

# Bachelor in Computer Science Engineering

## Course information

Year 2021-22

GENERAL SPECIFICATIONS			
<b>English name</b>			
Information Systems – Design & Development			
<b>Spanish name</b>			
Diseño y Desarrollo de Sistemas de Información			
<b>Code</b>		<b>Type</b>	
606010212		Compulsory	
<b>Time distribution</b>			
	<b>Total</b>	<b>In class</b>	<b>Out class</b>
Working hours	150	60	90
<b>ECTS: 6</b>			
<b>Standard group</b>		<b>Small groups</b>	
	<b>Classroom</b>	<b>Lab</b>	<b>Practices</b>
<b>3</b>		<b>3</b>	<b>0</b>
<b>Departments</b>		<b>Knowledge areas</b>	
Tecnologías de la Información		Lenguajes y Sistemas Informáticos	
<b>Year</b>		<b>Semester</b>	
3º		1º	

TEACHING STAFF			
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SPECIFIC INFORMATION OF THE COURSE
<b>1. Contents description</b>
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: <ul style="list-style-type: none"> <li>– Architectures, features, components and types of information systems.</li> <li>– Conceptual and logical database design.</li> <li>– Implementation of procedures for an efficient database access.</li> </ul>
1.2. In Spanish
En líneas generales, la asignatura “Diseño y Desarrollo de Sistemas de Información” estudia los Sistemas de Información, haciendo especial hincapié en el diseño e implementación de bases de datos. Para ello, se desarrollarán los siguientes contenidos: <ul style="list-style-type: none"> <li>– Construcción, depuración y ejecución de programas para el acceso y gestión de la información almacenada en una base de datos.</li> <li>– Restricciones de integridad y lógica de negocio a distintos niveles: conceptual, lógico, físico o de aplicación.</li> <li>– Persistencia de objetos en bases de datos relacionales.</li> </ul>

- 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 where the student will gain knowledge about database design, data models and their implementation in a DBMS. In the subject "Databases", (2<sup>nd</sup> year, 2<sup>nd</sup> semester) relational model is studied in depth. This knowledge is needed to understand the relation between the conceptual data modeling and the logical data model. On the other hand, in the subject "Introduction to Software Engineering", the foundations of design and development of software projects is studied.

### 2.2. Recommendations:

No recommendations

## 3. Objectives (as result of teaching):

Information Systems – Design & Development has as main objectives to provide the student with a general vision of information systems and to provide the necessary mechanisms for the design and access to the databases. Through the study of this subject, the student will learn 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.
- Know 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 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. To 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

### 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.

The practice activity of this subject will consist of carrying out exercises and a project for the design and development of an information system.

Also, several partial test will be done. The final evaluation of the subject will consider the evaluation of the theoretical exam, the defense of the practice part, individual work or activities and partial tests, as detailed in the "Systems and Assessment Criteria" section

This subject has a web site, where students can consult the material to prepare each class, as well as the necessary documentation for each practical session. Students who wish may bring material to the class (books, laptops, etc.).

## 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. In addition, a project using object relational mapping, JDBC and Java graphical libraries.

**7.1. Basic Bibliography**

Database Systems: A Practical Approach to Design, Implementation, and Management, Fourth 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](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:**

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](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:**

## Continuous Evaluation

- **Examination Call I and II**

The final grade will be obtained as follows:

$$\text{Final Grade} = 0.5 * \text{TPEXam} + 0.4 * \text{PracticalDefense} + 0.1 * \text{ISM}$$

- TPEXam = Theoretical-Problems Exam. The theory exam will consist of problem solving and theoretical / practical questions related to the theory syllabus. Skills CC01, CC05, CC12, CC13, CB1, CG0 and CG03
- PracticalDefense = The practical mark will be obtained by evaluating the developed project and its defense. For the defense, the student will have to solve, one or more exercises related to the developed project. Skills CC01, CC05, CC12, CC13, CG0, CG03 and CG08
- ISM = Individual Student Monitoring. Partial test and activities. Skills CG03, CG06 CT2, CT3, CT6

### Considerations:

- To pass the course in the continuous assessment, students must obtain at least 3 points out of 10 in the grade TPEXam, at least, 3 points out of 10 PracticalDefense and at least 5 out 10 in Final Grade.
- In case of failing Examination Sitting I (Final Grade less than 5) a part of the evaluation will be considered passed when their grade is greater than or equal to 5 points out of 10. In this case, passed parts may be transferred from Examination I to II.

- **Examination Call III and Extraordinary**

- Same as Final Single Assessment

## Final Single Assessment

Those 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:

$$\text{Final grade} = 0.6 * \text{Theory exam} + 0.4 * \text{Practice exam}$$

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 by the faculty. The practical exam 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.

## Honors

The student must obtain a 10 in his final grade. In the event that 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.