

Academic Year: (2023 / 2024)

Review date: 09-02-2024

Department assigned to the subject: Computer Science and Engineering Department

Coordinating teacher: CALLE GOMEZ, FRANCISCO JAVIER

Type: Compulsory ECTS Credits : 6.0

Year : 3 Semester : 2

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

- Programming (1st year, 1st term)
- Discrete Mathematics (1st year, 2nd term)
- Algorithms and Data Structures (2nd year, 2nd term)
- Computer Structure (2nd year, 1st term)

SKILLS AND LEARNING OUTCOMES

CB1. Students have demonstrated possession and understanding of knowledge in an area of study that builds on the foundation of general secondary education, and is usually at a level that, while relying on advanced textbooks, also includes some aspects that involve knowledge from the cutting edge of their field of study.

CB2. Students are able to apply their knowledge to their work or vocation in a professional manner and possess the competences usually demonstrated through the development and defence of arguments and problem solving within their field of study.

CB3. Students have the ability to gather and interpret relevant data (usually within their field of study) in order to make judgements which include reflection on relevant social, scientific or ethical issues.

CB4. Students should be able to communicate information, ideas, problems and solutions to both specialist and non-specialist audiences.

CB5. Students will have developed the learning skills necessary to undertake further study with a high degree of autonomy.

CG1. Students are able to demonstrate knowledge and understanding of concepts in mathematics, statistics and computation and to apply them to solve problems in science and engineering with an ability for analysis and synthesis.

CG3. Students can solve computationally with the help of the most advanced computing tools mathematical models coming from applications in science, engineering, economy and other social sciences.

CG4. Students are able to show that they can analyze and interpret, with help of computer science, the solutions obtained from problems associated to real world mathematical models, discriminating the most relevant behaviours for each application.

CG6. Students can search and use bibliographic resources, in physical or digital support, as they are needed to state and solve mathematically and computationally applied problems arising in new or unknown environments or with insufficient information.

CE12. Students have shown that they know the main data structures, being able to use, design, and implement them determining its computational and storage complexity.

CE18. Students know how to evaluate and select in an adequate way storage systems and database management systems and to adequately design storage and access structures, as well as applications that make use of them, including data visualization tools.

RA2. Through sustained and well prepared argument and procedures, students will be able to apply their knowledge, their understanding and the capabilities to resolve problems in complex specialized professional and work areas requiring the use of creative and innovative ideas.

RA3. Students must have the capacity to gather and interpret data and information on which they base their conclusions, including where relevant and necessary, reflections on matters of a social, scientific, and ethical nature in their field of study.

RA5. Students must know how to communication with all types of audiences (specialized or not) their knowledge, methodology, ideas, problems and solutions in the area of their field of study in a clear and

precise way.

RA6. Students must be capable of identifying their own education and training needs in their field of study and the work or professional environment and organize their own learning with a high degree of autonomy in all types of contexts (structured or not).

DESCRIPTION OF CONTENTS: PROGRAMME

The descriptors associated with the subject are: File structures serial, sequential, hashed and indexed. Multidimensional access. Relational Data Model. Database Management Systems for Relational Databases. SQL database language: definition and manipulation.

The program features the following agenda:

ITEM 1. Introduction to Data Bases

Storage and Files: Physical vs. Logical focuses
Definition of Database

ITEM 2. The Relational Statics

Elements of the Relational Model. Description and notation.
Inherent vs. Semantic Constraints

ITEM 3. The Relational Dynamics

Relational Algebra
Data Manipulation through SQL

ITEM 4. Advanced Relational

Views
Triggers

ITEM 5. Introduction and Basic Concepts

File Design. Goals of Physical Design.
File Processing: Selection vs. Location

ITEM 6. Base Structures

Basic structures: Serial and Sequential
Direct Access and Hashing
Clusters

ITEM 7. Auxiliary Structures

Indexed Organization
B Tree-structured indexes
Special Indexes: bitmap
Index supported Processes

ITEM 8. Data Base Management Systems

Architecture and Fundamentals of the RDBMS Oracle
Internal Schema in the RDBMS Oracle
Processes and Execution Plans the RDBMS Oracle

ITEM 9. DB Paradigms & Analytic DB

Storage characterization: OLTP vs. OLAP
Introducing OLAP technologies: types, uses and tools.

LEARNING ACTIVITIES AND METHODOLOGY

THEORETICAL-PRACTICAL CLASSES. [44 hours with 100% classroom instruction, 1.67 ECTS]

Knowledge and concepts students must acquire. Student receive course notes and will have basic reference texts to facilitate following the classes and carrying out follow up work. Students partake in exercises to resolve practical problems and participate in workshops and evaluation tests, all geared towards acquiring the necessary capabilities.

TUTORING SESSIONS. [4 hours of tutoring with 100% on-site attendance, 0.15 ECTS]

Individualized attendance (individual tutoring) or in-group (group tutoring) for students with a teacher.

STUDENT INDIVIDUAL WORK OR GROUP WORK [98 hours with 0 % on-site, 3.72 ECTS]

WORKSHOPS AND LABORATORY SESSIONS [8 hours with 100% on site, 0.3 ECTS]

FINAL EXAM. [4 hours with 100% on site, 0.15 ECTS]

Global assessment of knowledge, skills and capacities acquired throughout the course.

METHODOLOGIES

THEORY CLASS. Classroom presentations by the teacher with IT and audiovisual support in which the subject's main concepts are developed, while providing material and bibliography to complement student learning.

PRACTICAL CLASS. Resolution of practical cases and problem, posed by the teacher, and carried out individually or in a group.

TUTORING SESSIONS. Individualized attendance (individual tutoring sessions) or in-group (group tutoring sessions) for students with a teacher as tutor.

LABORATORY PRACTICAL SESSIONS. Applied/experimental learning/teaching in workshops and laboratories under the tutor's supervision.

ASSESSMENT SYSTEM

% end-of-term-examination: 50

% of continuous assessment (assignments, laboratory, practicals...): 50

Assessment - REGULAR CALL:

There are two configurations to be assessed in regular call: Continuous Assessment or Single Exam.

To pass the course by any of these routes, it is necessary to obtain a minimum of 5 points.

CONTINUOUS ASSESSMENT:

It consists of five assessment elements (during the teaching period) worth one point each, and an end-of-term (final) examination worth five points.

Those five elements are a theoretical test, a laboratory exam, and three (home) assignments.

The laboratory elements are compulsory, and obtaining less than 20% of the score in any of them (three assignments and one laboratory exam) entails the exclusion of the student from the continuous assessment process.

SINGLE EXAM: it is an exam with a maximum value of 6 points, in which the knowledge, skills and abilities acquired throughout the course will be assessed globally. The date of this exam is the same scheduled for the end-of-term exam.

Assessment - EXTRAORDINARY CALL

It consists of an exam with a maximum value of 10 points, and it is necessary to obtain a minimum of 5 points to pass the subject in this way.

BASIC BIBLIOGRAPHY

- Cuadra, D., Castro, E., Iglesias, A., Martínez, P., Calle, J., de Pablo, C., Al'Jumaily, H., Moreno, L. Desarrollo de Bases de Datos: casos prácticos desde el análisis a la implementación, Ra-Ma, 2ª ed. revisada y ampliada (2013)

- Elmasri, R. y Navathe, S. Fundamentals of Database Systems (7th ed.), Pearson Education, 2017

- Oracle® SQL*Plus. User's Guide and Reference, <http://docs.oracle.com/database/121/SQPUG/E18404-12.pdf>, 2013

- Oracle® Database SQL Language Reference, <http://docs.oracle.com/database/121/SQLRF/E41329-17.pdf>, 2015

ADDITIONAL BIBLIOGRAPHY

- Date, C.J. An introduction to database systems (7th edition)., Pearson Educación, 2001

- Frakes, W. y Baeza-Yates, R., Eds. Information retrieval. Data structures and algorithms., Prentice Hall., 1992

- Gaede, O. and Günther, V. (1998). Multidimensional Access Methods., ACM Computing Surveys, Vol. 30, No. 2. , (c) 1998 ACM NY.

- Guttman, A. R-trees: A dynamic index structure for spatial searching, Procs. of the ACM SIGMOD 84, Int. Conference on Management of Data., 1984

- Livadas, Panos E. File Structures: Theory and Practice., Ed. Prentice-Hall Int, 1990

- Ramakrishnan, R.; Gehrke, J. Database management systems, WCB/McGraw Hill. , 3rd ed., 2012

BASIC ELECTRONIC RESOURCES

- Oracle Corp . Oracle® Database PL/SQL Language Reference: <https://docs.oracle.com/en/database/oracle/oracle-database/12.2/lnpls/index.html>

- Oracle Corp . SQL Language Quick Reference: <https://docs.oracle.com/en/database/oracle/oracle-database/12.2/sqlqr/index.html>

- Oracle Corp. . Oracle Database Express Edition 18c Release 18.4:
<http://www.oracle.com/technetwork/products/express-edition/downloads/index.html>

- Oracle Corp. . Oracle SQL*Plus Quick Reference: <https://docs.oracle.com/en/database/oracle/oracle-database/12.2/sqpqr/index.html#SQPQR101>

- Oracle Corp. . PL/SQL Language Reference: <https://docs.oracle.com/en/database/oracle/oracle-database/12.2/lnpls/index.html>

- Oracle Corp. . Database PL/SQL Packages and Types Reference:
<https://docs.oracle.com/en/database/oracle/oracle-database/12.2/arpls/index.html>