COURSE DATA

Data Subject	
Code	36412
Name	Databases
Cycle	Grade
ECTS Credits	6.0
Academic year	2023 - 2024

Study (s)

Degree	Center	Acad. year	Period
1406 - Degree in Data Science	School of Engineering	1	Second term

Subject-matter

Degree	Subject-matter	Character
1406 - Degree in Data Science	3 - Informatics	Basic Training

Coordination

Name	Department
CERVERON LLEO, VICENTE	240 - Computer Science
FUERTES SEDER, ARIADNA	240 - Computer Science

SUMMARY

The basic subject Databases, framed within the subject Computer Science, consists of 6 ECTS credits and is taught during the second term of the first year.

In this subject, the fundamentals of organising the data stored in a computer are addressed presenting databases as the best way to store them. The main characteristics and foundations the databases will be described as well as the different models of representation and access to data.

Particularly, the subject will focus on the relational database model, which is the widest used model nowadays. Students will learn how to design databases on this model, using conceptual design models, such as Entity/Relationship (E/R) diagrams, data logical models and physical models, as well as the basics of standardisation techniques. In addition, they will learn to work with data through a standard language: Structured Query Language (SQL) and make a semantic representation of the information through markup languages.

This course aims to provide students with basic training in the creation of relational databases, so that they learn how information stored on a computer is organised and, therefore, know how to update it and recover it knowing which possibilities said information system offers.

Theory lessons will be taught in Spanish and practical and laboratory lessons as according to the information sheet available on the web page of the degree

PREVIOUS KNOWLEDGE

Relationship to other subjects of the same degree

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

Other requirements

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

OUTCOMES

1406 - Degree in Data Science

- (CG01) Knowledge of basic subjects and technologies that enable students to learn new methods and technologies, and to provide them with versatility to adapt to new situations.
- (CG03) Capability to elaborate models, calculations, reports, to plan tasks and other works analogous to the specific field of data science.
- (CG05) Analysis and synthesis capability in the preparation of reports and in the defence of ideas.
- (CT01) To be able to access (bibliographical) information tools and appropriately use them in the development of their daily tasks.
- (CT02) To be able to complete technical, scientific, social and human training in general, and to organise self-learning with a high degree of autonomy.
- (CE02) To methodologically know and apply the programming techniques and the algorithms necessary for the efficient processing of information and the computer resolution of problems that use large volumes of data.
- (CE04) To know and use the different models of data storage and database management systems using programming languages for the definition, query and handling of data.
- (CB2) Students must be able to apply their knowledge to their work or vocation in a professional manner and have acquired the competences required for the preparation and defence of arguments and for problem solving in their field of study.
- (CB4) Students must be able to communicate information, ideas, problems and solutions to both expert and lay audiences.

LEARNING OUTCOMES

To know the concepts about storage systems and models and data retrieval, and their importance in organisations. (CG01, CT01)

To know the advantages of using Databases and the functionalities provided by a DBMS. To know the theories and mathematical models which serve as the basis of the relational data model. (CB4, CT02, CE04)

To know about the tools to define, insert, update and manipulate information in a database management system. (CE02, CE04)

To apply the DB design methodology, from conceptual design to physical design. (CG03, CG05)

To know the basic concepts about the processing of transactions and their properties. (CE02)

To know how to represent semantic information through markup languages. (CG01)

DESCRIPTION OF CONTENTS

1. Introduction

Information systems.
Evolution of database technologies.
Databases as part of information systems.
DBMS architecture.
Databases basic concepts.
Designing databases: conceptual design, logical design and physical design.
Databases models.

2. The Entity/Relationship model

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

3. The relational model

The relational databases model.
Relational algebra.

4. Query languages. SQL

Query languages. SQL.
Data definition language (DDL).
Data manipulation language (DML).

5. Normalisation

Normalisation theory for the relational database design.

6. Physical design. Storage and Representation.

Basic storage structures for DBs.
Transaction processing and ACID properties.
Semantic representation of information. Markup languages.

WORKLOAD

ACTIVITY	Hours	% To be attended
Theory classes	28,00	100
Laboratory practices	20,00	100
Classroom practices	12,00	100
Development of group work	10,00	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	20,00	0
TOTAL	**150,00**	

TEACHING METHODOLOGY

In the theoretical activities during the lessons, the topics of the subject will be developed analysing the main aspects and promoting the student's discussion of their proposed solutions to the problems (CB2, CB4). Therefore, the theoretical activities will be complemented with other activities in the way that the students learn the main models and methodologies and can apply them to proposed works (CE02, CE04). The in class activities carried out will be of the following types: Classes of questions and problems in the classroom; discussion and problem solving sessions and exercises previously worked by the students; laboratory practices; individual evaluation questionnaires in the classroom with the presence of the teaching staff (CG01, CG03, CG05, MD1, MD2, MD4).

In addition to activities in classroom, students must perform a personal work outside the classroom that will be: conduct of search and directed reading of information, resolution of issues and problems raised, as well as the preparation of classes and exams (CT01, CT02). These tasks will be mainly carried out individually in order to enhance self-learning (AF04) but, in order to understand different points of view in the development of models, to encourage discussion, team work and task planning (CG01, CG03), sometimes these work will be done in groups. During lessons, evaluable exercises may be assigned to students and they may be asked to explain their resolutions of the exercises and to justify them properly (CB2, CB4).

The e-learning platform (Virtual Classroom) of the University of Valencia will be used to access teaching material and to submit requested tasks.

EVALUATION

At the first call, the evaluation of the subject will be conducted through the assessment of knowledge, skills and competences acquired by the student, both individually and in a teamwork environment, following a scheme of continuous assessment.

The following aspects will be considered:

1. Written test: [**SE1]** there will only be one final theoretical and practical written test. This test will be assessed: On the one hand, the understanding of the theoretical and conceptual aspects and associated formalism, through issues or simple particular cases. On the other hand, the ability to solve problems by applying the formalism and critical capacity regarding the results will be assessed. The minimum grade that the student must obtain to pass the subject will be 5 points (out of 10). (CG01, CG03, CG05)

The grade obtained in this test represents 50% of the final grade.

2. Continuous practical assessment of the knowledge acquired during the academic year:

a) [**SE3]** Throughout the course, the work carried out by students will be assessed: presented results, questions proposed and discussed in the classroom, oral presentation of problems solved by them and any other method that involves interaction and feedback of the student's jobs. Some of these activities will be developed individually and other ones in teams. This will mean 20% of the final grade. (CB2, CB4, CT01, CT02)

b) **[SE2]** In addition, the students will have a practical note corresponding to the evaluation of the tasks carried out during the practical classes in the computer room and attendance is compulsory unless absence is properly justified. With these tasks carried out, the acquired skills will be shown in the accomplishment of computer exercises. This will mean 30% of the final grade. (CE02, CE04).

The activities on components SE2 and SE3 cannot be retaken.

At the first call, the composition of the final mark will follow, in summary, the following table:

• Exam: 50%

• Preparation of lessons, theory questions and exercises: 20%

• Practical tasks carried out in the computer room: 30%

TOTAL 100%

The second examination sitting will comprise an exam that will account for 70% of the final grade. A minimum of 5 points out of 10 will be needed to pass the exam, and the grade obtained during the academic year in block SE2 will account for the remaining 30%..

In any case, the assessment of the subject will be done in accordance with the assessment and qualification Regulation of the University of Valencia for degrees and masters:

https://webges.uv.es/uvTaeWeb/MuestraInformacionEdictoPublicoFrontAction.do?accion=inicio&idEdictoSeleccionado=5639

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