Master in Information and Communication Sciences

Emphasis in Software Engineering

NAME OF THE SUBJECT: Databases
Seminary 1 XXX
- Obligatory (X): Basic ( ) Complementary ( )
- Elective (): Intrinsic ( ) Extrinsic ( )

NUMBER OF ACADEMIC CREDITS: Four (4).

COURSE TYPE: THEORETICAL: ___ PRACTICAL: ___ THEORETICAL-PRACTICAL: _X_
Methodological alternatives:
Master Class (X), Seminar (X), Seminar - Workshop (X), Workshop (X), Practice (X),
Tutored projects (X), Other: _____

Justification

SYNOPSIS OF THE SUBJECT:

The efficient management of the information in one of the fundamental pillars of the computer applications, this implies that the applications based on databases, or that simply use them, find in them the responsibility of custody, access, availability, and security of that heritage input of great value to which information has become.

JUSTIFICATION:

PREREQUISITE: None

Content

GENERAL OBJECTIVE

The fundamental purpose of the subject is for the student to understand the nature, structure, and purposes of databases and database management systems (DBMS), to select, model

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and implement them properly, as well as consult and manage them efficiently according to specific requirements and well-defined restrictions.

The main focus of the subject will be towards the relational model, but the NoSQL database approaches will also be discussed. A practical approach will be carried out during the development of the subject, emphasizing autonomous and investigative work

SPECIFIC OBJECTIVES
- Understand the concepts of database, database management and the architecture of a database by analyzing the different models.
- Deepen and use the relational and Object-Relational models with their associated languages.
- Develop an appropriate approach to planning, analysis, design, implementation, and administration of databases.
- Distribute the information in several databases with a fragmentation approach appropriate to the needs of the requirements
- Define and implement a security approach and availability of information in the database according to the needs
- Appropriate, adapt and use knowledge of other different models and compare them technically to take into account implementation alternatives.

SYNTHETIC PROGRAM:
Databases
1. **Database System**
   a. Databases and Database Management Systems
   b. Database modelling
   c. Database architecture
   d. Database life circle
   e. Database administration
2. **Conceptual design**
   a. Entity-relationship model (E-R)
   b. Relational model
   c. Reduction to relational schemas
   d. Data-manipulation and data-definition languages
3. **Logical design**
   a. Functional dependencies
   b. Normalization
   c. Views
   d. Integrity constraints
   e. Security

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4. **Functions, procedures and triggers**
5. **Distributed databases**
    a. Distributed architecture
    b. Fragmentation
    c. Replication
    d. Transactions
6. **NoSQL Databases**
    a. Key-value store
    b. Document store
    c. Graph DBMS
    d. Object oriented DBMS
    e. Wide column storage

Strategies

METHODOLOGY:

In the course various activities will be carried out that correspond to combinations of the following methodologies:

- Project-based learning. Key knowledge and skills are acquired through project development.
- Cooperative learning. Groups are formed where each student has a defined role to achieve common objectives by interacting and working in a coordinated way.
- Problem-based learning. They start with questions which lead to other questions that, when answered, generate knowledge that must be converted into useful information and data. Develops critical thinking, problem solving and knowledge transfer skills

	Hours			Teacher hours / week	Student hours / week	Total Hours Student / semester	Academic credits
Type of course	DW	CW	AW	(DW + CW)	(DW + CW +AW)	X 18 weeks	
	3	1	8	4	12	192	4

Direct Presential Work (DW): classroom work in plenary session with all students.
Mediated-Cooperative Work (CW): Teacher tutoring work to small groups or individually to students.
Autonomous Work (AW): Student work without the presence of the teacher, which can be done in different instances: in work groups or individually, at home or in a library, laboratory, etc.)

Resources

PHYSICAL RESOURCES REQUIRED:

There is a virtual space where documents, presentations, statements and, in general, all the communications that take place in the development of the subject are found. The classes will be taught in computer rooms equipped with the database system software that adjusts to the needs of the course, in addition to video beams for the presentations. You will have access to the digital and physical library system for inquiries of academic material.

BIBLIOGRAPHY:

Connolly, Thomas, y Carolyn Begg. 2014. *Database Systems: A Practical Approach to Design, Implementation, and Management*. Edición: 6. Boston: Pearson.

Date, C. J. 2003. *An Introduction to Database Systems*. Edición: 8. Boston: Pearson.

Özsu, M. Tamer, y Patrick Valduriez. 2020. *Principles of Distributed Database Systems*. 4.ª ed. Springer International Publishing.

Professor, Abraham Silberschatz, Henry F. Korth, y S. Sudarshan. 2019. *Database System Concepts*. 7 edition. New York, NY: McGraw-Hill Education.

BIBLIOGRAPHIC RESOURCES:

http://www.udistrital.edu.co:8080/web/biblioteca/bases-de-datos1
https://db-engines.com/en/
https://www.postgresql.org/
https://nosql-database.org/

Course Schedule

Week /Unid	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1.	X	X														
2.			X	X	X	X										
3.						X	X	X	X							
4.									X	X	X					
5.											X	X	X	X		
6.													X	X	X	

Evaluation

ASPECTS TO EVALUATE

	TIPO DE EVALUACIÓN	**FECHA**	**PORCENTAJE**
1	Individual report. Conceptual design	Week 5	10%
2	Individual class exercise. Conceptual design	Week 6	10%
3	Individual report. Logic design - SQL	Week 8	10%
4	Individual class exercise. Logic design - SQL	Week 9	10%
5	Individual report. Functions, procedures and triggers	Week 11	10%
6	Group report. Distributed database	Week 14	10%
7	NoSQL Database seminar. Article and oral presentation	Weeks 13-15	10%
8	Final project report and defense	Week 16	30%

TEACHER INFORMATION:

NAME: Alvaro Enrique Ortiz Dávila