Universidad Zaragoza

Academic Year/course: 2022/23

29522 - Relational and Non-relational Databases

Syllabus Information

Academic Year: 2022/23
Subject: 29522 - Relational and Non-relational Databases
Faculty / School: 175 - Escuela Universitaria Politécnica de La Almunia
Degree: 625 - Bachelor's Degree in Industrial Processes' Data Engineering
ECTS: 6.0
Year: 2
Semester: Second semester
Subject Type: Compulsory
Module:

1. General information

1.1. Aims of the course

The subject and its expected results respond to the following approaches and objectives:

In this subject it is intended that students develop a series of skills to design, manage and use relational databases and have basic notions of non-relational databases. The main objective is to work with the relational model designing databases and programming their creation, updating and consultation in a commercial relational manager. For this purpose, the SQL programming language and the necessary tools for the use of databases will be used.

Likewise, the aptitudes and attitudes of students are reinforced so they are able to work and learn autonomously, integrate knowledge, manage information, develop their critical thinking so that they can analyze and solve the problems that arise, related to information management using computer applications. Necessary for the Information Management of any company / organization through ICTs.

These approaches and objectives are in line with the following Sustainable Development Goals (SDGs) of the United Nations 2030 Agenda (https://www.un.org/sustainabledevelopment/es/), in such a way that the acquisition of the course learning outcomes provides training and competence to contribute to their achievement to some degree.

- **Goal 4**: Quality education (4.4)
- **Goal 5**: Gender equality (5.b)
- **Goal 8**: Decent Work and Economic Growth (8.2)

1.2. Context and importance of this course in the degree

Relational and non-relational databases is a compulsory subject taught in the second year of the degree. It corresponds to Module 3: "Data processing", and to the block: "Systems and BigData" with a load of 6 ECTS. This temporary location allows students to apply the knowledge acquired previously in programming subjects and learn to use computer tools for database management, for subsequent application in other subjects of the degree, mainly in "Development of BigData applications" and "Cloud computing".

1.3. Recommendations to take this course

It is necessary for the student to know the basic fundamentals of programming. In addition, they are required to have a predisposition to learn and use multiple software tools.

2. Learning goals

2.1. Competences

(CB) Basic, (GC) General, (TC) Transversal, (EC) Specific Competences

- CB4 - Transmit information, ideas, problems and solutions to both a specialized and non-specialized audience
- CG03 - Apply techniques for the acquisition, management and processing of data in Engineering.

- CT01 - Work cooperatively assuming and respecting the role of the different team members.
- CT05 - Communication of results effectively.
- CE16 - Build systems for data handling and storage.
- CE19 - Apply data processing tools and libraries

2.2. Learning goals

The student, to pass this subject, must show the following results ...

1. Learn the conceptual, logical and physical design of relational databases, the SQL query language and basic management tasks.
2. Learn about noSQL databases, main data models and their fundamental characteristics.

2.3. Importance of learning goals

Nowadays the use of databases is widespread, both in the relational model and in other models. Information management is one of the most important activities in any entity or organization. It is necessary to have a solid foundation in the design, creation and administration of databases and in the associated query languages, so essential to extract information and generate knowledge from data warehouses. A correct, intelligent, and efficient management of data is something vital today and, therefore, it is essential to be able to get along in the professional world and to develop information systems that address future challenges.

3. Assessment (1st and 2nd call)

3.1. Assessment tasks (description of tasks, marking system and assessment criteria)

The student must show that he has achieved the expected learning outcomes through the following assessment activities:

Evaluation activities in the **continuous assessment** mode:

The following activities are carried out, on a compulsory basis:

1. Written tests and active participation (40%). Individual. It will consist of one or more tests and active participation in the different activities suggested in the classroom, both face-to-face and online.
2. Creating a Relational (60%). Mixed work (individual and/or team). Design, creation and operation of an original relational database, together with its corresponding memory. The maximum number of equipment components will be indicated at the beginning of the semester. Two deliveries will be planned with the aim of carrying out educational assessment and evaluating the continuous work. The first delivery will consist of the analysis and modeling of the system and the design of the standardized database. The second delivery corresponds to the creation of the database in a commercial DBMS, data loading, and the (individual) programming of the SQL queries necessary to meet the requirements of the end user. This test requires face-to-face defense with the teacher.

In the continuous assessment mode 80% of assistance is required in the classroom activities of the subject.

Assessment activities in the **global assessment** mode:

1. Creation of a relational database (40%). Mixed work (individual and/or team). Design, creation and use of an original relational database, together with its corresponding memory. It will consist of: the analysis and modeling of the system and the creation of the standardized database; the creation of the DATABASE in a commercial DBMS, data loading, and the (individual) programming of the SQL queries necessary to meet the requirements of the end users. This test requires face-to-face defense with the teacher.
2. Final written test (60%). Individual. It will consist of the timed completion of a theoretical and practical written test, about the whole content of the course. The right to consult supporting material may or may not be granted. This test will include one or more questions about the academic work done in the previous point.

The following table shows a summary of the evaluation:

	Continuous assessment	**Global assessment**
Written tests and active participation	40%	0%
Creation of a relational database	60%	40%

Final written Test	0%	60%

Success in the subject will be based on the sum of the scores obtained in the different activities carried out, each one contributing with a minimum of 50%, that is, all the tests must be passed on an individual basis.

For those students who have failed the continuous assessment system, but some activities have been carried out successfully, these will be valid for the global assessment test.

The activities which have been carried out successfully in the global assessment test will be valid for the next official call, within the same academic year.

The grading of the assessment activities will range from 0 to 10 points. The assessment criteria will be explained in the corresponding sections, or prior to their completion.

The dates of the global assessment exams will be those officially published on the EUPLA-Web.

4. Methodology, learning tasks, syllabus and resources

4.1. Methodological overview

The learning process designed for this subject is based on the following:

Strong interaction between the teacher/student. This interaction is brought into being through a division of work and responsibilities between the students and the teacher. Nevertheless, it must be taken into account that, to a certain degree, students can set their learning pace based on their own needs and availability, following the guidelines set by the teacher.

The current subject (Information systems management) is conceived as a stand-alone combination of contents, yet organized into three fundamental and complementary forms, which are: the theoretical concepts of each teaching unit, the solving of problems or the resolution of questions and laboratory work, at the same time supported by other activities

The organization of teaching will be carried out using the following steps:

- Lectures: Theoretical activities carried out mainly through exposition by the teacher, where the theoretical supports of the subject are displayed, highlighting the fundamental, structuring them into topics and or sections, interrelating them.
- Practice Sessions: The teacher resolves practical problems or cases for demonstrative purposes. This type of teaching complements the theory shown in the lectures with practical aspects.
- Individual Tutorials: Those carried out giving individual, personalized attention with a teacher from the department. Said tutorials may be in person or online.

The approach, methodology and assessment of this guide are intended to be the same for any teaching scenarios. They will be adapted to the social-health situation at any particular time, as well as to the instructions given by the authorities concerned.

4.2. Learning tasks

The course includes the following learning tasks:

Involves the active participation of the student, in a way that the results achieved in the learning process are developed, not taking away from those already set out, the activities are the following:

* **Face-to-face generic activities**:

- **Lectures**: The theoretical concepts of the subject are explained and illustrative examples are developed as a support to the theory when necessary.
- **Practice Sessions**: Problems and practical cases are carried out, complementary to the theoretical concepts studied.

* **Generic non-class activities**:

- Study and understanding of the theory taught in the lectures.
- Understanding and assimilation of the problems and practical cases solved in the practical classes.
- Preparation of seminars, solutions to proposed problems, etc.
- Preparation of the written tests for continuous assessment and final exams.

4.3. Syllabus

The course will address the following topics:

Theoretical contents.

- SQL databases: Conceptual, logical and physical design. Storage. Structured query language. SQL Database Management.

- Non-traditional databases: Characteristics of noSQL databases. Advantages and disadvantages

Practical contents.

- Design of relational databases.
- Implementation of relational databases and operatión through SQL.

4.4. Course planning and calendar

Session Calendar and Presentation of Tasks

The subject has 6 ECTS credits, which represents 150 hours of student work in the subject, in other words, 10 hours per week for 15 teaching weeks.

The weekly programme of theoretical and practical content, together with the dates on which the continuous assessment tests will be carried out and the dates of publication of grades, will be published in Moodle before the start of the semester.

In the continuous assessment mode, an approximate distribution of the most relevant activity deliveries will be as follows:

- Week 3.- Proposal of relational database design system.
- Week 5.- Standardized design of the relational database.
- Week 11-12.- Creation of the database in relational DBMS and programming of predefined SQL queries
- Weeks 12-14.- Defense of database and SQL project.

In the global evaluation modality, the deadlines for delivery of the required tests or works will be published in Moodle, previous to the final exam date.

4.5. Bibliography and recommended resources

http://psfunizar10.unizar.es/br13/egAsignaturas.php?codigo=29522