Escuela Técnica Superior de Ingeniería

GENERAL SPECIFICATIONS

COURSE 22/23

Subject Data

Name:

Diseño y Desarrollo de Sistemas de Información

English name:

Information Systems – Design & Development

Code:	Type:
606010212	Compulsory

Hours:

	Total	In class	Out class
Time distribution	60	60	

ECTS:

Standard group	Small groups			
	Classroom	**Lab**	**Practices**	**Computer classroom**
	40	20		

Departments:	Knowledge areas:
Tecnologías de la Información	Lenguajes y Sistemas Informáticos

Year:	Semester
3°	1°

TEACHING STAFF

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Others Data (Tutoring, schedule...)

See: https://www.uhu.es/etsi/informacion-academica/informacion-comun-todos-los-titulos/horarios-2/

SPECIFIC INFORMATION OF THE COURSE

1. Contents description:

1.1 In English:

Information Systems – Design & Development studies the Information System, focused on the design and implementation of databases. To do this, the following contents will be developed:
- Architectures, features, components, and types of information systems.
- Conceptual and logical database design.
- Implementation of procedures for an efficient database access.

1.2 In Spanish:

En líneas generales, la asignatura "Diseño y Desarrollo de Sistemas de Información" estudia los Sistemas de Información, haciendo hincapié en el diseño e implementación de bases de datos. Para ello, se desarrollarán los siguientes contenidos:
- Construcción, depuración y ejecución de programas para el acceso y gestión de la información almacenada en una base de datos.
- Restricciones de integridad y lógica de negocio a distintos niveles: conceptual, lógico, físico o de aplicación.
- Persistencia de objetos en bases de datos relacionales.
- Modelos de bases de datos orientados a objeto y objeto-relacionales
- Sistemas de información: arquitecturas, características, componentes y tipos.
- Programación en el ámbito web orientados al desarrollo de sistemas de información.
- Diseño conceptual de sistemas de información basándose en metodologías de análisis conjunto de datos y aplicaciones.
- Desarrollo y despliegue de aplicaciones de sistemas de información

2. Background:

2.1 Situation within the Degree:

"Information Systems - Design & Development" is a 3rd-year, 1st-semester course designed to give students knowledge about database design, data modeling, and implementation in a DBMS. In the 2nd year, 2nd semester, the subject of "Databases" delves deeper into the relational model. This understanding is necessary to see the connection between conceptual data modeling and the logical data model. Additionally, the subject of "Introduction to Software Engineering" covers the basics of software design and development for software projects.

2.2 Recommendations

Basic programming knowledge.

3. Objectives (as result of teaching):

The main objectives of Information Systems - Design & Development are to provide students with a general overview of information systems and to equip them with the tools necessary to design and access databases. By studying this subject, students will learn how to:
- Design and develop applications and information systems that interact with databases, ensuring their reliability, safety, and quality.
- Analyze and design the conceptual and logical model of a database.
- •Understand the main characteristics and applications of object-relational databases.

4. Skills to be acquired

4.1 Specific Skills:

CC01: Ability to design, develop, select and evaluate applications and computer systems, ensuring their reliability, safety and quality, in accordance with ethical principles and current legislation and regulations.
CC05: Knowledge, administration and maintenance of computer systems, services and applications.
CC12: Knowledge and application of the characteristics, functionalities and structure of the databases, which allow their proper use, and the design and analysis and implementation of applications based on them.
CC13: Knowledge and application of the necessary tools for storage, processing and access to Information Systems, including web-based ones.

4.2 General, Basic or Transversal Skills:

CB1 - Demonstrate to understand and have acquired knowledge about an area of study that starts from basic Secondary Education, and is often at supported by advanced textbooks, but also includes some aspects that involve knowledge related to the forefront of their field of study.
CG0 - Ability to analyze and synthesize: Find, analyze, critique (critical reasoning), relate, structure and synthesize information from various sources, as well as integrate ideas and knowledge.
G03 - Ability to solve problems
G06 - Capacity for autonomous learning as well as initiative and entrepreneurial spirit
G08 - Ability to adapt to technologies and future environments by updating professional skills.
TC2 - Develop a critical attitude, being able to analyse and synthesize.
TC3 - Develop an attitude of inquiry that permanently enables to review and deepen in the knowledge.
TC6 - Promote, respect and safeguard human rights, democratic values, social equality and environmental sustainability, without discrimination on the basis of birth, race, sex, religion, opinion or other personal or social circumstances.

5. Training Activities and Teaching Methods

5.1 Training Activities:

- Evaluation activities and self-evaluation
- Practical sessions in specialized laboratories
- Lecture
- individual work

5.2 Teaching Methods::

- Participatory magisterial class.
- Development of practices in specialized laboratories or computer classrooms in small groups.
- Problem solving and practical exercises.
- Presentation, Implementation, tutoring and presentation of works.
- Evaluations and exams.

5.3 Development and Justification:

In each participatory magisterial class, main concepts of each subject will be explained. To facilitate the learning process, problem sessions or exercises will be interspersed during these with the aim that the students themselves can assess their level of knowledge and delve into the concepts developed. One or several tests will be carried out in which the student will have the opportunity to evaluate the knowledge acquired during the study of the subject. These tests will be part of the "Academically Directed Activities" (ADA). As a complement to the ADA, activities related to the theme of this subject (seminars, conferences, etc.) will be scheduled, whenever possible.

The practices (lab sessions) of this subject will consist of exercises and a design and development project for an information system that accesses a database. The teaching staff will explain the necessary concepts to approach the project with guarantees. During the practice sessions, students will individually implement a secure, reliable, and scalable client/server application that accesses data stored in a remote database. The subject has a web page on the Moodle platform so that students are promptly informed and where they can consult the necessary material to prepare the subject of theory and practice. However, the use of additional bibliography resources and sources of knowledge is recommended.

6. Detailed Contents

Topic 1. What is an Information System?
      - Information systems
      - Databases and Information Systems
Topic 2. Conceptual Data Model and Logical Data Model
      - Conceptual Data Modeling Elements: Entity-Relationship Model
      - The Enhanced Entity Relationship model
      - Design Considerations
      - Mapping EER model to relations
Topic 3. Non-Relational Databases
      - What is a non-relational database?
      - The benefits of a non-relational database
      - Non-relational databases and application development.

Laboratory sessions

Lab sessions will consist of the development of programs to access relational and non-relational databases through a client-server architecture, using the Java programming language and a DBMS (Oracle, MySQL and MongoDB). In addition, a project using object relational mapping, JDBC and Java graphical libraries will be developed.

7. Bibliography

7.1 Basic Bibliography:

Database Systems: A Practical Approach to Design, Implementation, and Management, Fouth Edition
Thomas M. Connolly, Carolyn E. Begg
Pearson Educacion, 2014

Sistemas de bases de datos. Un enfoque práctico para diseño, implementación y gestión (4ª edición)
Thomas M. Connolly, Carolyn E. Begg
Pearson Educacion, 2006
http://columbus.uhu.es/record=b1370230~S1*spi

Beginning Java Databases, 2002
Kevin Mukhar,Todd Lauinger, John Carnell , James R. De Carli, Mark Mamoner, Nitin Nanda , Damon Payne , Joel Peach
ISBN-10: 1861004370
ISBN-13: 978-1861004376

Fundamentos de bases de datos con Java
Kevin Mukhar
Anaya Multimedia, 2002

7.2 Additional Bibliography:

ANEXO I

Fundamentals of Databases Systems (Sixth Edition)
Ramez A. Elmasri, Shamkant B. Navathe
Addison Wesley, 2011

Fundamentos de Sistemas de Bases de Datos (3ª edición)
Ramez A. Elmasri, Shamkant B. Navathe
Addison Wesley, 2002
http://columbus.uhu.es/record=b1341702~S1*spi

8. Systems and Assessment Criteria

8.1 System for Assessment:

- Examination of theory / problems
- Defense /Examen of practice
- Individual monitoring (partial tests and activities)

8.2 Assessment Criteria and Marks:

8.2.1 Examinations Convocatory I

The final grade through continuous assessment will be calculated using the following formula:

Final mark = 0.4 * Theory mark + 0.3 * Practice defense mark + 0.2 * Practice exam mark + 0.1 * Academically Directed Activities mark

To earn a passing grade in this class, students will need to earn at least a 3 on the theory section of the continuous assessment, a 3 on the practical defense, and a 3 on the practice exam. The theory exam will focus on problem solving and theoretical/practical questions related to the theory syllabus. Students are only allowed to use material that the teacher has indicated and nothing else. This exam will assess the specific skills CC01, CC05, CC12, and CC13 in their most theoretical aspects, as well as the basic and general skills CB1, CG0, and CG03.

The practice defense will consist of the evaluation of the documentation and functionality of the proposed project. The practice exam will consist of resolving one or several exercises related to the project. The skills being assessed in the practice exam are CC01, CC05, CC12, and CC13 in their practical aspects. Additionally, the general skills CG0, CG03, and CG08 will be evaluated.

Students' individual performance will be evaluated through some of the Academically Directed Activities detailed in the "Training Activities and Teaching Methodologies" section. The competencies being evaluated through this type of activity are general competences CG03 and CG06, and the transversal ones CT2, CT3, and CT6.

A part of the evaluation for the subject (theory grade, practice grades, or Academically Directed Activities grade) will be considered passed when the grade is a 5 or higher out of 10. In this case, the passed part of the assessment can be transferred from one term to the next. To transfer some of the qualifications from one term to the next, the student must indicate it through the mechanisms proposed by the teaching staff. If no indication is given, it will be assumed that the student does not wish to transfer any qualifications.

Honors
The student must obtain a 10 in his final grade. If there are more students with this final grade, and it is not possible to grant them all due to the number of students enrolled, it will be granted to the student with best mark in a new exam between all the candidates.

8.2.2 Examinations Convocatory II

Same as Convocatory I

8.2.3 Examinations Convocatory III

Same as Final Single Assessment

8.2.4 Extraordinary Convocatory

Final Single Assessment

8.3 Single Final Evaluation:

Final Single Assessment

Students who want to benefit from the final single evaluation must communicate it in the first two weeks of the subject, or in the two weeks following enrolment if it has occurred after the beginning of the subject. To do this, a link will be enabled on the web of the subject. For these cases, the following formula will be applied for its evaluation:

Final grade = 0.6 * Theory exam + 0.4 * Defense practice

In this case, both the theory exam and the internship exam will take place on the day set by the University. The theory exam will consist of problem solving and theoretical / practical questions related to the theory syllabus. For the performance of this exam, no additional material may be used except that indicated. The defense practice will consist of the development of a complete application (in the laboratory) that accesses a database, using the same methodologies and tools as those presented during the course.

In the final single evaluation, to pass the subject the student must obtain, at least, 5 points out of 10 in the theory exam and 5 points out of 10 in the practice exam.