COURSE DATA

Data Subject	
Code	34894
Name	Databases and information systems
Cycle	Grade
ECTS Credits	6.0
Academic year	2024 - 2025

Study (s)

Degree	Center	Acad. year	Period
1403 - Degree in Telematics Engineering	School of Engineering	3	First term

Subject-matter

Degree	Subject-matter	Character
1403 - Degree in Telematics Engineering	15 - Information systems	Obligatory

Coordination

Name	Department
DIAZ VILLANUEVA, WLADIMIRO	240 - Computer Science
VES CUENCA, ESTHER DE	240 - Computer Science

SUMMARY

The course “Databases and Information Systems” is taught during the first semester of the third year. It deals with different subjects: data storage management, storage and retrieval algorithms, and efficient retrieval and update of data.

In this course, databases are presented as the best way to organize factual data in a computer, in front of the use of data files. The main characteristics of databases, theoretical foundations and the data representation models will be described. The architecture of the Database Management Systems will also be introduced.

Particularly, the course will focus on the relational data model, which is the widest used model in commercial implementations of DBMS (Oracle, IBM, Microsoft, …). The students will learn to use the Structured Query Language (SQL) as the basic tool to work with data in a relational database. They will also learn to design and implement a database through a well defined methodology: conceptual design, Entity/Relationship diagrams, logical and physical data models, and normalization.

Finally, the course will deal with the construction of software applications that interact with databases. A major attention will be paid to web applications, and the basic web languages (HTML, XML).

PREVIOUS KNOWLEDGE

Relationship to other subjects of the same degree

There are no specified enrollment restrictions with other subjects of the curriculum.

Other requirements

It is advisable to have taken the Informática (first year) and Amplicación de Informática (second year).

COMPETENCES (RD 1393/2007) // LEARNING OUTCOMES (RD 822/2021)

1403 - Degree in Telematics Engineering

- G4 - Ability to solve problems with initiative, decision-making and creativity, and to communicate and transmit knowledge, abilities and skills, understanding the ethical and professional responsibility of the activity of a telecommunications technical engineer.
- E3 - Ability to construct, operate and manage telematic services using analytical tools for planning, dimensioning and analysis.
- E4 - Ability to describe, program, validate and optimize communication protocols and interfaces at different levels of a network architecture.
- E6 - Ability to design networks and telematic services architectures.
- E7 - Ability to programme networked and distributed telematic services and applications.

LEARNING OUTCOMES (RD 1393/2007) // NO CONTENT (RD 822/2021)

This course will provide students with the following learning results:

1. To know the concepts about storage systems and models and data retrieval, and their importance in organizations.
2. To get the basics for defining, designing and implementing information systems using database management systems.
3. To know the theories and mathematical models which serve as the basis of the relational model.
4. To know about the tools to define, insert, update and manipulate information in a database management system.
5. To apply the relational model principles and technics to develop software applications in the business scope of organizations.
6. To understand the problems related to DBMS design and the needs of each of its components.
7. To deeply know the functional elements of a DBMS, and to critically evaluate and compare the different algorithms implemented in a DBMS.

Complementary skills and social competences that students will acquire are:

- To find, select and assess information to address new problems, using new technologies.
- To make plans for new situations
- To model and solve problems by identifying the essential elements of situations, and making approximations to reduce the problems complexity, including non-standard solutions and providing original ideas.
- To organize, plan and drive individual or group learning process, in a coordinated manner.
- To work individually and in groups.
- Teamwork: collaborate, lead, plan, interact, reach consensus, negotiate, solve conflicts and respect other’s opinions.
- Discuss and argue opinions, and get critical attitudes towards problems.
- Analyze texts. Writing and presenting texts with clarity, coherence, organization and comprehension for experts and novices.
- To get a positive attitude towards new problems
- To promote the ethics in the regular professional activity, and to get an ethic compromise.

DESCRIPTION OF CONTENTS

1. Introduction

Information systems
File systems vs database management systems
Databases as part as information systems
Basic conceptos of databases
DBMS architecture. The ANSI-SPARC model

2. The Entity/Relationship model

A brief history
Entities and atributes
Relationships
Restrictions
Aggregation
The extended E/R model

3. The relational model

Lecture 3.
The relacional model
Relational algebra
Relational calculus

4. Query and data definition languages

Introduction to SQL
Data definition language (DDL)
Data manipulation language (DML)
Introduction toPL/SQL.

5. Database design

Design methodologies
Conceptual design
Logical design. Normalization.
Physical design

6. Accesing databases from software applications

Multilayer applications architecture
HTML and XML documents
Embeded and dynamic SQL
ODBC and JDBC

WORKLOAD

ACTIVITY	Hours	% To be attended
Theory classes	30,00	100
Laboratory practices	20,00	100
Classroom practices	10,00	100
Development of group work	5,00	0
Development of individual work	20,00	0
Study and independent work	10,00	0
Readings supplementary material	5,00	0
Preparation of evaluation activities	15,00	0
Preparing lectures	10,00	0
Preparation of practical classes and problem	25,00	0
TOTAL	**150,00**	

TEACHING METHODOLOGY

The learning process will be based on a combination of lectures, problem resolution sessions and practical activities (computer based laboratories). It will be complimented with the student personal work.

- Lectures will have a duration of 90 minutes, and different subjects will be taught, trying to promote the students participation.

- Practical activities will be based on problems resolution in the classroom. The duration of the sessions will be 90 minutes. Some of the planned activities are:
  - Problems resolution sessions
  - Seminars in regular classrooms and computer facilities
  - Debates, problems resolution and exercises previously worked by students
  - Individual tutorials

- Laboratory sesions will focus on the resolution of problems introduced in the regular lectures, with a duration of 150 minutes.

- Individual personal work for promoting the autonomous learning process, based on these aspects:
  - Preparation of lectures and reading of recommended texts
  - Problems resolution
  - Homework to be evaluated by the lecturer
  - Laboratory sessions preparation with anticipation

- Teamwork. Development of activities in small groups, inside and outside the classroom.

The virtual learning platform of the UVEG (Aula Virtual) will be used as a support to the teaching process and the student-lecturer communication. All the course material will be made available in this platform.

EVALUATION

Students will do 2 types of work:

1. Autonomous auto-learning work
2. Supervised work

1. Autonomous work for auto-learning will consist of activities done outside the regular schedule. The lecturer will guide this type of activities (readings, problems resolution, researching, etc.), but they will not be marked, although students could ask the lecturer for their revision in the individual tutorials.
2. Supervised work will consist of activities proposed by the lecturer, and they will be marked in order to evaluate the student evolution (N_Activities). The types of work are:
    1. Individual activities
    2. Group activites
    3. Practical work with computers

The main characteristics of these activities are:

- They will be evaluated by the lecturer
- They will have a deadline or will be made in-person
- They are mandatory

The student will have to pass several exams during the semester (N_exams). Lectures attendance and participation will be considered for the final mark (N_continuous). The final mark will be calculated using this formula:

Final Mark = 10% N_Continuous + 50% N_Exams + 40% N_Activities

It will be necessary to get, at least, 5 out of 10 at N_Exams and 3,5 out of N_Activities for the formula to be applied.

As a general rule and if not stated otherwise, both N_Continuous and N_Activities are NOT recoverable. In the same way and if not expressly stated otherwise, N_Exams is recoverable.

This assessment starts from the premise that teaching at the University of Valencia is, by definition, on-campus lecture delivery method. In this sense, the student should be aware that attendance at both the theoretical and practical lectures is essential for proper monitoring of the contents of the course. The student must also consider the possibility to enroll part time (except in the case of students who register for the first time), when it is unable to attend all courses (60 credits). However, there is an exception for those students that justify it and request it. They have the possibility of being assessed without attending to all or part of the lectures. For these cases, students should proceed as follows:

- At the beginning of the course, student should inform to lecturer responsible for the course, the incidence that makes her/him unable to attend the class. This must be adequately justified in documentary form.
- The lectures in charge, in the light of this information, will decide the possibility of evaluation without full or partial assistance to the lectures.

Students who are in this situation must submit for evaluation all work required by the lecturer (not necessarily the same to those required for the course) and may also be called to defend them orally to the lecturer, and conduct a knowledge test. The weight of the final grade work will be 50% and the test the remaining 50% knowledge.

List of competencies assessed by activity:

- N_Continuous: G4, E3, E4
- N_Exams: G4, E3, E4, E7
- N_Activities: G4, E3, E4

In any case, the system of evaluation will be ruled by the established in the Regulation of Evaluation and Qualification of the University of Valencia for Degrees and Masters (**ACGUV 108/2017**).

Copying or plagiarism of any activity that is part of the evaluation will result in the impossibility of passing the course, and the student will then be subject to the appropriate disciplinary procedures indicated in the ACTION PROTOCOL FOR FRAUDULENT PRACTICES AT THE UNIVERSITY OF VALENCIA. (ACGUV 123/2020).

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Basic

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Additional

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