Files and data bases

Academic Year: (2021 / 2022) **Review date: 05/07/2021 09:35:53**

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

OBJECTIVES

LEARNING OUTCOMES:

R1. Knowledge and understanding: To acquire basic knowledge and understanding of the scientific and technological foundations of Computer Engineering, as well as specific knowledge of computer science, computer engineering and information systems.

R2 Engineering Analysis: Being able to identify Computer Engineering problems, recognize their specifications, establish different resolution methods and select the most appropriate one for their solution, taking into account the applicable social, human health, environmental, and commercial limitations, in each case.

R3 Engineering Design: To be able of carrying out engineering designs, according to their level of knowledge and understanding, that meet the required specifications, collaborating with other engineers and graduates. Design encompasses devices, processes, methods, objects, and specifications that are broader than strictly technical, including social awareness, health and safety, and environmental and business-related considerations.

R4 Research and Innovation: To be able of using appropriate methods to carry out research and carry out innovative contributions in the field of Computer Engineering.

R5 Engineering Applications: Graduates will be able of applying their knowledge and understanding to solve problems, direct research and design devices or processes in the field of Computer Engineering, according to criteria of cost, quality, safety, efficiency, respect for the environment, and ethical implications. These skills include the knowledge, use, and limitations of computer systems, process engineering, computer architectures, computational models, equipment, practical work, technical literature, and information sources.

BASIC AND GENERAL COMPETENCES:

CG2 ¿ To be able of generating new ideas (creativity), of anticipating new situations, and of adapting to teamwork and of interacting with other professionals, but being able of working autonomously at the same time.

CG1 ¿ To apply appropriate theoretical and practical methods for the analysis, design and resolution of problems, providing IT solutions that respect the standards of accessibility, ergonomics and safety at work and that comply with existing legislation.

CG3 ¿ To be able of assessing the different possible solutions from a technical, profitable and professional point of view while observing the current legislation in both the general and the professional fields.

CGB3 - Ability to understand and master the basic concepts of discrete mathematics, logic, algorithmic and computational complexity, and its application for solving engineering problems.

CGB4 - Basic knowledge about the use and programming of computers, operating systems, databases and computer programs with applications in engineering.

CGB5 - Knowledge of the structure, organization, operation and interconnection of computer systems, the fundamentals of computer programming, and their application for solving engineering problems.

CG9 - Efficiently use ICT media to write technical reports and project reports on Computer Science, as well as high-quality presentations.

CGO3 - Ability to design, develop, evaluate and ensure the accessibility, ergonomics, usability and security of computer systems, services and applications, as well as the information they manage.

CGO8 - Knowledge of basic subjects and technologies that enable the learning and development of new methods and technologies, as well as those that provide them with great versatility to adapt to new situations.

CGO9 - Ability to solve problems with initiative, decision-making, autonomy and creativity. Ability to know how to communicate and transmit the knowledge, abilities and skills of the profession of Computer Engineer.

CB2 - To know how to apply their knowledge to their work or vocation in a professional way, and have the skills that are usually demonstrated through the development and defense of arguments and resolution of problems within their area of study

SPECIFIC SKILLS:

CECRI5 - Knowledge, administration and maintenance of computer systems, services and applications.

CECRI7 - Knowledge, design and efficient use of the most appropriate data types and structures to solve any given problem.

CECRI12 - Knowledge and application of the characteristics, functionalities and structure of databases, which allow their proper usage, and the design and analysis and implementation of applications based on them.

CECRI13 - Knowledge and application of the tools required for the storage, processing and access to Information Systems, including those based on the web.

CECRI17 - Ability to design and evaluate person-computer interfaces that guarantee accessibility and usability to computer systems, services and applications.

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.
Selection vs. Location

ITEM 6. Base Structures
Basic structures: Serial and Sequential
Hashing
Clusters

ITEM 7. Auxiliary Structures
Indexed Organization
B Tree-structured indexes
Special Indexes
Index supported Processes

ITEM 8. Data Base Management Systems
Architecture and Fundamentals of the RDBMS Oracle
Database Administration, Control and Tuning
DBMS Conectivity

ITEM 9. Storage Paradigms

LEARNING ACTIVITIES AND METHODOLOGY

AF1.THEORETICAL-PRACTICAL CLASSES (1.7 ECTS). Knowledge and concepts students must acquire. Student receive course notes and will have basic reference texts to facilitatefollowing the classes and carrying out follow up work.Students partake in exercises to resolve practical problems and participatein workshops and an evaluation tests, all geared towards acquiring the necessary capabilities.
Temporization: 44 hours, 100% presential instruction

AF8.WORKSHOPS AND LABORATORY SESSIONS (0.3 ECTS). Temporization: 8 hours, 100% presential instruction

AF2.TUTORING SESSIONS (0.2 ECTS). Individualized attendance (individual tutoring) or in-group (group tutoring) for students with a teacher.
Temporization: 4 hours, 100% presential instruction.

AF3.STUDENT INDIVIDUAL WORK OR GROUP WORK (3.8 ECTS). Temporization: 98 hours, 0% presential instruction

MD1.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.
MD2.PRACTICAL CLASS. Resolution of practical cases and problem, posed by the teacher, and carried out individually or in a group.
MD3.TUTORING SESSIONS. Individualized attendance (individual tutoring sessions) or in-group (group tutoring sessions) for students with teacher as tutor.
MD6.LABORATORY PRACTICAL SESSIONS. Applied/experimental learning/teaching in workshops and laboratories under the tutor's supervision.

ASSESSMENT SYSTEM

% end-of-term-examination/test:	40
% of continuous assessment (assigments, laboratory, practicals…):	60

SE1.FINAL EXAM. Global assessment of knowledge, skills and capacities acquired throughout the course.

SE2.CONTINUOUS EVALUATION. Assesses papers, projects, class presentations, debates, exercises, internships and workshops throughout the course.

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

- Folk, M. J., Zoellick, B., y Riccardi, G. File Structures., Addison Wesley , 1998

- 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

- Silverschatz, A., Korth, H. F. & Sudarshan, S. Database System Concepts, 7th ed , Mc-Graw Hill, 2019

ADDITIONAL BIBLIOGRAPHY

- Date, C.J. An introduction to database systems (7th edition)., Pearson Education, 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. (1984). R-trees: A dynamic index structure for spatial searching, Procs. of the ACM SIGMOD ¿84, Int. Conference on Management of Data..

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

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