BASIC DETAILS:

Subject:	TECNOLOGÍAS DE LA INFORMACIÓN		
Id.:	30072		
Programme:	GRADUADO EN INGENIERÍA INFORMÁTICA. PLAN 2008 (BOE 15/12/2008)		
Module:	GESTION DE LA INFORMACION Y EL CONOCIMIENTO		
Subject type:	OBLIGATORIA		
Year:	3	**Teaching period:**	Segundo Cuatrimestre
Credits:	6	**Total hours:**	150
Classroom activities:	66	**Individual study:**	84
Main teaching language:	Castellano	**Secondary teaching language:**	Inglés
Lecturer:		**Email:**	

PRESENTATION:

Information Technologies (or Information Systems) are responsible for the acquisition, processing, storage and transport of information. We live in an Information Age in which almost all Computer Engineers perform the same activity: information processing. Thanks to the Internet and its ability to allow any pair of computers in the world to share information; thanks to advances in storage capacity of hard drives; thanks to the reduction of hardware cost; and thanks to the reduction in size that has allowed the creation of mobile computing, the production of information by humans and machines has grown exponentially in the last two decades. The massive use of information makes it necessary to understand how the new Big Data systems work and compress the new revolution that this type of technology supposes both at the technical level and at the business level.

Most of this information is being stored in a very complex type of software called Database Management System (DBMS), due to the capacity of these systems to store large amounts of data, safely and securely. efficient, and to recover that information quickly and without failures.

In this course we will study several information processing tasks related to DBMSs from an eminently practical point of view, from the small databases that a smartphone or a desktop application can use, to the large enterprise Data Warehouses, or the bases of distributed data necessary to support complex processes of our business or the latest existing Big Data techniques

One of the topic will be Big data, it refers to the analysis of large data sets to find trends, correlations or other insights not visible with smaller data sets or traditional processing methods. The exponential growth of internet-connected devices and sensors is a major contributor to the massive data and the storage, processing and analysis can require hundreds or thousands of computers. An example of big data in use is in the development of the autonomous vehicle. The sensors on self-driving vehicles are capturing millions of data points that can be analyzed to help improve performance and avoid accidents. Learn the fundamentals of big data with this courses designed to introduce you to this in-demand field and teach you how to design and implement big data analytics solutions. Learn key tools and systems for working with big data such as Azure, Hadoop and Spark and learn how to implement NoSQL data storage and processing solutions.

This course continues where an introduction course to the INFORMATION SYSTEMS and the databases will end. These types of courses tend to focus on the theoretical and conceptual aspects of the databases, introducing the student to the relational model and the SQL language. In this subject, however, the emphasis is on the practical and real use of different types of DBMS, not just the relational ones.

PROFESSIONAL COMPETENCES ACQUIRED IN THE SUBJECT:

General programme competences	G13	Capacity to use individual learning strategies aimed at continuous improvement in professional life and to begin further studies independently.
	G14	Capacity for abstraction to handle various complex knowledge models and apply them to examining and solving problems.
	G15	Capacity to structure reality by means of linking objects, situations and concepts through logical mathematical reasoning.
Specific programme competences	E12	Capacity to manage complexity through abstraction, modelling, 'best practices', patterns, standards and the use of the appropriate tools.
	E13	Capacity to identify, assess and use current and emerging technologies, considering how they apply in terms of individual or organisational needs.
Learning outcomes	R01	Understand data storage techniques and access methods.
	R02	Undertake consultation processing and heuristic implementation of operations based on cost estimation.
	R03	Create transaction processing, contemplating integrity, concurrency control and recovery techniques.

	R04	Establish database security and authorisation procedures.

PRE-REQUISITES:

This course continues where you finish an introductory course to INFORMATION SYSTEMS and relational databases. Therefore, the student is expected to know the following concepts from the beginning:

- Relational model: attributes, relationships, keys, functional dependencies and normalization.
- SQL language
- Conceptual modeling using EER and / or UML
- Generation of logical models from conceptual models
- Big Data
- Non-SQL languages

In some activities the student must program small desktop applications, so the student should have practical experience in:

- Some general-purpose object-oriented language (Java, Python, C #, Visual Basic, ...)
- Object-oriented analysis and design
- Algorithms
- Design patterns
- IDE (Visual Studio, PyCharm Eclipse, ...)
- Debugging and application testing.
- Most of the course will be communicating components that may be running on different machines.

Therefore, it is expected that the student knows:

- Computer networking concepts
- Administration and configuration of computer networks
- Concepts of Operating Systems
- Administration of Operating Systems (Windows, Linux, ...)

SUBJECT PROGRAMME:

Subject contents:

1 - Relational Data Bases
1.1 - Architectures
1.2 - Transactions and Concurrency Control
2 - Data Warehousing
2.1 - Data Warehousing
2.2 - Data Analysis: OLAP and DSS
2.3 - Data Integration (ETL)
3 - Big Data
3.1 - Big Data technologies
3.2 - Non-SQL
4 - Knowledge representation
4.1 - Ontologies

Subject planning could be modified due unforeseen circumstances (group performance, availability of resources, changes to academic calendar etc.) and should not, therefore, be considered to be definitive.

TEACHING AND LEARNING METHODOLOGIES AND ACTIVITIES:

Teaching and learning methodologies and activities applied:

El principal medio de comunicación entre el profesor y el estudiante será la Plataforma Docente Universitaria de la USJ.

All students are encouraged to review each week the planning, activities, and materials provided by the teacher through the PDU. The contents will be organized by week, and will include the statements of the activities proposed for the week, links to complementary or interesting material, a summary of the theoretical contents of the topic and recommendations for its study and preparation for the exam. Self-evaluation questionnaires will also be available to verify the correct use of the subject by the student.

Through the PDU calendar, students will be reminded of deadlines, dates and times of face-to-face meetings, dates and times of virtual tutorials and exam calendars.

The use of the subject forums is considered essential. All students are encouraged to actively participate in the forums to ask questions or ask for help, or to offer and organize those tasks that require collaboration among several students. When reviewing the activities submitted by students, the student's participation in the forums related to these activities will be taken into account in their evaluation. To this end, various forums will be set up according to thematic blocks, and students are therefore asked to keep their contributions focused on the correct forum.

All activities have been designed incrementally, so that an activity will normally extend and complement the previous activities. For this reason, it is recommended that students try to keep up with the pace of the course week after week, devoting the 10 hours per week that this subject requires according to its load of 6 ECTS.

During the face-to-face sessions on Tuesday and Thurdays, the teacher will explain the topics whose practical work has been done since the previous face-to-face session and resolve any doubts that may have arisen during the completion of such work.

The teaching methodology used in this course is Problem-Based Learning (PBL).

When one unit is finished, the teacher will present the students with a problem related to that week's topic. Students should:

Analyze the problem.
Identify the learning objectives, recognize what is known and what is not with respect to the problem.
Develop a work plan to address the problem.
Collect information about the problem.
Use the information gathered to propose or develop a solution to the problem.
Examine one's ability to solve the problem by self-monitoring one's own work.

Problem statements will be available through the PDU when the unit has finished. It is expected that the student will be able to carry out the proposed activity throughout the week (until the following 10 days), dedicating a maximum of 20 hours of autonomous work. Each activity will include a list of deliverables that must be prepared by the student for evaluation, and that normally will be a small document of 2-4 pages with the work scheme, the consulted sources, the proposed solution, the results and the conclusions, besides complementary auxiliary material (database schemes, database exports, executable programs...).

From time to time, this documentation should be submitted to the teacher for evaluation. Through the PDU, special links will be enabled that will allow the student to upload their material and through which the teacher will proceed to the evaluation of the activity. One of these links will be enabled for each activity to be delivered in order to facilitate its control.

The PDU will provide information on the delivery dates of each activity. Activities may be delivered after the deadline, as explained in detail below.

In the PDU, the active participation of the student is very important, but given the eminently practical nature that has been given to this subject, the teacher hopes to adequately motivate students to make the most of this course. That each student is capable of self-evaluating and verifying

Student work load:

Teaching mode	Teaching methods	Estimated hours
Classroom activities	Master classes	5
	Workshops	52
	Laboratory practice	4
	Assessment activities	5
Individual study	Tutorials	5

	Individual study	5
	Individual coursework preparation	53
	Group cousework preparation	5
	Project work	10
	Research work	6
	Total hours:	150

ASSESSMENT SCHEME:

Calculation of final mark:

Individual coursework:	60	%
Final exam:	30	%
Participation:	10	%
TOTAL	100	%

*Las observaciones específicas sobre el sistema de evaluación serán comunicadas por escrito a los alumnos al inicio de la materia.

BIBLIOGRAPHY AND DOCUMENTATION:

Basic bibliography:

ELMASRI, Ramez; NAVATHE, Shamkant B. Fundamentals of Database Systems. Addison Wesley, 2007 (5th edition), 2010 (6th edition)

Recommended bibliography:

Recommended websites:

Extensible Markup Language (XML)	http://www.w3.org/XML/
IEEE Data Engineering Bulletin	http://www.informatik.uni-trier.de/~ley/db/journals/debu/index.html
Learning Center of the ACM	http://learning.acm.org/
Microsoft SQL Server	http://www.microsoft.com/sqlserver/en/us/default.aspx
Oracle Database	http://www.oracle.com/us/products/database/index.html
Pentaho Business Analytics	http://www.pentaho.com/
PostgreSQL open source database	http://www.postgresql.org/

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