Course guide
320103 - BD - Data Bases

Last modified: 19/04/2023

Unit in charge: Terrassa School of Industrial, Aerospace and Audiovisual Engineering
Teaching unit: 723 - CS - Department of Computer Science.

Degree: BACHELOR'S DEGREE IN AUDIOVISUAL SYSTEMS ENGINEERING (Syllabus 2009). (Compulsory subject).

Academic year: 2023 **ECTS Credits:** 6.0 **Languages:** Catalan, Spanish

LECTURER

Coordinating lecturer: MARIA JOSE LOPEZ LOPEZ

Others:

REQUIREMENTS

It is strongly recommended for students to have passed the Fundamentals of Informatics course from the first semester and the Data Structures and Object-Oriented Design course from the second semester.

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
CE07-ESAUD. Ability to use communication and computer applications (office automation, databases, advanced calculation, project management, visualization, etc.) to support the development and exploitation of networks, services, and telecommunications and electronic applications. (Common module for the telecommunications branch)
CE08-ESAUD. Ability to use computer tools to search for bibliographic resources or information related to telecommunications and electronics. (Common module for the telecommunications branch)

Generical:
CG03-ESAUD. Knowledge of basic subjects and technologies, which enables learning of new methods and technologies, as well as providing great versatility to adapt to new situations.

Transversal:
CT01 N2. Entrepreneurship and innovation - Level 2. Taking initiatives that give rise to opportunities and to new products and solutions, doing so with a vision of process implementation and market understanding, and involving others in projects that have to be carried out.

TEACHING METHODOLOGY

· Face-to-face lecture sessions.
· Face-to-face practical work sessions.
· Independent learning and exercises.
· Preparation and completion of group activities subject to assessment.
In the face-to-face lecture sessions, the lecturer will introduce the basic theory, concepts and results for the subject and use examples to facilitate students' understanding.
Practical class work will be covered in three types of sessions:
a) Sessions in which the lecturer will provide students with guidelines to analyse data for solving problems by applying methods, concepts and theoretical results.
b) Sessions in which students give presentations of group work.
c) Examination sessions.
Students will be expected to study in their own time so that they are familiar with concepts and are able to solve the exercises set, whether manually or with the help of a computer. Autonomous study by students will be reinforced by the use of online tools.
Students will prepare a project in which they will design and create a database and design and implement a client-server application for modifying and querying this database.

LEARNING OBJECTIVES OF THE SUBJECT

The basic aim of this subject is to teach students how to design, implement and use small databases.
To pass the subject, the student should be able to do the following:
· Understand the basic concepts underlying databases.
· Apply data analysis and design techniques in a particular context.
· Use tools to convert logical designs into physical databases.
· Use and maintain data in a relational database management system.
· Implement programs for working with databases.

STUDY LOAD

Type	Hours	Percentage
Self study	90,0	60.00
Hours large group	30,0	20.00
Hours small group	30,0	20.00

Total learning time: 150 h

CONTENTS

TOPIC 1: DATA PERSISTENCE

Description:
1.1. The concept of economics.
1.2. Scarcity, choice and opportunity cost.
1.3. Factors and production.
1.4. Consumption, savings and wealth.
1.5. The choices available in a society.
1.6. Market functioning.
1.7. State intervention and market failures.
1.8. Demand, supply and market equilibrium.

Specific objectives:
For students to:
· Describe the concept of, and justify the need for, an external memory.
· Name and describe the different types of external memory
· Describe the concept of a file.
· Correctly use files.
· Describe the concept of a database.
· Name and describe the different database models.
· Name and describe the various programming paradigms.
· Understand the basic requirements of a program.
· Name and describe the phases of software development.
· Understand what an algorithm is.

Full-or-part-time: 8h
Theory classes: 2h
Laboratory classes: 2h
Self study : 4h

TOPIC 2: THE RELATIONAL MODEL

Description:
2.1. Relations.
2.2. Interrelations and keys.
2.3. Relational algebra.
2.4. Relational database design.

Specific objectives:
For students to:
· Understand relational terminology: domain, attribute, relation, view, interrelation, key.
· Understand referential integrity rules.
· Perform basic relational algebra operations.
· Make a logical design for a database.
· Convert a logical design into a normalised relational database.

Full-or-part-time: 24h
Theory classes: 8h
Laboratory classes: 4h
Self study : 12h

TOPIC 3: SQL LANGUAGE

Description:
3.1. Definition of data.
3.2. Data manipulation: insertion, modification and deletion.
3.3. Querying operations.

Specific objectives:
For students to:
- Understand the concept of rationality in decision-making by companies.
- Understand the concepts of short and long term in the theory of production.
- Distinguish between technical efficiency and economic efficiency.
- Relate the concepts of production and costs.
- Distinguish between the concepts of economic profit and accounting profit.
- Understand the characteristics of perfectly competitive markets and the process of maximising profit.
- Understand the long-term balance of a competitive market and the dynamics that exist until this balance is achieved.

Full-or-part-time: 50h
Theory classes: 10h
Laboratory classes: 12h
Self study : 28h

TOPIC 4: PROGRAMMING WITH DATABASES

Description:
4.1. Client-server structures.
4.2. Client implementation for database operations.

Specific objectives:
For students to:
· Design programs with client-server structures.
· Implement client programs for database manipulation and querying.

Full-or-part-time: 68h
Theory classes: 10h
Laboratory classes: 12h
Guided activities: 6h
Self study : 40h

ACTIVITIES

TITTLE OF THE ACTIVITY: ASSESSED PROJECT

Description:
Making a project (in group of three) that includes all the specific objectives of the course. It is done in groups. There will be 3 sessions with 3 groups of 3 people to work about topic 4.
The activity is based on collaborative work with experts. At the end of each session, every group has to implement a small program.

Material:
Examples of solved projects

Delivery:
Program done at the end of the session.
The evaluation of this work is included in activities of type 3.

Full-or-part-time: 6h
Guided activities: 6h

TITTLE OF THE ACTIVITY: ASSESSED PROJECT

Description:
Making a project (in group of three) that includes all the specific objectives of the course. It is done in groups. There will be 3 sessions with 3 groups of 3 people to work about topic 4.
The activity is based on collaborative work with experts. At the end of each session, every group has to implement a small program.

Material:
Examples of solved projects

Delivery:
Program done at the end of the session.
The evaluation of this work is included in activities of type 3.

TYPE 1: LAB TESTS

TYPE 2: INDIVIDUAL TESTS IN ATENEA

TYPE 3: INDIVIDUAL WORK IN ATENEA

TYPE 4: PROJECT IN GROUP

GRADING SYSTEM

Partial exam: 20%
Final Examen: 30%
Laboratory: 20%
Troubleshooting: 10%
Project: 20%

For those students who meet the requirements and submit to the reevaluation examination, the grade of the reevaluation exam will replace the grades of all the on-site written evaluation acts (tests, midterm and final exams) and the grades obtained during the course for lab practices, works, projects and presentations will be kept.
If the final grade after reevaluation is lower than 5.0, it will replace the initial one only if it is higher. If the final grade after reevaluation is greater or equal to 5.0, the final grade of the subject will be pass 5.0.

EXAMINATION RULES.

Students will be expected to have passed Foundation of Computing of first semester and Data Structures and Object-Oriented Design of second semester.

BIBLIOGRAPHY

Basic:
- Ullman, Jeffrey D. Introducción a los sistemas de bases de datos. México: Prentice Hall, 1999. ISBN 9701702565.
- Rivero Cornelio, Enrique [et al.]. Introducción al SQL para usuarios y programadores : a nivel de IBM DB2 UDB versión 7.2 o superior. 2a ed. Madrid: Thomson, 2002. ISBN 8497320824.
- Sistac Planas, J. [et al.]. Bases de dades. Barcelona: EDIUOC, 2000. ISBN 8484291057.
- Silberschatz, Abraham. Fundamentos de bases de datos [on line]. 5a ed. Madrid: McGraw-Hill, 2006 [Consultation: 14/09/2022]. Available on: https://ebookcentral-proquest-com.recursos.biblioteca.upc.edu/lib/upcatalunya-ebooks/detail.action?pq-origsite=primo&docID=3195647. ISBN 8448146441.

Complementary:
- Date, C. J. Introducción a los sistemas de bases de datos. 7a ed. México: Pearson Educación, 2001. ISBN 9684444192.
- Sistac Planas, Jaume. Tècniques avançades de bases de dades. Barcelona: EDIUOC, 2000. ISBN 8484291065.
- Luque Ruiz, Irene. Diseño y uso de bases de datos relacionales. Madrid: Ra-Ma, 1997. ISBN 847897279X.