



Universitat de Lleida

DEGREE CURRICULUM  
**DATABASES AND SOFTWARE  
ENGINEERING II**

Coordination: GIMENO ILLA, JUAN MANUEL

Academic year 2017-18

Subject's general information

<b>Subject name</b>	DATABASES AND SOFTWARE ENGINEERING II			
<b>Code</b>	102019			
<b>Semester</b>	2nd Q(SEMESTER) CONTINUED EVALUATION			
<b>Typology</b>	<b>Degree</b>	<b>Course</b>	<b>Typology</b>	<b>Modality</b>
	Double bachelor's degree: Degree in Computer Engineering and Degree in Business Administration and Management	3	COMPULSORY	Attendance-based
	Bachelor's Degree in Computer Engineering	3	COMPULSORY	Attendance-based
	Master's Degree in Informatics Engineering		COMPLEMENTARY TRAINING	Attendance-based
<b>ECTS credits</b>	6			
<b>Groups</b>	1GG,2GM			
<b>Theoretical credits</b>	3			
<b>Practical credits</b>	3			
<b>Coordination</b>	GIMENO ILLA, JUAN MANUEL			
<b>Department</b>	INFORMATICA I ENGINYERIA INDUSTRIAL			
<b>Teaching load distribution between lectures and independent student work</b>	6 ECTS = 25x6 = 150 work hours 40% -> 60 presential hours 60% -> 90 hours of autonomous work			
<b>Important information on data processing</b>	Consult <a href="#">this link</a> for more information.			
<b>Language</b>	Preferably catalan.			
<b>Office and hour of attention</b>	send e-mail to get an appointment.			

Teaching staff	E-mail addresses	Credits taught by teacher	Office and hour of attention
GIMENO ILLA, JUAN MANUEL	jmgimeno@diei.udl.cat	6	arranged by e-mail Office 3.20 of the EPS
OLIVA SOLE, MARTA	oliva@diei.udl.cat	3	arranged by e-mail Office 3.11 of the EPS

## Subject's extra information

To follow this subject properly the previous knowledge acquired in the subjects Data Bases and Software Engineering is assumed.

## Learning objectives

- Understand the data storage needs of the users
- Understand the different technologies which facilitate distributed data management
- Understand the different technologies to integrate existing data sources
- Understand the different NoSQL technologies which facilitate the storage og bid volumes of data.
- Define designs which are robust to changes
- Apply basic object oriented design patterns to problems of limited size.

## Competences

### Cross-disciplinary competences

- **EPS11:** Capacity to understand the needs of the user expressed in a no technical language.

### Specific competences

- **GII-CRI2:** Capacity to plan, conceive, deploy and direct projects, services and computer systems in all the fields, leading his set up and his continuous improvement and evaluation his economic and social impact.
- **GII-CRI12:** Knowledge and application of the characteristics, functionalities and structure of the databases, that allow their suitable use, and the design and the analysis and implementation of applications based in them.
- **GII-CRI13:** Knowledge and application of the necessary tools for the storage, processing and access to the Systems of information, including those based in web.
- **GII-CRI16:** Knowledge and application of the principles, methodologies and life cycle of the software engineering.
- **GII-CRI17:** Capacity to design and evaluate person-computer interfaces that guarantee the accessibility and usability of systems, services and computer applications.

## Subject contents

1. Database optimization

## 2. Distributed Databases

### 2.1 Data distribution

### 2.2 Managements aspects of a distributed system

## 3. Database Integration

### 3.1 Types of integrated systems

### 3.2 Systems with wrappers and mediators

### 3.3 Peer-to-peer systems

## 4. NoSQL Databases

### 4.1 Key-Value Databases

### 4.2 Document Databases

### 4.3 Column-Family Stores

### 4.4 Graph Databases

## 5. Object-Oriented Design Patters

### 5.1 Classifications by purpose and scope

### 5.2 Some classic patterns

## 6. Persistence organization

### 6.1 JDBC

### 6.2 JPA

## 7. Introduction to Java 8

### 7.1 Lambda Expressions

### 7.2 Streams

## Methodology

### **Big-size Group: Theory Sessions (3 credits)**

- The theory conten is presented helped by the materials prepared by the teaching staff
- It also has an applied component because, when possible, we work on concrete examples

### **Mid-size Group: Problems / Laboratory Sessions (3 credits)**

- The previously proposed exercises, which should have been prepared by the students, are solved
- Pros and cons of the proposed solutions are commented
- There will be two laboratory sessions to show the query language of the NoSQL MongoDB Database

### **Autonomous work**

- Study of the given materials and solving thr proposed exercises
- Homework/exercises and/or programming projects

Development plan

Setmana	Presencial GG	Presencial GM	No Presencial
1	Presentation. Optimization	Optimization Exercises	Study and problem solving
2	Distributed DB	Distributed DB Exercises	Study and problem solving
3	Distributed DB	Distributed DB Exercises	Study and problem solving Optimization Exercise (Evaluable Activity)
4	Distributed DB DB Integration	Exercises on Distributed DB and Integration	Study and problem solving Distributed DB Exercise (Evaluable Activity)
5	DB Integration NoSQL	DB Integration Exercises	Study and problem solving DB Integration (Evaluable Activity)
6	NoSQL		Study MongoDB Reference Reading
7	NoSQL	MongoDB Laboratory	Study MongoDB Reference Reading
8	Design Patterns	MongoDB Laboratory	Study
9	Evaluation		
10	Design Patterns	Design Patterns Exercises	Study and problem solving
11	Patrons de disseny	Design Patterns Exercises	Study and problem solving Patterns Homework (Evaluable Activity)
12	Patrons de disseny	Design Patterns Exercises	Study and problem solving Patterns Homework (Evaluable Activity)
13	Persistence	Design Patterns Exercises	Study and problem solving Patterns Homework (Evaluable Activity)
14	Persistence Java 8	Exam Preparation	Study and problem solving Programming Project (Evaluable Activity)
15	Java 8	Exam Preparation	Study and problem solving Programming Project (Evaluable Activity)
16	Evaluation		Study and problem solving
17	Evaluation		Study and problem solving
18	Tutories		Programming Project (Evaluable Activity)
19	Recovery		Study and problem solving

## Evaluation

Acr	Type	Denomination	Weight	Minimum grade	Weeks	Ind/Group	Mandatory
Ex	Exercises	Optimization, DDB	10%	No	3 to 6	3 people.	No
Par1	Written exam	First midterm	40%	4,0	9	Ind	Yes
Pro1	Project	First Activity on Design Patterns	10%	No	10 to 12	3 people	No
Pro2	Project	Second Activity on Design Patterns	10%	No	13 to 17	3 people.	No
Par2	Written exam	Second midterm	30%	4,0	16 to 17	Ind.	Yes

$$\text{Final grade} = 0,10 * \text{Ex} + 0,40 * \text{Par1} + 0,10 * \text{Pro1} + 0,10 * \text{Pro2} + 0,30 * \text{Par2}$$

- The subject cannot be passed with any midterm with a grade less than 4,0 (Max grade: 4,5)

## Bibliography

### Basic bibliography

- H. Garcia Molina, J.D. Ullman, J. Widom. Database Systems. The Complete Book (2nd edition). Pearson Prentice Hall (2009)
- S.J.Metsker i W.C.Wake: Design Patterns in Java, Addison-Wesley (2006)
- P.J. Sadalage & M. Fowler. No SQL Distilled. A Brief Guide to the Emerging World of Polyglot Persistence. AddisonWesleyProfessional (2012)

### Complementary bibliography

- M. Tamer Özsu; Patrick Valduriez. Principles of Distributed Database Systems (3rd edition). Springer (2011)
- R. Elmasri & S. B. Navathe. Fundamentals of Database Systems (7th edition). Pearson. (2015)
- E.Gamma, R.Helm, R.Johnson i J.Vlissides: Patrones de Diseño, Addison-Wesley (1995)
- D.Sullivan: NoSQL for Mere Mortals, Addison-Wesley (2015)