320103 - BD - Data Bases

Coordinating unit: 205 - ESEIAAT - Terrassa School of Industrial, Aerospace and Audiovisual Engineering
Teaching unit: 723 - CS - Department of Computer Science
Academic year: 2019
Degree: BACHELOR'S DEGREE IN AUDIOVISUAL SYSTEMS ENGINEERING (Syllabus 2009). (Teaching unit Compulsory)
ECTS credits: 6

Teaching languages: Catalan, Spanish

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:
5. AUD_COMMON: Ability to use computerised research tools and information on telecommunications and electronics.
6. AUD_COMMON: Ability to use information and communication applications (office and databases, advanced calculation, project management, visualisation, etc.) to support the development and exploitation of networks, services and telecommunications and electronics applications.

Transversal:
1. SELF-DIRECTED LEARNING - Level 2: Completing set tasks based on the guidelines set by lecturers. Devoting the time needed to complete each task, including personal contributions and expanding on the recommended information sources.
2. EFFICIENT ORAL AND WRITTEN COMMUNICATION - Level 2. Using strategies for preparing and giving oral presentations. Writing texts and documents whose content is coherent, well structured and free of spelling and grammatical errors.
3. TEAMWORK - Level 2. Contributing to the consolidation of a team by planning targets and working efficiently to favor communication, task assignment and cohesion.
4. EFFECTIVE USE OF INFORMATION RESOURCES - Level 2. Designing and executing a good strategy for advanced searches using specialized information resources, once the various parts of an academic document have been identified and bibliographical references provided. Choosing suitable information based on its relevance and quality.
7. 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.
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**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**

<table>
<thead>
<tr>
<th><strong>Total learning time</strong>: 150h</th>
<th>Hours large group: 30h</th>
<th>20.00%</th>
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<tr>
<td></td>
<td>Hours medium group: 0h</td>
<td>0.00%</td>
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<tr>
<td></td>
<td>Hours small group: 30h</td>
<td>20.00%</td>
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<td></td>
<td>Guided activities: 6h</td>
<td>4.00%</td>
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<tr>
<td></td>
<td>Self study: 84h</td>
<td>56.00%</td>
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### TOPIC 1: DATA PERSISTENCE

<table>
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<th>Learning time: 8h</th>
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<tbody>
<tr>
<td>Theory classes: 2h</td>
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<tr>
<td>Laboratory classes: 2h</td>
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<tr>
<td>Self study: 4h</td>
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**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.
**TOPIC 2: THE RELATIONAL MODEL**

<table>
<thead>
<tr>
<th>Description:</th>
<th>Learning time: 24h</th>
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<tbody>
<tr>
<td>2.1. Relations.</td>
<td>Theory classes: 8h</td>
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<tr>
<td>2.2. Interrelations and keys.</td>
<td>Laboratory classes: 4h</td>
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<tr>
<td>2.3. Relational algebra.</td>
<td>Self study: 12h</td>
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<td>2.4. Relational database design.</td>
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**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.

**TOPIC 3: SQL LANGUAGE**

<table>
<thead>
<tr>
<th>Description:</th>
<th>Learning time: 50h</th>
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<tbody>
<tr>
<td>3.1. Definition of data.</td>
<td>Theory classes: 10h</td>
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<tr>
<td>3.2. Data manipulation: insertion, modification and deletion.</td>
<td>Laboratory classes: 12h</td>
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<tr>
<td>3.3. Querying operations.</td>
<td>Self study: 28h</td>
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</table>

**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.
TOPIC 4: PROGRAMMING WITH DATABASES

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

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.
### Planning of activities

| TITTLE OF THE ACTIVITY: ASSESSED PROJECT | Hours: 6h  
Guided activities: 6h |
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<tr>
<td><strong>Description:</strong></td>
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| 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. |                      |
| **Support materials:**                  |                      |
| Examples of solved projects              |                      |
| **Descriptions of the assignments due and their relation to the assessment:** |                      |
| Program done at the end of the session.  
The evaluation of this work is included in activities of type 3. |                      |

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**TYPE 1: LAB TESTS**

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**TYPE 2: INDIVIDUAL TESTS IN ATENEA**

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**TYPE 3: INDIVIDUAL WORK IN ATENEA**

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**TYPE 4: PROJECT IN GROUP**

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Qualification system

Partial exam: 20%
Final Exam: 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.

Regulations for carrying out activities

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:

Complementary: