COURSE DATA

Data Subject	
Code	34854
Name	Databases
Cycle	Grade
ECTS Credits	6.0
Academic year	2020 - 2021

Study (s)

Degree	Center	Acad. year	Period
1407 - Degree in Multimedia Engineering	School of Engineering	2	Second term

Subject-matter

Degree	Subject-matter	Character
1407 - Degree in Multimedia Engineering	9 - Gestión de la Información Multimedia	Obligatory

Coordination

Name	Department
VES CUENCA, ESTHER DE	240 - Computer Science

SUMMARY

The course “Databases” is taught during the second semester of the second 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 and Programación (first year) and Estructura de Datos y Algoritmos (second year, first semester) courses prior to taking this course.

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

1405 - Degree in Multimedia Engineering

- G1 - Be able to relate and structure information from different sources and to integrate ideas and knowledge. (RD1393/2007)
- G3 - Take into account the economic and social context in engineering solutions, be aware of diversity and multiculturalism and ensure sustainability and respect for human rights and equality between men and women.
- G5 - Be able to lead working groups properly, respect and appreciate the work of others, take into account the needs of the group and be available and accessible.
- I2 - Know, design and make an efficient use of the data types and data structures that are most suited to solving a problem.
- I7 - Know and apply the features, functionalities and structure of databases, be able to use them properly and to design, analyse and implement applications based on them.
- I8 - Know and apply the tools needed for the storage of, processing of and access to information systems, including web-based systems.

- MM3 - Be able to implement methodologies, technologies, processes and tools for the professional development of multimedia products in a real context of use by applying the appropriate solutions for each environment.
- MM5 - Know how to apply the theoretical and practical resources to deal with a multimedia application as a whole.
- MM8 - Integrate knowledge of different multimedia technologies to create products that offer global solutions that are appropriate to each context.
- MM26 - Be able to conceive, develop and maintain multimedia systems, services and applications using the methods of software engineering as a tool for quality assurance, according to the knowledge acquired as described in the specific competences.

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

Lecture 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

Lecture 4. The Entity/Relationship model
- A brief history
- Entities and atributes
- Relationships
- Restrictions
- Aggregation
- The extended E/R model

3. The relational model

Lecture 2. The relational model
- The relacional model
- Relational algebra
- Relational calculus

4. Databases design

Lecture 4. Database design
- Design methodologies
- Conceptual design
- Logical design. Normalization.
- Physical design

5. Query and data definition languages

Lecture 5. Query and data definition languages
- Introduction to SQL
- Data definition language (DDL)
- Data manipulation language (DML)
- Introduction toPL/SQL.

6. Accessing databases from software applications

Lecture 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.

The theoretical sessions will be carried out using the inverted class methodology in which the students review the material provided by the teacher prior to the session. Students will also solve an online questionnaire on the topic studied. The theory session will serve to reinforce with very practical examples all the concepts that the students consider, giving greater weight to the needs of the students. These sessions will last 2 hours. The teachers will also use these sessions to always give a global and integrating vision, highlighting the key aspects and of greater complexity, promoting student participation so that

learning is guided by the students. These theoretical sessions are also used to carry out other more practical activities such as problem solving and questions. They complement the classroom lessons with the aim of applying the basic concepts and expanding them with the knowledge and experience that they acquire during the completion of the proposed work.

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:

o Preparation of lectures and reading of recommended texts

o Problems resolution

o Homework to be evaluated by the lecturer

o Laboratory sessions preparation with anticipation

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

The e-learning platform (Virtual Classroom) of the Universitat de València will be used as a support for communication with students and their multiple resources (questionnaires, workshops, interactive content, etc.). Through it you will have access to the didactic material used in class, as well as the problems and exercises to solve

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 10 at N_Activities for the formula to be applied.

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.

For the second call of the subject, the notes of the parts approved in 1st call with the same weight are kept (provided that the student has actively worked in class). Rest of percentage of a theoretical-practical exam. For this average to apply, the student must have attended all the laboratory classes. If this is not the case, you must take an additional written test of the contents seen in the laboratory sessions.

In any case, the evaluation of this subject will be done in compliance with the University Regulations in this regard, approved by the Governing Council on 30th May 2017 (ACGUV 108/2017)

REFERENCES

Basic

- Henry F. Korth, Abraham Silberschatz. Fundamentos de Bases de Datos. McGraw Hill, 2000
- Ramez A. Elmasri, Shmkant B. Navathe Fundamentos de Sistemas de Bases de Datos. Addison Wesley, 2002
- R. Ramakrishnan, J. Gehrke Database Management Systems. McGraw-Hill, 2000.

Additional

- T. Connolly, C. Carolyn Begg Database systems. A practical approach to design, implementation and management. Pearson Education. 2015
- C. J. Date. Introducción a los sistemas de bases de datos. Pearson Education, 1993.
- M. Celma, J.C. Casamayor, L. Mota. Bases de datos relacionales. Pearson Educación. 2003.

ADDENDUM COVID-19

This addendum will only be activated if the health situation requires so and with the prior agreement of the Governing Council

The teaching methodology for this subject will follow the model approved by the Academic Committee of the GII / GIM degrees (https://links.uv.es/catinfmult/modeloDocent). If the facilities are closed because of COVID-19 pandemics, the scheduled lectures will be replaced by synchronous online sessions within the assigned time slots of the course, using the tools provided by the university.

If the facilities need to be closed due to the pandemics causing any of the evaluation exercises to be held at ETSE-UV, these exercises will be substituted by equivalent exercieses held online using the tools provided by the university. The weights for each activity will remain the same as specified in the teaching guide.