the different assessment systems listed in the table

Final note:  $SE1 * 0.1 + SE2 * 0.3 + SE4 * 0.3 + SE6 * 0.3$

For the second call, the component SE1 is considered non-recoverable because it can only be evaluated during the school year.

SE2 and SE6 components are maintained in the case for the second call, and improvements to the tasks made during the school year can be presented for the second call.

The final project may be submitted and evaluated through the SE2 and SE4 systems in the two calls, although a point minus the delivery will be penalized in the second call.

The grading system is specified at the following link:

<http://www.uv.es/uvweb/universidad/es/estudios-postgrado/informacion-administrativa-postgrado/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-academica-administrativa/normativas/normativas-universidad-valencia-1285850677111.html>

## REFERENCES

### Basic

- Harrington, Jan L. 2016. Relational Database Design and Implementation, 4th Edition. 4th ed. Morgan Kaufmann. <http://proquest.safaribooksonline.com/book/databases/9780128499023>.
- Keith, Mike, and Merrick Schincariol. 2013. Pro JPA 2, Second Edition. 2nd ed. Apress. <http://proquest.safaribooksonline.com/book/programming/java/9781430249269>.
- Das, Vinoo. 2015. Learning Redis. Packt Publishing. <http://proquest.safaribooksonline.com/book/databases/9781783980123>.
- Strauch, Christof, Ultra-Large Scale Sites, and Walter Kriha. "NoSQL databases." Lecture Notes, Stuttgart Media University 20 (2011).
- Carpenter, Jeff, and Eben Hewitt. 2016. Cassandra: The Definitive Guide, 2nd Edition. 2nd ed. O'Reilly Media, Inc. <http://proquest.safaribooksonline.com/book/databases/9781491933657>.





- Robinson, Ian, Jim Webber, and Emil Eifrem. 2015. Graph Databases, 2nd Edition. 2nd ed. O'Reilly Media, Inc. <http://proquest.safaribooksonline.com/book/databases/9781491930885>.

Agus Kurniawan. 2014. MongoDB Succinctly. <https://www.syncfusion.com/resources/techportal/details/ebooks/mongodb>.

## 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 scheduling

Since most of the work was already done independently or in pairs through the tools provided, the dedication in hours by ECTS is not modified.

The face-to-face sessions from the interruption of the same have been replaced by sessions by videoconference scheduled on the same dates and times with a shorter duration, given that some time has been previously spent (the difference between the duration initially scheduled and the one finally carried out) to the display of explanatory videos prepared by the teachers.

### 3. Teaching methodology

The UV has a Virtual Classroom that is used by all the teachers of the master. On this platform is the class material (notes, laboratory statements, workshops, etc.) and 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. Specifically, the theoretical contents that had not been taught, have been made available to the students as explanatory videos on the dates when the class was scheduled.

During class hours, the teacher will connect by videoconference, with Teams or Webex being the chosen systems, and they will be able to choose:

- Solve doubts
- Instruct the students to view a video with the material that would be worked on in the corresponding classroom.
- Hold a workshop synchronously
- Make the explanation of the practice to be developed and let the students work autonomously solving the 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 face-to-face class.



The tutorials will be carried out by email or through the videoconference tools mentioned above, which offers the possibility of using different types of chats: a chat for the subject to discuss general topics, chats in pairs to answer questions related to practices and chats individual.

#### 4. Assessment

The activities and weight in the evaluation will be the following:

- Practical Assessment (LAB) 30% Through the delivered code and documentation that must be uploaded to the virtual classroom. In the sessions that have already been orally evaluated, the grade is maintained
- Final Project (PRO): 30% Documentation and delivered code of the final project. Development in pairs or individually - 30%
- Oral Defense (DEF): 40% Oral and individual defense of the project by videoconference. Questions about the development made.

#### 5. Bibliography

The recommended bibliography is available online in the UV digital repositories, so it is not modified.