

**1. General information****Course:** DATABASES**Type:** CORE COURSE**Degree:** 406 - UNDERGRADUATE DEGREE IN COMPUTER SCIENCE AND ENGINEERING (AB)**Center:** 604 - SCHOOL OF COMPUTER SCIENCE AND ENGINEERING (AB)**Year:** 2**Main language:** Spanish**Use of additional languages:** English in Group I (Bilingual Group)**Web site:****Code:** 42319**ECTS credits:** 6**Academic year:** 2021-22**Group(s):** 10 11 12**Duration:** C2**Second language:** English**English Friendly:** Y**Bilingual:** N**Lecturer:** JESUS DAMIAN GARCIA-CONSUEGRA BLEDA - Group(s): 10 11 12

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2. Pre-Requisites

This course relies on the competences and knowledge acquired in:

- Programming Fundamentals I (1st)
- Programming Fundamentals II (1st)
- Data Structures (2nd)
- Software Engineering I (2nd)

3. Justification in the curriculum, relation to other subjects and to the profession

In the age of digitalization, capturing, processing and querying information has become a key element for most services. Software engineers are aware of the need for efficient systems that are capable of managing large amounts of information of different nature. Therefore, at present, computer technology is not understood without an underlying database that supports reaching its objectives. Technologies based on artificial intelligence, networks, web technologies, games, information systems, etc. would not be understood without database management.

Database management systems are therefore a fundamental component in information and communication technologies, without them it would be impossible to imagine the social expansion that networks and communications have reached in today's society.

This course is related to Software Engineering, Information Systems and Intelligent Systems subjects and serves as a foundation for the following courses:

- Database Development

4. Degree competences achieved in this course**Course competences**

Code	Description
BA04	Basic knowledge about the uses and programming of computers, operating systems, data bases, and digital programmes with applications in engineering.
CO12	Knowledge and application of the features, functions, and structure of data bases so as to lead to an appropriate use, and the design, analysis, and implementation of application based on them.
CO13	Knowledge and application of the required tools for the storage, process, and access to informational systems, even web based ones.
INS03	Ability to manage information and data.
INS05	Argumentative skills to logically justify and explain decisions and opinions.
SIS03	Autonomous learning.
UCLM02	Ability to use Information and Communication Technologies.

5. Objectives or Learning Outcomes**Course learning outcomes**

Description

Knowledge of the characteristics and structures of databases, as well as the functionalities of systems that manage them and the languages \mathcal{L} for their consultation and manipulation.

Building of applications that use databases.

Additional outcomes

Obtain a global vision of the problem of the design and implementation of a Database through a work that starts from the analysis of requirements and ends with the implementation of the database, in the DBMS Postgres.

Introduce the design of Databases, focusing on the phases of conceptual and logical design from the conceptual model Entidad-Relación Extended.

To know in depth the Relational Data Model, the process of relational design through functional dependencies and normalization as well as relational languages and Relational Algebra.

Know the general characteristics of a Database Management System.

Learn to create, maintain and consult a database system using the SQL and PL / SQL languages.

From the analysis of requirements of a database, be able to define the active behavior of a database and implement it using triggers on a relational database.

6. Units / Contents

Unit 1: Unit 1. Database Management Systems

Unit 1.1 Origins and evolution of databases

Unit 1.2 Database concept: Purpose of Database

Unit 1.3 Data independence. Database architecture

Unit 1.4 Database Management Systems

Unit 1.5 Database Management

Unit 2: Introducing database design

Unit 2.1 Database design challenges

Unit 2.2 Design steps

Unit 2.3 Extended Entity-Relationship Model

Unit 3: Relational model concepts

Unit 3.1 Structure of relational databases

Unit 3.2 Integrity constraints

Unit 3.3 The theory of functional dependencies

Unit 3.4 Relational languages. Relational algebra

Unit 4: Relational database design

Unit 4.1 Introduction

Unit 4.2 Normalization based on the notion of functional dependencies

Unit 4.3 Logical design. Mapping E/R models to relational models.

Unit 5: Introduction to active databases

Unit 5.1 Concepts

Unit 5.2 Active rules

Unit 5.3 Triggers. Applications.

7. Activities, Units/Modules and Methodology

Training Activity	Methodology	Related Competences (only degrees before RD 822/2021)	ECTS	Hours	As	Com	Description
Class Attendance (theory) [ON-SITE]	Lectures	BA04 CO12 CO13 INS03 INS05	0.8	20	N	-	Group Class. In addition to the direct instruction method, tasks are carried out by the students. Some contents or topics may be taught by means of the flipped classroom method.
Problem solving and/or case studies [ON-SITE]	Combination of methods	CO12 CO13 INS03 INS05	0.56	14	Y	N	Solving exercises and problems, individually and in groups in class
Computer room practice [ON-SITE]	Practical or hands-on activities	BA04 CO12 CO13 INS03 INS05 SIS03 UCLM02	0.76	19	Y	Y	Small laboratory groups. Carrying out laboratory practices from a guide.
Progress test [ON-SITE]	Assessment tests	BA04 CO12 CO13 INS03 UCLM02	0.16	4	Y	Y	Theoretical and practical test Individually done. Assessment keys: PRES.
Writing of reports or projects [OFF-SITE]	Self-study	BA04 CO12 CO13 INS03 INS05 UCLM02	0.8	20	Y	Y	Group and individual work to design and implement a database based on your requirements analysis. In this project, the INS3 competence assigned to the subject is evaluated. Assessment key: INF
Study and Exam Preparation [OFF-SITE]	Self-study	BA04 CO12 CO13 INS03 SIS03 UCLM02	2.8	70	Y	N	Individual study
Final test [ON-SITE]	Assessment tests	BA04 CO12 CO13 INS03 INS05 UCLM02	0.12	3	Y	Y	Final test of project, theory and laboratory. Evaluation keys: INF , ESC and LAB
Total:			6	150			
Total credits of in-class work: 2.4			Total class time hours: 60				
Total credits of out of class work: 3.6			Total hours of out of class work: 90				

As: Assessable training activity

Com: Training activity of compulsory overcoming (It will be essential to overcome both continuous and non-continuous assessment).

8. Evaluation criteria and Grading System

Evaluation System	Continuous assessment	Non-continuous evaluation*	Description
Progress Tests	10.00%	0.00%	Written controls in class of theory and problems. Key: ESC
			Deliverables in virtual campus (work). The last deliverable may

Assessment of problem solving and/or case studies	30.00%	30.00%	be defended by the authors according to criteria of the teachers. key: INF
Progress Tests	10.00%	0.00%	Realization of controls to evaluate and supervise the work done in the laboratory. Key: LAB
Final test	30.00%	40.00%	Final test of theory and problems. Key: ESC
Final test	20.00%	30.00%	Final test of laboratory. Key: LAB
Total:	100.00%	100.00%	

According to art. 4 of the UCLM Student Evaluation Regulations, it must be provided to students who cannot regularly attend face-to-face training activities the passing of the subject, having the right (art. 12.2) to be globally graded, in 2 annual calls per subject, an ordinary and an extraordinary one (evaluating 100% of the competences).

Evaluation criteria for the final exam:

Continuous assessment:

The evaluation will be carried out continuously throughout the semester. In the continuous evaluation the following aspects will be taken into account:

- * 4 points of the overall score will be obtained from the theory and problem assessment (Key ESC; progress and final tests).

- * 3 points of the overall score for the evaluation of the practices carried out during the course (Key LAB; progress and final tests).

- * 3 points of the overall score for the evaluation of the project

To pass the subject it is necessary to obtain a minimum score of 40% in all the parts of which it consists (theory/problems, practices, and project) and to obtain an average grade of greater than or equal to 5.

If the number of students enrolled makes impossible to correct the work on time for the proper functioning of the planning, this part will be canceled, distributing its weight equally between the theory and laboratory parts. This consideration is maintained for all evaluations.

The suspended students, in some of the parts, will obtain a maximum grade of 4. The grade of the failure will be calculated proportionally to the percentages assigned to ESC, INF, and LAB.

Non-continuous evaluation:

The evaluation will be carried out continuously throughout the semester. In the continuous evaluation the following aspects will be taken into account:

- * 4 points of the overall score will be obtained from the theory and problem assessment (Key ESC; progress and final tests).

- * 3 points of the overall score for the evaluation of the practices carried out during the course (Key LAB; progress and final tests).

- * 3 points of the overall score for the evaluation of the work

To pass the subject it is necessary to obtain a minimum score of 40% in all the parts of which it consists (theory/problems, practices, and project) and to obtain an average grade of greater than or equal to 5.

Those students who have passed the progress tests, and so express it, will keep the grade for the calculation of the theoretical and practical part, according to the same weights of the continuous evaluation. For the rest of the students, the progress tests will not be taken into account, using the weights of the non-continuous evaluation. With this, the grade will be determined based on the grade in the final test.

The suspended students, in some of the parts, will obtain a maximum grade of 4. The grade of the failure will be calculated proportionally to the percentages assigned to ESC, INF, and LAB.

Specifications for the resit/retake exam:

Failed students will obtain a maximum grade of 4. The grade of the suspension will be calculated proportionally to the percentages assigned to ESC, INF, and LAB.

In the resit/retake exam, the tests corresponding to theory/problems and practices will be made to those parts where the student failed. The progress tests are not rescheduled.

Specifications for the second resit / retake exam:

As in "Specifications for the resit/retake exam"

9. Assignments, course calendar and important dates	
Not related to the syllabus/contents	
Hours	hours
Progress test [PRESENCIAL][Assessment tests]	4
Final test [PRESENCIAL][Assessment tests]	3
General comments about the planning: The subject is taught in three weekly sessions of 1.5 hours. This planning is ORIENTATIVE, being able to vary throughout the course depending on the teaching needs, festivities, etc. Any modification in the planning will be duly communicated via the virtual campus platform.	
Unit 1 (de 5): Unit 1. Database Management Systems	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	4
Study and Exam Preparation [AUTÓNOMA][Self-study]	4
Teaching period: week 1	
Unit 2 (de 5): Introducing database design	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	6
Problem solving and/or case studies [PRESENCIAL][Combination of methods]	4
Computer room practice [PRESENCIAL][Practical or hands-on activities]	6
Writing of reports or projects [AUTÓNOMA][Self-study]	4
Study and Exam Preparation [AUTÓNOMA][Self-study]	18
Teaching period: weeks 2-5	
Unit 3 (de 5): Relational model concepts	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	6
Problem solving and/or case studies [PRESENCIAL][Combination of methods]	4

Computer room practice [PRESENCIAL][Practical or hands-on activities]	7
Writing of reports or projects [AUTÓNOMA][Self-study]	8
Study and Exam Preparation [AUTÓNOMA][Self-study]	25
Teaching period: weeks 6-10	
Unit 4 (de 5): Relational database design	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	4
Problem solving and/or case studies [PRESENCIAL][Combination of methods]	4
Computer room practice [PRESENCIAL][Practical or hands-on activities]	4
Writing of reports or projects [AUTÓNOMA][Self-study]	4
Study and Exam Preparation [AUTÓNOMA][Self-study]	15
Teaching period: weeks 11-14	
Unit 5 (de 5): Introduction to active databases	
Activities	Hours
Problem solving and/or case studies [PRESENCIAL][Combination of methods]	2
Computer room practice [PRESENCIAL][Practical or hands-on activities]	2
Writing of reports or projects [AUTÓNOMA][Self-study]	4
Study and Exam Preparation [AUTÓNOMA][Self-study]	8
Teaching period: week 15	
Global activity	
Activities	hours
Class Attendance (theory) [PRESENCIAL][Lectures]	20
Problem solving and/or case studies [PRESENCIAL][Combination of methods]	14
Computer room practice [PRESENCIAL][Practical or hands-on activities]	19
Progress test [PRESENCIAL][Assessment tests]	4
Writing of reports or projects [AUTÓNOMA][Self-study]	20
Study and Exam Preparation [AUTÓNOMA][Self-study]	70
Final test [PRESENCIAL][Assessment tests]	3
Total horas: 150	

10. Bibliography and Sources						
Author(s)	Title/Link	Publishing house	Cítrv	ISBN	Year	Description
Miguel Castaño, Adoración de	Diseño de bases de datos relacionales	Ra-Ma		84-7897-385-0	1999	
Miguel Castaño, Adoración de	Fundamentos y modelos de bases de datos	Ra-Ma		84-7897-361-3	1999	
Piattini, M.; Marcos, E.	Tecnología y diseño de bases de datos	RA-MA		84-7897-733-3	2006	
Silberschatz, Abraham	Fundamentos de bases de datos	McGraw-Hill/Interamericana de España		84-481-4644-1	2006	
	http://www.postgresql.org.es/					Portal de PostgreSQL en español
	https://www.postgresql.org					Página principal de PostgreSQL
	http://www.oracle.es					Página principal de Oracle
	http://otn.oracle.com					Documentación y software Oracle