Asignatura: Databases
Código: 18508
Centro: Escuela Politécnica Superior
Titulación: Grado en Ingeniería de Tecnologías y Servicios de Telecomunicación
Nivel: Grado
Tipo: Optativa
Nº de créditos: 6

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COURSE TITLE

DATABASES (DB)

1.1. Course number

18508

1.2. Course area

Computer Systems

1.3. Course type

Optative

1.4. Course level

Graduate

1.5. Year

3rd

1.6. Semester

1st

1.7. Credit allotment

6 ECTS

1.8. Prerequisites

This course is the first contact of the student with database technologies and their applications. It is recommended to be previously approved *Fundamentals of Computer Systems*. The course includes nonetheless an important part devoted to the implementation of databases, for which the student requires a good level of programming in C, acquired in the corresponding first year courses.

1.9. Faculty data

Add @uam.es to all email addresses below.

Theory:

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Labs:

To be confirmed

1.10. Course objetives

Databases is an introductory course to the technology and fundamentals of databases. It aims the student to acquire basic knowledge on database design, creation and management, as well as the internal mechanisms upon which common database technologies are built.

The targeted **competencies** of the course are:

Common:

FB2: Knowledge and application of the characteristics, functionalities and structure of databases, enabling their adequate use, and the design, analysis and implementation of applications based thereupon.

The course is driven towards the following objectives:

GENERAL OBJECTIVES	
G1	Create and manage databases, and use them to solve computer science problems
G2	Describe the internal mechanisms and foundations of databases, and their effect on their external functionality
G3	Use database technologies in an adequate and optimal way

SPECIFIC OBJECTIVES BY TOPIC

UNIT 1.- Introduction to databases	
1.1.	Types of databases
1.2.	Design databases for storing structured information

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1.3.	Practical use of a DBMS as end-user or administrator
UNIT 2.- Entity-relationship model and relational model	
2.1.	Entity-relationship model
2.2.	Formal and systematic design of databases
2.3.	Formalize the properties of a relational design
2.4.	Encode queries as logic relational expressions
UNIT 3.- Relational algebra	
3.1.	Formalize the representation of relational operations and queries
3.2.	Describe the internal query representation and execution mechanisms
3.3.	Optimize query execution
UNIT 4.- Query languages	
4.1.	Apply the main advanced features of the SQL language
4.2.	Use alternative languages to query formulation

1.11. Course content

Overview

UNIT 1. Introduction to databases
UNIT 2. Entity-relationship model and Relational model
UNIT 3. Relational algebra
UNIT 4. Query languages

Detailed topics

1.- INTRODUCTION TO DATABASES

Concepts and definitions
Types of databases
Data models
Database languages
Database management systems

2.- ENTITY-RELATIONSHIP MODEL AND RELATIONAL MODEL

Entity-relationship model
Relational schema design
Functional dependencies
Normal forms
Relational calculus

3.- RELATIONAL ALGEBRA

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Operations
Logical plan
Rewriting
Optimization

4.- QUERY LANGUAGES

SQL
Other languages

1.12. Course bibliography

Bibliografía:

Fundamentals of Database Systems (5th edition). Ramez Elmasri, Shamkant Navathe. Addison Wesley, 2007. INF/681.31.65/ELM.

Database Management Systems (3rd edition). Raghu Ramakrishnan, Johannes Gehrke. McGraw-Hill, 2003. INF/C6160/RAM.

Database Systems: The Complete Book (2nd edition). Hector Garcia-Molina, Jeffrey D. Ullman, Jennifer Widom. Prentice Hall, 2008.

Database System Concepts (6th edition). Abraham Silberschatz, Henry F Korth, S Sudarshan. McGraw-Hill, 2007. INF/681.31.65/SIL.