DEGREE CURRICULUM

DATABASES

Coordination: SAYAGO BARRANTES, SERGIO

Academic year 2022-23

DATABASES 2022-23

Subject's general information

<table>
<tr><td>Subject name</td><td>DATABASES</td></tr>
<tr><td>Code</td><td>102381</td></tr>
<tr><td>Semester</td><td>1st Q(SEMESTER) CONTINUED EVALUATION</td></tr>
<tr><td>Typology</td><td>
<table>
<tr><th>Degree</th><th>Course</th><th>Character</th><th>Modality</th></tr>
<tr><td>Bachelor's degree in Digital Interaction and Computing Techniques</td><td>2</td><td>COMPULSORY</td><td>Attendance-based</td></tr>
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<tr><td>Course number of credits (ECTS)</td><td>6</td></tr>
<tr><td>Type of activity, credits, and groups</td><td>
<table>
<tr><th>Activity type</th><td>PRALAB</td><td>TEORIA</td></tr>
<tr><th>Number of credits</th><td>3</td><td>3</td></tr>
<tr><th>Number of groups</th><td>1</td><td>1</td></tr>
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<tr><td>Coordination</td><td>SAYAGO BARRANTES, SERGIO</td></tr>
<tr><td>Department</td><td>COMPUTER SCIENCE AND INDUSTRIAL ENGINEERING</td></tr>
<tr><td>Teaching load distribution between lectures and independent student work</td><td>According to the academic framework of bachelor’s degrees of the EPS:
- 1 ECTS = 25 hours; 6 ECTS = 150 hours
- 40% (60h) of in-class work and 60% (90h) of independent student work

This distribution in this course is as follows:
- 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</td></tr>
<tr><td>Important information on data processing</td><td>Consult this link for more information.</td></tr>
<tr><td>Language</td><td>Catalan (materials). Catalan & Spanish (in class)</td></tr>
<tr><td>Distribution of credits</td><td>See type of activity, credits and groups</td></tr>
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DATABASES 2022-23

Teaching staff	E-mail addresses	Credits taught by teacher	Office and hour of attention
SAYAGO BARRANTES, SERGIO	sergio.sayago@udl.cat	6	Make an appointment via e-mail Office 12 Campus Igualada (Pla de la Massa) / Online via videoconference

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.

Free online software will be used in the course; PostgreSQL - or similar - as Database Management System (DBMS), and Apache Netbeans, for Java Swing and JDBC application programming.

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 makejudgments 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. Capacity to conceive, plan and develop projects in the field of ICT

CG2. Capacity to design, develop, evaluate and ensure the accessibility, ergonomics, usability and security of computer systems

CG4. Capacity to use software engineering methods in the development of interactive computer applications.

CG9. Capacity to analyze and synthesize

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 suitableparadigm 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.

CE15. Knowledge and application of the principles, methodologies and life cycles of software engineering

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

CE25. Being able to analyze, organize, label and visualize the structure that defines the interaction with digital content, through the application of information architecture methods, techniques and tools that facilitate accessibility

CE26. Knowing how to apply the principles and standards of accessibility and universal design of the main digital products and services to design experiences that guarantee equal opportunities among their 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) - optional	X	X	
Exercises in laboratories		X	
Exercises at home			X
Laboratories at home			X

Study			X

The activity "teacher of the day" is detailed in the contents of the module.

Development plan

Week	Dates	TEORIA	PRALAB	Comments
1	12 Sept - 16 Sept	Presentation + T1 T2	Presentation + P1 P1 (cont.)	
2	19 Sept - 22 Sept	T2 (cont.) T3 - part A	P2	ProfessorXDia (opcional P2)
3	26 Sept - 30 Sept	T3 - part B	HOLIDAYS	
4	3 Oct - 7 Oct	T3 - part B (cont)	P3	ProfessorXDia (opcional P3)
5	10 Oct - 14 Oct	HOLIDAYS	P4	ProfessorXDia (opcional P4)
6	17 Oct - 21 Oct	T4 - part A	P5	ProfessorXDia (opcional a T4. part A)
7	24 Oct - 28 Oct	T4 (cont- Part B)	Mockup_SQL	ProfessorXDia (opcional a T4. part B)
8	31 Oct - 04 Nov	Simulacre examen_1	P6	
9	07 Nov - 11 Nov	Exams		Theory (T1-T4) Labs (SQL)
10	14 Nov - 18 Nov	T5	P6 (cont.)	P6 - Scenario definition + ER ProfessorXDia (opcional T5)
11	21 Nov - 25 Nov	T6	P6 (cont.)	P6 - ER + tables ProfessorXDia (opcional a T6)
12	28 Nov - 02 Dec	T7	P6 (cont.)	P6 - programming
13	05 Dec - 09 Dec	HOLIDAYS	P6 (cont.)	P6 - programming (treball a casa)
14	12 Dec - 16 Dec	T7 (cont.) T8	P6 (cont.)	P6 - programming ProfessorXDia (opcional T7)
15	19 Dec - 23 Dec	Mockup_2	P6 (cont.)	P6 - Submission and presentations
16	09 Jan - 13 Jan	Exams		Theory (T5-T8)
17	16 Jan - 20 Jan	Examss		
18	23 Jan - 27 Jan	Setmana de tutories		
19	30 Jan - 3 Feb	Re-takes		

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://www.eps.udl.cat/ca/informacio-academica/normatives/marc-academic-eps/), and the regulation for assessing degrees at UdL (http://www.udl.cat/ca/udl/norma/). According to this framework, the evaluation of this course is as follows:

Continuous evaluation

Final Grade (FG) = **Labs * 0.5 + Theory * 0.5**, **FG >= 5**

- **Labs** (50% of the FG) **> = 5**
  - (25% of the FG) SQL test. 2h, with computer and Internet. Students must not submit their labs (P1-P5). Feedback will be provided at the end of the sessions.
    - The Final mark of the SQL test will be the MAX (mock-up_SQL_exam, SQL_exam)
  - (25% of the FG) SQL project. 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.
  - *If TeacherXDay is carried out:*
    - (20% of the FG) SQL test . 2h, with computer and Internet. Students must not submit their labs (P1-P5). Feedback will be provided at the end of the sessions.
      - The Final mark of the SQL test will be the MAX (mock-up_SQL_exam, SQL_exam)
    - (20% of the FG) SQL project. 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.
    - (10% of the FG) Teacher X Day
- **Theory** (50% of the FG) **>= 5**
  - (25% of the FG) First exam. 2h. Without notes. In paper
    - The final mark of the First Exam will be the MAX (mock-up exam_1, first exam)
  - (25% of the FG) Second exam. 2h. Without notes. In paper.
    - The final mark of the Second exam will be the MAX (mock-up exam_2, second exam)
  - *If Teacher X Day is carried out:*
    - (20% of the FG) First exam. 2h. Without notes. In paper
      - The final mark of the First Exam will be the MAX (mock-up exam_1, first exam)
    - (20% of the FG) Second exam. 2h. Without notes. In paper.
      - The final mark of the Second exam will be the MAX (mock-up exam_2, second exam)
    - (10% of the FG) Teacher X Day

Retakes - Minimum grade = 5. Maximum grade = 7.5

- Retakes are NOT for getting a higher grade
- If **Theory < 5** : Final exam. 2 hours. In paper
- If **Labs < 5:** Final SQL exam. With computer and Internet. 2 hours.

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

DATABASES 2022-23

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/