Course guide
270105 - ABD - Database Administration

Last modified: 30/01/2024

Unit in charge: Barcelona School of Informatics
Teaching unit: 747 - ESSI - Department of Service and Information System Engineering.

Degree: BACHELOR'S DEGREE IN INFORMATICS ENGINEERING (Syllabus 2010). (Optional subject).

Academic year: 2023 **ECTS Credits:** 6.0 **Languages:** Catalan

LECTURER

Coordinating lecturer: CARME MARTIN ESCOFET

Others: Segon quadrimestre:
CARME MARTIN ESCOFET - 10

PRIOR SKILLS

Be able to understand conceptual schemes in UML and transform into a Relational model.
Be able to create, consult and manipulate databases with SQL and Relational Algebra.

REQUIREMENTS

- Prerequisite BD

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
CSI2.6. To demonstrate knowledge and capacity to apply decision support and business intelligence systems.
CSI4.2. To participate actively in the design, implementation and maintenance of the information and communication systems.
CSI4.3. To administrate databases (CES1.6).
CT2.2. To demonstrate knowledge and capacity to apply the characteristics, functionalities and structure of data bases, allowing an adequate use, design, analysis and implementation of applications based on them.
CT7.2. To evaluate hardware/software systems in function of a determined criteria of quality.

Generical:
G8. APPROPIATE ATTITUDE TOWARDS WORK: to have motivation to be professional and to face new challenges, have a width vision of the possibilities of the career in the field of informatics engineering. To feel motivated for the quality and the continuous improvement, and behave rigorously in the professional development. Capacity to adapt oneself to organizational or technological changes. Capacity to work in situations with information shortage and/or time and/or resources restrictions.

TEACHING METHODOLOGY

During theory hours, the teacher explains the concepts corresponding to some of the content. Students must work on these concepts and solve, using cooperative learning, a problem that arises. Some concepts of some contents are not presented by the teacher, but the students must work on materials that the teacher will have published on the virtual campus.

During laboratory hours, the teacher proposes a problem to the students to solve in pairs.

LEARNING OBJECTIVES OF THE SUBJECT

1.Be able to understand the tasks, available documentation, tools and principles of action of the database administrator.
2.Being able to get the conceptual schema of a database of an information system from the physical schema, theoretically and in practice with reverse engineering tools.
3.Be able to understand the operation of a corporate information factory and obtain information from multidimensional databases.
4.Be able to prepare documentation for a physical design.
5.Being able to decide which materialized views must be defined according to the expected operations.
6.Be able to decide the most appropriate indexes for each situation.
7.Be able to perform semantic, syntactic and physical optimization on a theoretical level. On a practical level, be able to use specialized tuning tools.
8.Be able to get access plan for a query according to criteria of optimization.
9.Be able to understand the algorithms involved in an access plan.
10.Be able to reproduce the concurrent execution of transactions depending on the level of isolation.
11.Being able to list the main options and parameters that affect the recovery.
12.Being able to manage the security of the database, and specifically access control.
13.Being able to detect and correct faults in a logic design.
14.Being able to detect and solve data integration problems.
15.Be able to choose the parameter values needed for the most appropriate database administration for each situation.
16.Be able to know the main types of NOSQL databases.
17.Through presentations of experts, understand the importance of a good professional realization.
19.Be able to participate with a proactive attitude in carrying out exercises in teams of 2 or more, following the assigned roles, which change in different exercises.

STUDY LOAD

Type	Hours	Percentage
Self study	84,0	56.00
Hours small group	30,0	20.00
Hours large group	30,0	20.00
Guided activities	6,0	4.00

Total learning time: 150 h

CONTENTS

The importance of data in the information system

Description:
The importance of databases in the information system. Main tasks of the database administrator and documentation necessary for administration. The DAMA guide to data management.

Data in an information system: Correctness, normalization and improvement through data reengineering

Description:
Presentation of the main design pitfalls to be validated to guarantee the correctness of the design. Explanation of the 5 normal forms and the BCNF, as an additional validation tool. Generation of the conceptual scheme from the logical scheme. Types of foreign key patterns. Use of a specific tool of a DBMS to carry out reverse engineering.

Distributed databases

Description:
Characteristics, classification and main architectures of DBMSs. Problem of data heterogeneity. Information integration models.

The corporate information factory and its strategic factor

Description:
Data warehouses within the corporate information factory. The integration and transformation component: ETL. Metadata. Multidimensional model and operations. Data Warehouse Connections with Business Intelligence

Analysis and improvement of data performance

Description:
Characteristics of physical design. Adjustments and improvements. Performance management. Physical design documentation. File types and settings required for database administration. Examples to choose the most appropriate values for each situation.

Key factors to choose the best access plan

Description:
The B index and its insertion and deletion algorithms. Static and dynamic hashing. Cluster index. Multi-attribute index. Bitmap. Criteria for choosing the appropriate index for each case. Main sorting and combination algorithms. The access plan for any SQL statement. Definition and purpose of materialized views.

Administration and 'Tuning' of databases

Description:
Introduction to query processing. Semantic, syntactic and physical optimization. Database tuning with a specific DBMS administration tool.

Concurrency in databases

Description:
The transaction manager, the concurrency manager, and the data manager. Transactions, Interferences. Insulation levels. Basic and advanced incompatibilities of the reserve-based concurrency control technique. Use of multiple levels of granularity.

Security and recovery in databases

Description:
Definition of security. Consequences of loss of security and basic security mechanisms. Recovery techniques. Modalities of the recovery manager and examples of the different modalities.

Administration of post-relational databases

Description:
Main types of post-relational databases. Knowing more about a NOSQL database of a particular type.

ACTIVITIES

Presentation and SQL review

Description:
Students prepare the connection to the Oracle database that will be used throughout the semester. Become familiar with LEARSQL. Solve some basic queries using the SQL language.

Specific objectives:
1, 19

Related competencies :
G8. APPROPIATE ATTITUDE TOWARDS WORK: to have motivation to be professional and to face new challenges, have a width vision of the possibilities of the career in the field of informatics engineering. To feel motivated for the quality and the continuous improvement, and behave rigorously in the professional development. Capacity to adapt oneself to organizational or technological changes. Capacity to work in situations with information shortage and/or time and/or resources restrictions.

Full-or-part-time: 2h
Laboratory classes: 2h

The experience of an administrator

Description:
Study of the contents. Answer a questionnaire.

Specific objectives:
1, 17

Related competencies :
G8. APPROPIATE ATTITUDE TOWARDS WORK: to have motivation to be professional and to face new challenges, have a width vision of the possibilities of the career in the field of informatics engineering. To feel motivated for the quality and the continuous improvement, and behave rigorously in the professional development. Capacity to adapt oneself to organizational or technological changes. Capacity to work in situations with information shortage and/or time and/or resources restrictions.

Full-or-part-time: 2h
Self study: 2h

Study of the importance of data in the information system

Description:
Understand the importance of data for the information system. Know the main tasks of the database administrator and the necessary documentation for administration. Perform the transformation from a conceptual design to logical design.

Specific objectives:
1, 19

Related competencies :
G8. APPROPIATE ATTITUDE TOWARDS WORK: to have motivation to be professional and to face new challenges, have a width vision of the possibilities of the career in the field of informatics engineering. To feel motivated for the quality and the continuous improvement, and behave rigorously in the professional development. Capacity to adapt oneself to organizational or technological changes. Capacity to work in situations with information shortage and/or time and/or resources restrictions.

Full-or-part-time: 6h
Theory classes: 2h
Self study: 4h

Session 1: SQL and Relational Algebra Queries

Description:
Students, in pairs, must answer a SQL and Relational Algebra Query Moodle Quiz that is instantly corrected via LEARNSQL. Each time students submit the answer to a question they receive a grade. Students may decide to submit new answers to try to improve on the previous ones. Each new submission is a penalty, but you get the best grade.

Specific objectives:
1, 19

Related competencies :
G8. APPROPIATE ATTITUDE TOWARDS WORK: to have motivation to be professional and to face new challenges, have a width vision of the possibilities of the career in the field of informatics engineering. To feel motivated for the quality and the continuous improvement, and behave rigorously in the professional development. Capacity to adapt oneself to organizational or technological changes. Capacity to work in situations with information shortage and/or time and/or resources restrictions.

Full-or-part-time: 4h
Guided activities: 2h
Self study: 2h

Study of data in an information system: Database reengineering as a validation and improvement tool

Description:
Study of the contents explained: generation of the conceptual scheme from the logical scheme and types of foreign key patterns. and self-study materials. Perform database reengineering to move from a logical model to a conceptual model.

Specific objectives:
2, 19

Related competencies :
G8. APPROPIATE ATTITUDE TOWARDS WORK: to have motivation to be professional and to face new challenges, have a width vision of the possibilities of the career in the field of informatics engineering. To feel motivated for the quality and the continuous improvement, and behave rigorously in the professional development. Capacity to adapt oneself to organizational or technological changes. Capacity to work in situations with information shortage and/or time and/or resources restrictions.

Full-or-part-time: 6h
Theory classes: 2h
Self study: 4h

Session 2: Advanced SQL queries

Description:
The students, in pairs, must answer a Moodle quiz of SQL queries and Real Algebra that is instantly corrected through LEARNSQL. Each time the student body submits an answer to a question, they receive a grade. Students can decide to send new answers to try to improve the previous ones. Each new submission incurs a penalty, but eventually you get the best grade.

Specific objectives:
1, 19

Related competencies :
G8. APPROPIATE ATTITUDE TOWARDS WORK: to have motivation to be professional and to face new challenges, have a width vision of the possibilities of the career in the field of informatics engineering. To feel motivated for the quality and the continuous improvement, and behave rigorously in the professional development. Capacity to adapt oneself to organizational or technological changes. Capacity to work in situations with information shortage and/or time and/or resources restrictions.

Full-or-part-time: 4h
Guided activities: 2h
Self study: 2h

Study of data in a information system: Correctness and standardization

Description:
Study of the main design traps to be validated to guarantee the correctness of the design and of the 5 normal forms and the BCNF, as an additional validation tool. Realization of correctness and normalization exercises.

Specific objectives:
13, 19

Related competencies :
G8. APPROPIATE ATTITUDE TOWARDS WORK: to have motivation to be professional and to face new challenges, have a width vision of the possibilities of the career in the field of informatics engineering. To feel motivated for the quality and the continuous improvement, and behave rigorously in the professional development. Capacity to adapt oneself to organizational or technological changes. Capacity to work in situations with information shortage and/or time and/or resources restrictions.

Full-or-part-time: 6h
Theory classes: 2h
Self study: 4h

Session 3: Reverse engineering

Description:
Students, in pairs, have to solve a data reengineering problem using the tools of a DBMS.

Specific objectives:
2, 19

Related competencies :
G8. APPROPIATE ATTITUDE TOWARDS WORK: to have motivation to be professional and to face new challenges, have a width vision of the possibilities of the career in the field of informatics engineering. To feel motivated for the quality and the continuous improvement, and behave rigorously in the professional development. Capacity to adapt oneself to organizational or technological changes. Capacity to work in situations with information shortage and/or time and/or resources restrictions.

Full-or-part-time: 4h
Guided activities: 2h
Self study: 2h

Study of concepts of distributed databases

Description:
Study of the characteristics, classification and main architectures of DBMSs. Problem of data heterogeneity. Information integration models. Performing distributed database exercises.

Specific objectives:
14, 19

Related competencies :
G8. APPROPIATE ATTITUDE TOWARDS WORK: to have motivation to be professional and to face new challenges, have a width vision of the possibilities of the career in the field of informatics engineering. To feel motivated for the quality and the continuous improvement, and behave rigorously in the professional development. Capacity to adapt oneself to organizational or technological changes. Capacity to work in situations with information shortage and/or time and/or resources restrictions.

Full-or-part-time: 6h
Theory classes: 2h
Self study: 4h

Session 4: Design correctness

Description:
Els estudiants, per parelles, han de resoldre un problema. Els estudiants també hauran de contestar algunes preguntes per escrit. El professor corregirà totes les proves.

Specific objectives:
13, 19

Related competencies :
G8. APPROPIATE ATTITUDE TOWARDS WORK: to have motivation to be professional and to face new challenges, have a width vision of the possibilities of the career in the field of informatics engineering. To feel motivated for the quality and the continuous improvement, and behave rigorously in the professional development. Capacity to adapt oneself to organizational or technological changes. Capacity to work in situations with information shortage and/or time and/or resources restrictions.

Full-or-part-time: 4h
Guided activities: 2h
Self study: 2h

The strategic factor of the corporate information factory

Description:
Study of data warehouses within the corporate information factory. The integration and transformation component: ETL. Metadata. Multidimensional design and operations. Connections of data warehouses with business intelligence. Completion of exercises on this topic.

Specific objectives:
3, 19

Related competencies :
G8. APPROPIATE ATTITUDE TOWARDS WORK: to have motivation to be professional and to face new challenges, have a width vision of the possibilities of the career in the field of informatics engineering. To feel motivated for the quality and the continuous improvement, and behave rigorously in the professional development. Capacity to adapt oneself to organizational or technological changes. Capacity to work in situations with information shortage and/or time and/or resources restrictions.

Full-or-part-time: 6h
Theory classes: 2h
Self study: 4h

Session 5: Multidimensional queries

Description:
Students, in pairs, must solve a problem of multidimensional queries, using the tools of a DBMS.

Specific objectives:
3, 19

Related competencies :
G8. APPROPIATE ATTITUDE TOWARDS WORK: to have motivation to be professional and to face new challenges, have a width vision of the possibilities of the career in the field of informatics engineering. To feel motivated for the quality and the continuous improvement, and behave rigorously in the professional development. Capacity to adapt oneself to organizational or technological changes. Capacity to work in situations with information shortage and/or time and/or resources restrictions.

Full-or-part-time: 4h
Guided activities: 2h
Self study: 2h

Study of the concepts of physical design

Description:
Study of adjustments and improvements. Characteristics of physical design. Performance management. Physical design documentation. Completion of exercises on this topic.

Specific objectives:
4, 19

Related competencies :
G8. APPROPIATE ATTITUDE TOWARDS WORK: to have motivation to be professional and to face new challenges, have a width vision of the possibilities of the career in the field of informatics engineering. To feel motivated for the quality and the continuous improvement, and behave rigorously in the professional development. Capacity to adapt oneself to organizational or technological changes. Capacity to work in situations with information shortage and/or time and/or resources restrictions.

Full-or-part-time: 6h
Theory classes: 2h
Self study: 4h

Session 6: Algorithms

Description:
Students, in pairs, have to solve an algorithm problem using the tools of a DBMS.

Specific objectives:
9, 19

Related competencies :
G8. APPROPIATE ATTITUDE TOWARDS WORK: to have motivation to be professional and to face new challenges, have a width vision of the possibilities of the career in the field of informatics engineering. To feel motivated for the quality and the continuous improvement, and behave rigorously in the professional development. Capacity to adapt oneself to organizational or technological changes. Capacity to work in situations with information shortage and/or time and/or resources restrictions.

Full-or-part-time: 4h
Guided activities: 2h
Self study: 2h

DBA presentation

Description:
Preparation of questions and writing a report.

Specific objectives:
1, 17

Related competencies :
G8. APPROPIATE ATTITUDE TOWARDS WORK: to have motivation to be professional and to face new challenges, have a width vision of the possibilities of the career in the field of informatics engineering. To feel motivated for the quality and the continuous improvement, and behave rigorously in the professional development. Capacity to adapt oneself to organizational or technological changes. Capacity to work in situations with information shortage and/or time and/or resources restrictions.

Full-or-part-time: 4h
Theory classes: 2h
Self study: 2h

Session 7: Materialized views

Description:
Students, in pairs, must solve a problem of materialized views using the tools of a DBMS.

Specific objectives:
5, 19

Related competencies :
G8. APPROPIATE ATTITUDE TOWARDS WORK: to have motivation to be professional and to face new challenges, have a width vision of the possibilities of the career in the field of informatics engineering. To feel motivated for the quality and the continuous improvement, and behave rigorously in the professional development. Capacity to adapt oneself to organizational or technological changes. Capacity to work in situations with information shortage and/or time and/or resources restrictions.

Full-or-part-time: 4h
Guided activities: 2h
Self study: 2h

Study of concepts related to indexes

Description:
Study of B+ trees and their insertion and deletion algorithms. Static and dynamic hash. Cluster index. Multi-attribute index. Bitmap. Criteria for choosing the appropriate index for each case. Performing access method exercises.

Specific objectives:
6, 19

Related competencies :
G8. APPROPIATE ATTITUDE TOWARDS WORK: to have motivation to be professional and to face new challenges, have a width vision of the possibilities of the career in the field of informatics engineering. To feel motivated for the quality and the continuous improvement, and behave rigorously in the professional development. Capacity to adapt oneself to organizational or technological changes. Capacity to work in situations with information shortage and/or time and/or resources restrictions.

Full-or-part-time: 6h
Theory classes: 2h
Self study: 4h

Session 8: Indexes

Description:
Students, in pairs, must solve an index problem using the tools of a DBMS.

Specific objectives:
6, 19

Related competencies :
G8. APPROPIATE ATTITUDE TOWARDS WORK: to have motivation to be professional and to face new challenges, have a width vision of the possibilities of the career in the field of informatics engineering. To feel motivated for the quality and the continuous improvement, and behave rigorously in the professional development. Capacity to adapt oneself to organizational or technological changes. Capacity to work in situations with information shortage and/or time and/or resources restrictions.

Full-or-part-time: 4h
Guided activities: 2h
Self study: 2h

Study of the concepts of security and recovery

Description:
Study of the contents explained and self-study materials. Resolution of exercises and proposed questions for the exam using Moodle glossary.

Specific objectives:
11, 12, 19

Related competencies :
G8. APPROPIATE ATTITUDE TOWARDS WORK: to have motivation to be professional and to face new challenges, have a width vision of the possibilities of the career in the field of informatics engineering. To feel motivated for the quality and the continuous improvement, and behave rigorously in the professional development. Capacity to adapt oneself to organizational or technological changes. Capacity to work in situations with information shortage and/or time and/or resources restrictions.

Full-or-part-time: 6h
Theory classes: 2h
Self study: 4h

Session 9: System parameters

Description:
Study of the contents. Answer a questionnaire.

Specific objectives:
15

Full-or-part-time: 4h
Guided activities: 2h
Self study: 2h

Study of concepts related to optimization

Description:
SStudy of query processing. Semantic, syntactic and physical optimization.

Specific objectives:
7, 8, 19

Related competencies :
G8. APPROPIATE ATTITUDE TOWARDS WORK: to have motivation to be professional and to face new challenges, have a width vision of the possibilities of the career in the field of informatics engineering. To feel motivated for the quality and the continuous improvement, and behave rigorously in the professional development. Capacity to adapt oneself to organizational or technological changes. Capacity to work in situations with information shortage and/or time and/or resources restrictions.

Full-or-part-time: 6h
Theory classes: 2h
Self study: 4h

Session 10: Optimization according to workload

Description:
Tuning databases with a specific administration tool for a DBMS.

Specific objectives:
7, 8, 19

Related competencies :
G8. APPROPIATE ATTITUDE TOWARDS WORK: to have motivation to be professional and to face new challenges, have a width vision of the possibilities of the career in the field of informatics engineering. To feel motivated for the quality and the continuous improvement, and behave rigorously in the professional development. Capacity to adapt oneself to organizational or technological changes. Capacity to work in situations with information shortage and/or time and/or resources restrictions.

Full-or-part-time: 4h
Guided activities: 2h
Self study: 2h

Study of concepts relating to transactions

Description:
Study of the transaction manager, the concurrency manager and the data manager. Transactions, Interferences. Isolation levels. Basic and advanced incompatibilities of the reserve-based concurrency control technique. Use of multiple levels of granularity. Completion of exercises on this topic.

Specific objectives:
10, 19

Related competencies :
G8. APPROPIATE ATTITUDE TOWARDS WORK: to have motivation to be professional and to face new challenges, have a width vision of the possibilities of the career in the field of informatics engineering. To feel motivated for the quality and the continuous improvement, and behave rigorously in the professional development. Capacity to adapt oneself to organizational or technological changes. Capacity to work in situations with information shortage and/or time and/or resources restrictions.

Full-or-part-time: 6h
Theory classes: 2h
Self study: 4h

Session 11: Concurrency

Description:
Students, in pairs, must solve a concurrency problem using the tools of a DBMS.

Specific objectives:
10, 19

Related competencies :
G8. APPROPIATE ATTITUDE TOWARDS WORK: to have motivation to be professional and to face new challenges, have a width vision of the possibilities of the career in the field of informatics engineering. To feel motivated for the quality and the continuous improvement, and behave rigorously in the professional development. Capacity to adapt oneself to organizational or technological changes. Capacity to work in situations with information shortage and/or time and/or resources restrictions.

Full-or-part-time: 2h
Guided activities: 2h

Study of concepts relating to NoSQL databases

Description:
Study of the main types of NOSQL databases. Completion of exercises on this topic.

Specific objectives:
16, 19

Related competencies :
G8. APPROPIATE ATTITUDE TOWARDS WORK: to have motivation to be professional and to face new challenges, have a width vision of the possibilities of the career in the field of informatics engineering. To feel motivated for the quality and the continuous improvement, and behave rigorously in the professional development. Capacity to adapt oneself to organizational or technological changes. Capacity to work in situations with information shortage and/or time and/or resources restrictions.

Full-or-part-time: 6h
Theory classes: 2h
Self study: 4h

Session 12: NOSQL Databases

Description:
Students, in pairs, must solve a problem using a NOSQL DBMS.

Specific objectives:
16, 19

Related competencies :
G8. APPROPIATE ATTITUDE TOWARDS WORK: to have motivation to be professional and to face new challenges, have a width vision of the possibilities of the career in the field of informatics engineering. To feel motivated for the quality and the continuous improvement, and behave rigorously in the professional development. Capacity to adapt oneself to organizational or technological changes. Capacity to work in situations with information shortage and/or time and/or resources restrictions.

Full-or-part-time: 4h
Guided activities: 2h
Self study: 2h

Important concepts of data use and processing in the information system

Description:
Study of the contents. Answer a questionnaire.

Specific objectives:
1, 3, 17

Related competencies :
G8. APPROPIATE ATTITUDE TOWARDS WORK: to have motivation to be professional and to face new challenges, have a width vision of the possibilities of the career in the field of informatics engineering. To feel motivated for the quality and the continuous improvement, and behave rigorously in the professional development. Capacity to adapt oneself to organizational or technological changes. Capacity to work in situations with information shortage and/or time and/or resources restrictions.

Full-or-part-time: 4h
Theory classes: 2h
Self study: 2h

Agile software and database development

Description:
Study of the contents. Answer a questionnaire.

Specific objectives:
1, 17

Related competencies :
G8. APPROPIATE ATTITUDE TOWARDS WORK: to have motivation to be professional and to face new challenges, have a width vision of the possibilities of the career in the field of informatics engineering. To feel motivated for the quality and the continuous improvement, and behave rigorously in the professional development. Capacity to adapt oneself to organizational or technological changes. Capacity to work in situations with information shortage and/or time and/or resources restrictions.

Full-or-part-time: 4h
Laboratory classes: 2h
Self study: 2h

Advanced Oracle Concepts

Description:
Study of the contents. Answer a questionnaire.

Specific objectives:
1, 17

Related competencies :
G8. APPROPIATE ATTITUDE TOWARDS WORK: to have motivation to be professional and to face new challenges, have a width vision of the possibilities of the career in the field of informatics engineering. To feel motivated for the quality and the continuous improvement, and behave rigorously in the professional development. Capacity to adapt oneself to organizational or technological changes. Capacity to work in situations with information shortage and/or time and/or resources restrictions.

Full-or-part-time: 4h
Theory classes: 2h
Self study: 2h

Advanced database security issues

Description:
Study of the contents. Answer a questionnaire.

Specific objectives:
12, 17

Related competencies :
G8. APPROPIATE ATTITUDE TOWARDS WORK: to have motivation to be professional and to face new challenges, have a width vision of the possibilities of the career in the field of informatics engineering. To feel motivated for the quality and the continuous improvement, and behave rigorously in the professional development. Capacity to adapt oneself to organizational or technological changes. Capacity to work in situations with information shortage and/or time and/or resources restrictions.

Full-or-part-time: 4h
Laboratory classes: 2h
Self study: 2h

Exam

Description:
The exam will consist of approximately 10 questions of all the contents of the subject.

Specific objectives:
1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16

Full-or-part-time: 14h
Guided activities: 2h
Self study: 12h

GRADING SYSTEM

The final grade = 30% L+ 50% E+ 20% P (to opt for this option attendance is required) or 100% E

L = Average of the top11 laboratory tests
E = Final exam grade
P = Average of the top 11 problem deliveries

The grade of the competency will be: A (competence passed with excellence), B (competition surpassed the desired level), C (competition surpassed a level sufficient) or D (competition unbeaten).

The grade of the generic competency "Appropriate attitude towards work " will be decided according to the notes of the cooperative learning activities carried out and the peer evaluation.

Peer evaluation: students will have multiple partners during the semester and evaluate them. Based on these assessments, the teacher assigned the note.

BIBLIOGRAPHY

Basic:
- Garcia-Molina, Hector.; Ullman, Jeffrey.D.; Widom, Jennifer. Database systems: the complete book. Pearson Education Limited. Pearson Education Limited, [2014]. ISBN 9781292024479.
- Shasha, Dennis Elliott; Bonnet, Philippe. Database tuning: principles, experiments, and troubleshooting techniques. Amsterdam [etc.]: Morgan Kaufmann, cop. 2003. ISBN 9781558607538.
- Teorey, Toby ... [et al.]. Database modeling and design: logical design. 5th ed. Morgan Kaufmann Publishers/Elsevier, cop. 2011. ISBN 9780123820204.
- Inmon, William H; Imhoff, Claudia; Sousa, Ryan. Corporate information factory. 2nd ed. John Wiley, cop. 2001. ISBN 9780471399612.
- Elmasri, Ramez; Navathe, Shamkant. Fundamentals of Database Systems. 7th ed. Pearson, [2016]. ISBN 9781292097626.
- Ozsu, M.T.; Valduriez, P. Principles of distributed database systems. 4th ed. New York: Springer, 2020. ISBN 9783030262525.

Complementary:
- Pressman, Roger; Maxim, Bruce. Software Engineering: A Practitioner's Approach. 9. McGrawHill, 2020. ISBN 9781259872976.
- Kimball, R.; Ross, M. The data warehouse toolkit: the definitive guide to dimensional modeling. Third edition. Indianapolis, Ind.: Wiley, 2013. ISBN 9781118732281.
- DAMA International. DAMA-DMBOK : data management body of knowledge. 2nd ed. Basking Ridge, New Jersey: Technics publications, 2017. ISBN 9781634622349.
- Abelló, Alberto; Rodríguez, M. Elena; Rollón, Emma. Diseño y administración de bases de datos. Edicions UPC, 2006. ISBN 9788483018606.
- Sistac i Planas, Jaume; Camps Paré, Rafael. Tècniques avançades de bases de dades. Edicions de la Universitat Oberta de Catalunya, 2000. ISBN 8484291065.

RESOURCES

Hyperlink:
- https://learnsql2.fib.upc.edu/