Master in Information and Communication Sciences

Emphasis in Geomatic

NAME OF THE SUBJECT: Spatial 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:

Academic space designed to learn to design, implement and use spatial databases. The main focus of the course will be towards the relational model, but the NOSQL database approaches will also be discussed. There will be a practical approach during the development of the subject, emphasizing autonomous and investigative work.

JUSTIFICATION:

It is estimated that 80% of corporate data worldwide has a geographical component (georeferenced), this is largely due to the fact that almost all professions can be related, in one way or another, to spatial information. The efficient use of large volumes of information is traditionally managed through database management systems, which have been used by geographic information systems as a repository of the information it uses. Spatial database management systems emerge as georeferenced information managers capable of processing spatial queries and performing spatial analysis independently of a GIS, or working together with them, greatly increasing their efficiency and productivity.

PREREQUISITE:

Database fundamentals

Content

GENERAL OBJECTIVE

Allow the students to design and implement a spatial database and can use it to represent the abstraction of reality and perform spatial queries and analyzes on it.
Work together on spatial databases and geographic information systems and take advantage of each of them.
know different approaches to Nosql database models as different options to the relational model

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:

Spatial databases

1. **Relational datamodel**
    a. Entity Relationship Model
    b. Relational Model
    c. Query language - SQL
2. **Spatial Databases**
    a. Spatial databases
    b. Modeling of spatial databases
    c. Spatial information standards and spatial databases (OGC)
    d. Spatial indices

e. Connectivity between spatial databases and GIS

3. **Spatial objects in databases**
    a. Spatial data types
    b. o Geometric constructors
    c. o Geometric accessories
4. **Relationships and measurements with geometric objects in databases**
    a. Topological relationships
    b. Measurement functions
5. **Geometric processing in databases**
6. **Raster information in databases**
7. **Route management in databases**
8. **NoSQL spatial databases**
    a. Key-value
    b. Documentaries
    c. Graphs
    d. Object oriented
    e. Columnar

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 16 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. Classes will be held in computer rooms equipped with the spatial database system software that meets the needs of the course, in addition to video beams for presentations. You will have access to the digital and physical library system for inquiries of academic material.

BIBLIOGRAPHY:

- Anón. 2001. *Spatial Databases: With Application to GIS*. 1 edition. San Francisco: Morgan Kaufmann.
- Obe, Regina, y Leo Hsu. 2020. *PostGIS in Action, Third Edition*. Manning Publications.
- PhD, Prof Emmanuel Stefanakis. 2014. *Geographic Databases and Information Systems*. 1.0 edition. North Charleston: CreateSpace Independent Publishing Platform.
- Shashi Shekhar, y Sanjay Chawla. 2003. *Spatial Databases a Tour*. Prentice Hall.
- Yeung, Albert K. W., y G. Brent Hall. 2007. *Spatial Database Systems: Design, Implementation and Project Management*. 2007 edition. Dordrecht: Springer.

BIBLIOGRAPHIC RESOURCES:

http://www.udistrital.edu.co:8080/web/biblioteca/bases-de-datos1
https://postgis.net/
https://pgrouting.org/
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	X													
2.			X	X												
3.				X	X											
4.						X	X	X								
5.									X	X	X					
6.												X				
7.													X	X		
8.														X	X	

Evaluation

ASPECTS TO EVALUATE

	TIPO DE EVALUACIÓN	FECHA	PORCENTAJE
1	Individual work report. Conceptual and logical database design	Week 3	10%
2	Individual exercise in class. SQL exercises	Week 4	10%
3	Individual work report. Relationship and measures exercise	Week 8	10%
4	Individual exercise in class. Geometric processing exercise	Week 10	10%
5	Individual work report. Geometric processing exercise	Week 11	10%
6	Individual work report. Route exercise	Week 14	10%
7	NoSQL spatial database seminar. Article and oral presentation	Weeks 14-15	10%
8	Final project. Workgroup	Week 16	30%

TEACHER INFORMATION:

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