DEGREE CURRICULUM

DATABASES AND SOFTWARE ENGINEERING II

Coordination: GIMENO ILLA, JUAN MANUEL

Academic year 2020-21

Subject's general information

Subject name	DATABASES AND SOFTWARE ENGINEERING II
Code	102019
Semester	2nd Q(SEMESTER) CONTINUED EVALUATION

Typology	Degree	Course	Character	Modality
	Master's Degree in Informatics Engineering		COMPLEMENTARY TRAINING	Attendance-based
	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

Course number of credits (ECTS)	6

Type of activity, credits, and groups	Activity type	PRAULA	TEORIA
	Number of credits	3	3
	Number of groups	3	1

Coordination	GIMENO ILLA, JUAN MANUEL
Department	COMPUTER SCIENCE AND INDUSTRIAL ENGINEERING
Teaching load distribution between lectures and independent student work	20% on-site 20% virtual 60% autonomous work
Important information on data processing	Consult this link for more information.
Language	Preferably Catalan (Spanish if any student shows dificulties with Catalan).

Teaching staff	E-mail addresses	Credits taught by teacher	Office and hour of attention
GIMENO ILLA, JUAN MANUEL	juanmanuel.gimeno@udl.cat	12	By appointment

Subject's extra information

To follow this subject properly the provious knowledge adquired in the subjects Data Bases and Software Engineering is assumed and the elements of the Java programming Language presented in Programming 2 and Data Structures.

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

    1.1 File organization

    1.2 Query processing

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

4. NoSQL Databases

    4.1 Key-Value Databases

    4.2 Document Databases

    4.3 Column-Family Stores

    4.4 Graph Databases

5. Introduction to Java 8

    5.1 Lambda Expressions

    5.2 Streams

6. Object-Oriented Design Patters

    6.1 Classifications by purpose and scope

    6.2 Some classic patterns

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

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Setmana	Presencial GG	Presencial GM	No Presencial
1	Presentation. Optimization	Optimization	Study and problem solving
2	Optimization	Optimization	Study and problem solving
3	Distributed DB	Optimization Exercises	Study and problem solving Optimization Exercise (Evaluable Activity)
4	Distributed DB DB Integration	Distributed DB Exercises	Study and problem solving Distributed DB Exercise (Evaluable Activity)
5	DB Integration	Distributed DB Exercises	Study and problem solving
6	DB Integration NoSQL	Integration Exercises	Study MongoDB Reference Reading
7	NoSQL	Integration Exercises	Study MongoDB Reference Reading
8	NoSQL	MongoDB Laboratory	Study
9	Evaluation		
10	Java 8	Java 8	Study and problem solving
11	Design patterns	Design Patterns	Study and problem solving Patterns Homework (Evaluable Activity)
12	Design patterns	Design Patterns Exercises	Study and problem solving Patterns Homework (Evaluable Activity)
13	Design patterns	Design Patterns Exercises	Study and problem solving Patterns Homework (Evaluable Activity)
14	Design patterns	Design Patterns Exercises	Study and problem solving Programming Project (Evaluable Activity)
15	Design patterns	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
Ex1	Exercises	Optimization	10%	No	3	group	No
Ex2	Exercises	DDB	10%	No	6	group	No
Par1	Written exam	First midterm	30%	4,0	9	Ind	Yes
Pro1	Project	First Activity on Design Patterns	10%	No	10 to 12	group	No
Pro2	Project	Second Activity on Design Patterns	10%	No	13 to 17	group	No
Par2	Written exam	Second midterm	30%	4,0	16 to 17	Ind.	Yes

Final grade = 0,10 * Ex1 + 0,10 * Ex2 + 0,30 * Par1 + 0,10 * Pro1 + 0,10 * Pro2 + 0,30 * Par2

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

Bibliography

Basic bibliography

- Héctor Garcia Molina, Jeffrey D. Ullman, Jennifer Widom. Database Systems. The Complete Book (2nd edition). Pearson Prentice Hall (2009)
- Stephen J.Metsker, William C.Wake: Design Patterns in Java, Addison-Wesley (2006)
- Pramod J. Sadalage, Martin 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 (4th edition). Springer (2019)
- Ramez Elmasri, Shamkant B. Navathe. Fundamentals of Database Systems (7th edition). Pearson. (2015)
- Eric Gamma, Richard Helm, Ralph Johnson, John Vlissides: Patrones de Diseño, Addison-Wesley (1995)
- Dan Sullivan: NoSQL for Mere Mortals, Addison-Wesley (2015)