

**1. General information****Course:** DATABASE DEVELOPMENT**Code:** 42328**Type:** CORE COURSE**ECTS credits:** 6**Degree:** 347 - DEGREE PROGRAMME IN COMPUTER SCIENCE ENGINEERING (CR)**Academic year:** 2023-24**Center:** 108 - SCHOOL OF COMPUTER SCIENCE OF C. REAL**Group(s):** 20**Year:** 3**Duration:** C2**Main language:** Spanish**Second language:****Use of additional languages:****English Friendly:** Y**Web site:** <https://campusvirtual.uclm.es>**Bilingual:** N**Lecturer:** DAVID GARCIA ROSADO - Group(s): 20

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**2. Pre-Requisites**

Knowledge of relational databases and SQL and PL/SQL languages is essential, as is mastery of object-oriented concepts as well as object-oriented programming and programming.

These competencies are acquired in the following subjects

Fundamentals of Programming I and II  
Data Structures  
Databases.

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

Databases and database systems are a basic component in the daily life of modern society, interaction with government, public services, the company can no longer be understood without the management of a database that allows communication between the various actors.

At present, information technology cannot be understood without an underlying database to cover information requirements. Technologies based on artificial intelligence, networks, web technologies, games, etc. would not be understood without database management.

The evolution and widespread implementation of object-orientation makes it increasingly necessary to design object-oriented databases. The use of databases, increasingly frequent in all aspects where ICTs are present, make it essential to maintain the integrity of the database and its independence from the applications that make use of it, which forces the database to be designed with active rules that improve independence.

The subject is integrated into the Software Engineering Specific Technology subject of the curriculum and serves as a foundation for the following subjects:

Advanced Databases  
Database Administration

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

Code	Description
INS01	Analysis, synthesis, and assessment skills.
INS02	Organising and planning skills.
INS03	Ability to manage information and data.
INS04	Problem solving skills by the application of engineering techniques.
INS05	Argumentative skills to logically justify and explain decisions and opinions.
IS04	Ability to detect and analyse problems, and design, develop, implement, verify, and document software solutions on the base of adequate knowledge about theories, models, and current techniques.
PER01	Team work abilities.
PER02	Ability to work in multidisciplinary teams.
PER04	Interpersonal relationship skills.
PER05	Acknowledgement of human diversity, equal rights, and cultural variety.
SIS01	Critical thinking.
SIS03	Autonomous learning.
SIS04	Adaptation to new scenarios.
SIS05	Creativity.
SIS06	Leadership skills.
SIS08	Initiative and entrepreneurial abilities.
SIS09	Care for quality.

## 5. Objectives or Learning Outcomes

### Course learning outcomes

#### Description

Knowledge and understanding of the application of the techniques of modeling and database design, both for classic and advanced models, following models and techniques that ensure running safety.

## 6. Units / Contents

### Unit 1: Database Design

### Unit 2: Database Integrity and Security

### Unit 3: Semi-structured Data and Big Data

### Unit 4: NoSQL Databases

### ADDITIONAL COMMENTS, REMARKS

The practical part of the course will look at PL/SQL, triggers, and database tools to design and use the different types of databases that will be seen in the theory part.

## 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	INS01 INS02 INS04 INS05 IS04 SIS01 SIS09	0.6	15	N	-	Teaching of the subject matter by lecturer (MAG)
Individual tutoring sessions [ON-SITE]	Collaborative on line international learning (COIL)	INS01 INS02 INS04 INS05 IS04 SIS09	0.18	4.5	N	-	Individual or small group tutoring in lecturer's office, classroom or laboratory (TUT)
Study and Exam Preparation [OFF-SITE]	Self-study	INS01 INS02 INS04 INS05 IS04 SIS03 SIS08 SIS09	1.8	45	N	-	Self-study
Other off-site activity [OFF-SITE]	Practical or hands-on activities	INS01 INS02 INS03 INS04 INS05 IS04 PER01 PER02 PER04 PER05 SIS03 SIS04 SIS05 SIS06 SIS08 SIS09	0.9	22.5	N	-	Lab practical preparation (PLAB)
Problem solving and/or case studies [ON-SITE]	Problem solving and exercises	INS01 INS02 INS04 INS05 IS04 PER01 PER02 PER04 PER05 IS04 PER01 PER02 SIS08 SIS09	0.6	15	Y	N	Worked example problems and cases resolution by the lecturer and the students (PRO)
Writing of reports or projects [OFF-SITE]	Self-study	INS01 INS02 INS04 INS05 IS04 PER01 PER02 PER04 PER05 SIS01 SIS03 SIS04 SIS05 SIS06 SIS08 SIS09	0.9	22.5	Y	N	Preparation of essays on topics proposed by lecturer (RES)
Laboratory practice or sessions [ON-SITE]	Practical or hands-on activities	INS01 INS02 INS03 INS04 INS05 IS04 PER01 PER02 PER04 PER05 SIS04 SIS05 SIS06 SIS08 SIS09	0.72	18	Y	Y	Realization of practicals in laboratory /computing room (LAB)
Mid-term test [ON-SITE]	Assessment tests	INS01 INS02 INS04 INS05 IS04	0.15	3.75	Y	Y	Partial test 1 of the first half of the syllabus of the subject (EVA)
Mid-term test [ON-SITE]	Assessment tests	INS01 INS02 INS04 INS05 IS04	0.15	3.75	Y	Y	Partial test 2 of the second half of the syllabus of the subject (EVA)
<b>Total:</b>			<b>6</b>	<b>150</b>			
<b>Total credits of in-class work: 2.4</b>			<b>Total class time hours: 60</b>				
<b>Total credits of out of class work: 3.6</b>			<b>Total hours of out of class work: 90</b>				

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
Theoretical papers assessment	15.00%	15.00%	Non-compulsory activity that can be retaken. To be carried out before end of teaching period
Laboratory sessions	25.00%	25.00%	Compulsory activity that can be retaken. To be carried out during lab sessions
Mid-term tests	25.00%	0.00%	Partial Test 2. Compulsory activity that can be retaken. To be carried out within the planned dates of the final exam call. The Partial Test 1 retake will be performed at this date.
Assessment of active participation	10.00%	10.00%	Non-compulsory activity that can be retaken. To be carried out during the theory/lab sessions in the case of continuous evaluation students. The non-continuous evaluation students will have an alternative evaluation system for this activity.
Final test	0.00%	50.00%	Compulsory activity that can be retaken (rescheduling) to be carried out within the planned exam dates of the final exam call (convocatoria ordinaria).

Mid-term tests	25.00%	0.00%	Partial Test 1. Compulsory and activity that can be retaken (rescheduling). To be carried out at the end of the first half of the teaching period.
<b>Total:</b>	<b>100.00%</b>	<b>100.00%</b>	

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:

In compulsory activities, a minimum mark of 40% is required in order to pass that activity and have the possibility to therefore pass the entire subject. A compulsory activity cannot be divided into eliminatory parts, nor can minimum marks be established for each of its parts. In the case of the activities that may be retaken (i.e., rescheduling), an alternative activity or test will be offered in the resit/retake exam call (convocatoria extraordinaria).

The partial tests will be common for all the theory/laboratory groups of the subject and will be evaluated by the lecturers of the subject in a serial way, i.e., each part of the partial tests will be evaluated by the same lecturer for all the students.

A student is considered to pass the subject if she/he obtains a minimum of 50 points out of 100, taking into account the points obtained in all the evaluable activities, and also has passed all the compulsory activities.

For students who do not pass the subject in the final exam call (convocatoria ordinaria), the marks of activities already passed will be conserved for the resit/retake exam call (convocatoria extraordinaria). If an activity is not recoverable, its assessment will be preserved for the resit/retake exam call (convocatoria extraordinaria) even if it has not been passed. In the case of the passed recoverable activities, the student will have the opportunity to receive an alternative evaluation of those activities in the resit/retake exam call and, in that case, the final grade of the activity will correspond to the latter grade obtained.

The mark of the passed activities in any call, except for the partial tests, will be conserved for the subsequent academic year at the request of the student, provided that mark is equal or greater than 50% and that the activities and evaluation criteria of the subject remain unchanged prior to the beginning of that academic year.

The failure of a student to attend the partial 1 and partial 2 tests will automatically result in her/him receiving a "Failure to attend" (no presentado). If the student has not passed any compulsory evaluation activity, the maximum final grade will be 40%.

##### Non-continuous evaluation:

Students may apply at the beginning of the semester for the non-continuous evaluation mode. In the same way, the student may change to the non-continuous evaluation mode as long as she/he has not participated during the teaching period in evaluable activities that together account for at least 50% of the total mark of the subject. If a student has reached this 50% of the total obtainable mark or the teaching period is over, she/he will be considered in continuous assessment without the possibility of changing to non-continuous evaluation mode.

Students who take the non-continuous evaluation mode will be globally graded, in 2 annual calls per subject, an ordinary and an extraordinary one (evaluating 100% of the competences), through the assessment systems indicated in the column "Non-continuous evaluation".

In the "non-continuous evaluation" mode, it is not compulsory to keep the mark obtained by the student in the activities or tests (progress test or partial test) taken in the continuous evaluation mode.

#### Specifications for the resit/retake exam:

Evaluation tests will be conducted for all recoverable activities. The failure of a student to attend the partial 1 and partial 2 tests will automatically result in her/him receiving a "Failure to attend" (no presentado), except in the case that the student conserves the mark for partial 1 and partial 2 from the final exam call (convocatoria ordinaria). In the latter case, the student's carrying out of any other evaluable activity in the resit/retake exam call (convocatoria extraordinaria) will result in a numerical mark.

#### Specifications for the second resit / retake exam:

Same characteristics as the resit/retake exam call.

9. Assignments, course calendar and important dates	
Not related to the syllabus/contents	
Hours	hours
General comments about the planning: The subject is taught in 3 x 1,5 hour sessions per week.	

10. Bibliography and Sources						
Author(s)	Title/Link	Publishing house	Citv	ISBN	Year	Description
Connolly y Begg	Database systems : a practical approach to design, implementation and management	Pearson		9780132943307	2015	
Piattini, Marcos, Calero y Vela	Tecnología y diseño de bases de datos <a href="http://www.ra-ma.es/libros/TECNOLOGIA-Y-DISENO-DE-BASES-DE-DATOS/235/978-84-7897-733-8">http://www.ra-ma.es/libros/TECNOLOGIA-Y-DISENO-DE-BASES-DE-DATOS/235/978-84-7897-733-8</a>	RA-MA		8478977333	2006	
Harrison G.	Next Generation Databases: NoSQL and Big Data	Apress		9781484213292	2015	
Elmasri y Navate	Fundamentals of Database Systems	Pearson		0-13-397077-9	2016	