



Universitat de Lleida

DEGREE CURRICULUM **DATABASES**

Coordination: SAYAGO BARRANTES, SERGIO

Academic year 2020-21

Subject's general information

Subject name	DATABASES			
Code	102381			
Semester	1st Q(SEMESTER) CONTINUED EVALUATION			
Typology	Degree	Course	Character	Modality
	Bachelor's degree in Digital Interaction and Computing Techniques	2	COMPULSORY	Attendance-based
Course number of credits (ECTS)	6			
Type of activity, credits, and groups	Activity type	PRALAB	TEORIA	
	Number of credits	3	3	
	Number of groups	1	1	
Coordination	SAYAGO BARRANTES, SERGIO			
Department	COMPUTER SCIENCE AND INDUSTRIAL ENGINEERING			
Teaching load distribution between lectures and independent student work	<p>According to the academic framework of bachelor's degrees of the EPS:</p> <ul style="list-style-type: none"> - 1 ECTS = 25 hours; 6 ECTS = 150 hours - 40% (60h) of in-class work and 60% (90h) of independent student work <p>This distribution in this course is as follows:</p> <ul style="list-style-type: none"> - In-class work: theory (28h) + laboratories (28h), + 4 hours of exams = 60 hours - Independent student work: SQL labs (20h) + SQL project (40h) + preparation for exams (30h) = 90 hours 			
Important information on data processing	Consult this link for more information.			
Language	English, Spanish and Catalan			
Distribution of credits	See type of activity, credits and groups			

Teaching staff	E-mail addresses	Credits taught by teacher	Office and hour of attention
SAYAGO BARRANTES, SERGIO	sergio.sayago@udl.cat	6	

Subject's extra information

Databases play a key role in the everyday lives of most of us. Databases are a key element in online social networks, cloud-based systems, etc. Databases is a mandatory course of 6 ECTS. Databases is held during the first semester of the second year of the bachelor's degree in Digital Interaction and Computing Techniques (GTIDIC). GTIDIC aims to train qualified professionals in the computing field with a very practical side, giving special emphasis to the design and implementation of interactive applications. The graduates will acquire solid programming knowledge, focusing on mobile and web applications, Internet technologies, administration tools and security systems, and interface design and development.

Databases is devoted to relational databases, which are pervasive. This main aim of this course is to provide students with a hands-on introduction to relational databases. This introduction should enable them to design high-quality relational databases, and to retrieve and store data in relational databases, in a rapid manner. Achieving this objective rests upon being conversant with DMBS, the relational model, mostly Entity-Relationship and Relational Algebra, Normalization, Transactions and Concurrency, Data Structures and connectivity with applications. Within the context of the GTIDIC, it is important to be able to apply all these aspects in a practical case study. Databases deepens and widens other courses the degree, namely Object Oriented Programming, Data Structures, Interaction and Usability, and Mathematics for Computing. Database also provides students with an introduction to other types of databases (e.g. NoSQL) that will be developed further in Interactive Applications Design.

Learning objectives

1. To learn to use a DMBS
2. To understand databases as a technology to store, manipulate and retrieve data
3. To administrate a database using a DMBS
4. To understand how a DMBS is structured
5. To design a database that meets the users' needs
6. To write SQL sentences to define and manipulate data
7. To write SQL sentences to create databases
8. To understand the storing needs of end-users

Competences

According to the table of competences of the GTIDIC (<https://ja.cat/zvyK4>):

Basic competences

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.

Transversal competences

CT3. Acquire training in the use of new technologies and information and communication technologies

General competences

CG1. Conceive, plan and develop projects in the field of ICT

CG2. Design, develop, evaluate and guarantee the accessibility, ergonomics, usability and security of computer systems

CG4. Use software engineering methods to develop interactive ICT applications.

CG9. Capacity for being analytic and synthetic

Specific competences

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

CE6. Capacity to design, develop, select and evaluate applications and computer systems, ensuring its reliability, security and quality.

CE10. Capacity to analyse, design, build and maintain safe and efficient applications, choosing the most suitable paradigm and programming languages.

CE13. 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 interactive applications based on them.

CE16. Capacity to design and evaluate person-computer interfaces that guarantee the usability of systems, services and computer applications

CE17. Capacity to apply knowledge on design to propose and defend a design concept for an interactive system and use proper creative technologies to develop each project

CE25. Capacity to analyse, organize, label and visualize the structure that defines the interaction with digital contents, by applying information architecture methods, techniques and tools that facilitate accessibility

CE26. Capacity to apply universal design and accessibility principles and standards to design experiences that guarantee equal opportunity for users.

Subject contents

- Basic concepts
- Relational model
- SQL
- Normalization
- Conceptual and logic design
- Components of DMBS
- Physical design

Methodology

Methodology	Theory	Laboratories	Indepedent student's work
Plenary sessions	X		
Plenary sessions (teacher for one day)	X	X	
Exercises in laboratories		X	
Exercises at home			X
Laboratories at home			X
Study			X

Course 20/21, theory is virtual and laboratories are face-to-face. Theory sessions will be conducted via the

videoconference system of the virtual campus.

Teacher for one day will be conducted in pairs. Students will select any topic of the theory part of the course, and any laboratory (except the project), and give the lecture. The teacher will clarify issues and helps the students. The assessment of this activity is: 40% students, by means of a rubric, and 60%, the lecturer.

Development plan

Week	Plenary sessions (virtual)	Laboratories (in-class)
1	T1. Introduction Basic concepts + introduction to DMBS T2. Relational Model	P1 – Introduction to SQL, PostgreSQL; Data Definition Language
2	T2 (cont.)	NO CLASS
3	P3. Simple SQL queries T3. Relational Algebra	P3 – Views, nested queries
4	T3 (cont.)	NO CLASS
5	T3 (cont.)	P4. Joins
6	T4. Entity-Relationship	P5 – Stored procedures
7	T4 (cont.)	P6 - Introduction to JDBC
8	T4 (cont.)	P7 - Project (SQL, Java Swing, JDBC)
9	Exams	
10	T5. Normalization	P7 (cont.)
11	T6. Transactions and concurrency	P7 (cont.)
12	T6 (cont.)	NO CLASS
13	T7. B+ trees	P7 (cont.)
14	T8. Introduction to query process	P7 (cont.)
15	T9. Introduction to NoSQL	P7 (presentation) and submission
16	Exams	
17	Exams	
18	Revisions	
19	Retakes	

Evaluation

The assessment instruments and their relationship with the learning objectives and specific competences are shown below:

Instrument	Objectives	Specific competences
SQL test	1-6-7	3-13
SQL project	All	All

Exams	2-4-5-6-7	3-13
Teacher for a day	It depends on the topic	3-13

The overall evaluation framework is defined by the degree plan of the GTIDIC, the academic framework of the EPS (<https://ja.cat/leppB>), and the regulation for assessing in degrees at UdL (<https://ja.cat/ZWcLF>). According to this framework, the evaluation of this course is as follows:

<p>Continuous evaluation - all activities are mandatory</p> <p>Final Grade (FG) = $Labs * 0.3 + Teacher_Day * 0.2 + Theory * 0.5$, FG ≥ 5</p> <ul style="list-style-type: none"> • <i>Labs</i> (30% of the FG) ≥ 5 <ul style="list-style-type: none"> ◦ <u>SQL test</u> (10%). 1 hour, with computer and Internet. Students must not submit their labs (P1-P6). Feedback will be provided at the end of the sessions. ◦ <u>SQL project</u> (20%). The project is conducted in pairs. It consists of designing and developing a desktop-based application in Java connected with a database through JDBC that meets the storing needs of its users. A final presentation (1h) should be made. • <i>Teacher_Day</i> (20% of the FG) ≥ 5. See methodology. • <i>Theory</i> (50% of the FG) ≥ 5 <ul style="list-style-type: none"> ◦ <u>First exam</u> (25%). 1 hour. Without notes. ◦ <u>Second exam</u> (25%). 1 hour. Without notes.
<p>Retakes - Minimum grade, 5. Maximum grade = 7.5</p> <ul style="list-style-type: none"> • Retakes are NOT for getting a higher grade • If <i>Theory</i> < 5 : <u>Final exam</u>. 2 hours. • If <i>Labs</i> < 5: <u>Final SQL exam</u>. With computer and Internet. 2 hours. • If <i>Teacher_Day</i> < 5: <u>Presentation</u> of the same topic as that selected during the continuous assessment

Pandemy COVID-19

If during the academic course 20/21 arises an emergency due to COVID-19 that limits in-class teaching, the assessment activities will go virtual. The weight of the assessment activities will not change.

We must keep the interpersonal distance of 1.5 metres and use masks during in-person activities.

Bibliography

[Database management systems / Raghu Ramakrishnan, Johannes Gehrke](#)

[Fundamentos de bases de datos / Abraham Silberschatz, Henry F. Korth, S. Sudashan ; revisión técnica: Jesús Sánchez Allende](#)

[Head first SQL / Lynn Beighley](#)

[Next generation databases : NoSQL, NewSQL, and Big Data / Guy Harrison](#)

[NoSQL for mere mortals / Dan Sullivan](#)

[Sistemas de bases de datos : un enfoque práctico para diseño, implementación y gestión / Thomas M. Connolly, Carolyn E. Begg](#)

[SQL queries for mere mortals / John L. Viescas](#)

[Relational database design and implementation / Jan L. Harrington](#)

Altres fonts d'informació interessants són:

<http://www.postgresqltutorial.com/>

<https://pgexercises.com/>