# 1. BASIC INFORMATION

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|---|---|
| **Course** | Databases |
| **Degree program** | Bachelor's Degree in Computer Engineering |
| **School** | Architecture, Engineering and Design |
| **Year** | Second |
| **ECTS** | 6 |
| **Credit type** | Compulsory |
| **Language(s)** | Spanish |
| **Delivery mode** | On Campus / on line |
| **Semester** | 4 |
| **Academic year** | 2025-2026 |
| **Coordinating professor** | SUTIL MARTIN, ISABEL |

# 2. PRESENTATION

Databases is the first compulsory subject area of specific technologies belonging to the "Computer Science" subject, where the students will be introduced to the concepts of information management and exploitation. It will explain the importance of business information management, the problems associated with its exploitation, as well as the fundamentals of databases (relational model, normalisation of diagrams, database design, etc.), SQL as a database query language and access from different clients. These concepts will be necessary and useful for other subject areas within the subject.

# 3. LEARNING OUTCOMES

**Knowledge**

KN06 Basic knowledge of computer use and programming, operating systems, databases, and software programs applicable in engineering.

KN14 Knowledge and application of the characteristics, functionalities, and structure of databases, enabling their proper use, and the design, analysis, and implementation of applications based on them.

**Skills**

SK10 Ability to acquire, obtain, formalize, and represent human knowledge in a computable form for problem-solving through a computer system in any field of application, particularly those related to aspects of computing, perception, and action in intelligent environments.

**Competences**

CP03. Ability to design, develop, evaluate, and ensure the accessibility, ergonomics, usability, and security of computer systems, services, and applications, as well as the information they manage.

**Specific learning outcomes for the subject**

Subject-Specific Knowledge

- Describe the fundamentals of databases.
- Understand a query language and/or data modification language for a database.

Subject-Specific Skills

- Design databases using specific notation for the field.
- Construct the schema of a database using a relational language (SQL).
- Generate queries to access and/or modify a database using a relational language (SQL).
- Utilize a commercial database management system.

Develop an application for querying and/or modifying data in a database.

## 4. CONTENT

Database analysis and the entity-relationship model. Database design, requirements analysis. Entity-Relationship Model and graphical notation for conceptual design.

Database theory and the relational model. Fundamentals of databases and the advantages of database management systems. Detail of the Relational Model, relations, attributes, keys, and integrity constraints.

Database design. Logical design of relational databases. Normalization techniques.

Database Management Systems. Architecture and functions. Security. Practical use.

Relational query languages. SQL Structured Query Language. Data manipulation, querying, and information management.

Fundamentals of advanced databases. NoSQL Databases.

## 5. TEACHING-LEARNING METHODOLOGIES

The types of teaching-learning methodologies used are indicated below:

- Master class

- Problem-based learning
- Project-based learning
- Workshop-based learning

## 6. LEARNING ACTIVITIES

Listed below are the types of learning activities and the number of hours the student will spend on each one:

**Campus-based mode:**

| Learning activity | Number of hours | Time in Class | Use of IA |
|---|---|---|---|
| Masterclasses | 12 | 12 | Not allowed |
| Practical application masterclasses | 18 | 18 | Not allowed / Suggested |
| Problem solving | 24 | 12 | Not allowed / Suggested |
| Research and projects | 22 | 6 | Allowed |
| Workshop and/or laboratory activities | 6 | 6 | Allowed |
| Autonomous work | 62 | 0 | Not allowed / Suggested |
| Debates and colloquiums | 4 | 4 | Not allowed |
| Face-to-face assessment tests | 2 | 2 | Not allowed |
| **TOTAL** | **150** | **60** | |

* The teacher may specify a different use for a specific activity within the subject if he/she deems it appropriate and advises the students accordingly.

**Virtual mode:**

| Learning activity | Number of hours | Virtual | Use of IA |
|---|---|---|---|
| Multimedia didactic resources | 12 | 0 | Not allowed |
| Synchronous virtual classes | 18 | 18 | Not allowed / Suggested |
| Problem solving | 24 | 0 | Not allowed / Suggested |
| Project development | 22 | 0 | Allowed |
| Synchronous activities in workshops and/or virtual labs | 6 | 6 | Allowed |

| | | | |
|---|---|---|---|
| Study of contents and complementary documentation (Autonomous Work) | 62 | 0 | Not allowed / Suggested |
| Virtual forum | 4 | 0 | Not allowed |
| Virtual assessment tests | 2 | 2 | Not allowed |
| **TOTAL** | **150** | **26** | |

* The teacher may specify a different use for a specific activity within the subject if he/she deems it appropriate and advises the students accordingly.

## 7. ASSESSMENT

Listed below are the assessment systems used and the weight each one carries towards the final course grade:

**Campus-based mode:**

| Assessment system | Weight |
|---|---|
| Face-to-face assessment tests | 50% |
| Oral presentations | |
| Reports and writings | |
| Case/problem | 10% |
| Learning portfolio | |
| Performance assessment | 10% |
| Research and projects | 20% |
| Strategy design work and intervention plans | |
| Laboratory/workshop practical notebook | 10% |

**Online mode:**

| Assessment system | Weight |
|---|---|
| Face-to-face assessment tests | 50% |
| Oral presentations | |
| Reports and writings | |
| Case/problem | 10% |
| Learning portfolio | |

| | |
|---|---|
| Performance assessment | 10% |
| Research and projects | 20% |
| Strategy design work and intervention plans | |
| Laboratory/workshop practical notebook | 10% |

When you access the course on the *Campus Virtual*, you'll find a description of the assessment activities you have to complete, as well as the delivery deadline and assessment procedure for each one.

### 7.1. First exam period

To pass the course in the first exam period, you must obtain a final course grade of at least 5 out of 10 (weighted average).

In any case, you will need to obtain a grade of at 4.0 in the final exam in order for it to count towards the final grade along with all the grades corresponding to the other activities.

The teacher reserves the right to request an additional test to any of the evaluation tests, in case of doubts about the student's authorship.

In order to pass the course, attendance is compulsory and, therefore, the minimum number established for the course by the teacher must be reached. In this case it will be 50%.

### 7.2. Second exam period

To pass the course in the second exam period, you must obtain a final grade of at least 5 out of 10 (weighted average).

In any case, you will need to obtain a grade of at 4.0 in the final exam in order for it to count towards the final grade along with all the grades corresponding to the other activities.

The student must deliver the activities not successfully completed in the first exam period after having received the corresponding corrections from the professor, or those that were not delivered in the first place.

## 8. SCHEDULE

This table shows the delivery deadline for each assessable activity in the course:

| Assessable activities | Deadline |
|---|---|
| Participation Activities (individual and group) | Week 1-18 |

| | |
|---|---|
| Knowledge Test (individual) | Week 10 |
| Mini-project delivery (group) and Checkpoint | Week 17-18 |
| Global Knowledge Test | Week 18 |

This schedule may be subject to changes for logistical reasons relating to the activities. The student will be notified of any change as and when appropriate.

## 9. BIBLIOGRAPHY

The main reference work for this subject is:

- Fundamentals of Database Systems
  Authors: Ramez Elmasri, Shamkant B. Navathe

The recommended Bibliography is:

- Seven Databases in Seven Weeks: A Guide to Modern Databases and the NoSQL Movement
  Authors: Luc Perkins, Eric Redmond, Jim Wilson

- Oracle PL/SQL Programming: Covers Versions Through Oracle Database 12c
  Authors: Steven Feuerstein

- Head First SQL: Your Brain on SQL -- A Learner's Guide
  Authors: Lynn Beighley

- Database Design for Mere Mortals: A Hands-On Guide to Relational Database Design
  Authors: Michael J Hernandez

- Beginning Database Design Solutions
  Authors: Rod Stephens

- Designing Data-Intensive Applications: The Big Ideas Behind Reliable, Scalable, and Maintainable Systems
  Authors: Martin Kleppmann

- The Data Warehouse Toolkit: The Definitive Guide to Dimensional Modeling
  Authors: Ralph Kimball

- Refactoring Databases: Evolutionary Database Design (Addison-Wesley Signature Series (Fowler))
  Authors: Scott W Ambler, Pramod J Sadalage

- SQL Antipatterns: Avoiding the Pitfalls of Database Programming (Pragmatic Programmers)
  Authors: Bill Karwin

- SQL Performance Explained Everything Developers Need to Know about SQL Performance
  Authors: Markus Winand

- SQL Cookbook: Query Solutions and Techniques for Database Developers
  Authors: Anthony Molinaro

- Joe Celko's SQL for Smarties: Advanced SQL Programming (The Morgan Kaufmann Series in Data Management Systems)
  Authors: Joe Celko

- The Art of SQL
  Authors: Stephane Faroult, Peter Robson

- Joe Celko's SQL Puzzles and Answers (The Morgan Kaufmann Series in Data Management Systems)
  Authors: Joe Celko

- SQL Server MVP Deep Dives
  Authors: Various Authors

- SQL Practice Problems: 57 beginning, intermediate, and advanced challenges for you to solve using a “learn-by-doing” approach
  Authors: Sylvia Moestl Vasilik

- SQL for Data Analytics
  Authors: Upom Malik, Matt Goldwasser, Benjamin Johnston

# 10. EDUCATIONAL GUIDANCE, DIVERSITY AND INCLUSION UNIT

From the Educational Guidance, Diversity and Inclusion Unit we offer support to our students throughout their university life to help them reach their academic achievements. Other main actions are the students' inclusions with specific educational needs, universal accessibility on the different campuses of the university and equal opportunities.

From this unit we offer to our students:

1. Accompaniment and follow-up by mean of counselling and personalized plans for students who need to improve their academic performance.
2. In terms of attention to diversity, non-significant curricular adjustments are made in terms of methodology and assessment for those students with specific educational needs, pursuing an equal opportunity for all students.
3. We offer students different extracurricular resources to develop different competences that will encourage their personal and professional development.
4. Vocational guidance through the provision of tools and counselling to students with vocational doubts or who believe they have made a mistake in their choice of degree.

Students in need of educational support can write to us at:

orientacioneducativa@universidadeuropea.es

## 11. ONLINE SURVEYS

Your opinion matters!

The Universidad Europea encourages you to participate in several surveys which help identify the strengths and areas we need to improve regarding professors, degree programs and the teaching-learning process.

The surveys will be made available in the “surveys” section on virtual campus or via e-mail.

Your assessment is necessary for us to improve.

Thank you very much for your participation.