NATIONAL UNIVERSITY OF ENGINEERING
COLLEGE OF SCIENCES
COMPUTER SCIENCE PROGRAM

CC202 – DATA BASE

I. GENERAL INFORMATION

CODE	: CC202 Data Base
SEMESTER	: 4
CREDITS	: 4
HOURS PER WEEK	: 6 (Theory – Practice)
PREREQUISITES	: CC211 Object Oriented Programming
CONDITION	: Mandatory

II. COURSE DESCRIPTION

Introduces the concepts and evolution of the database system. Introduces the relational model. Covers aspects of concurrency, reliability and information search using the SQL language.

III. LEARNING UNITS

1. Introduction

I: What is a database?
II: What is a database management system?
III: Independence of the data.
IV: Architecture of a database system.

2. Entity model, relationship (E/R)

I: Introduction to the ER data model.
II: Sets of entities and relationships.
III: Domains.
IV: Equivalent representations of a relationship.
V: Design issues.
VI: Specialization.
VII: Aggregation.
VIII: Reduction to tables.

3. The relational model. Conversion of E/R

I: Introduction.
II: Schemes, Tuples, Tables, Domains.

III: Conversion to tables from a model with relationships.
IV: Conversion to tables from a generalized model.
V: Discovery of keys in relationships.

4. Functional dependencies

I: Definition.
II: Armstrong axioms.
III: Additional Rules.
IV: Key of a set of attributes.
V: No redundancy.
VI: Determination of the keys of a scheme and calculation of the keys of a relational scheme.

5. Normalization. Dependencies of multiple values

I: Redundancy, Update anomalies and Elimination.
II: First and Second Normal form.
III: Decomposition without loss.
IV: Preservation of dependencies.
V: Boyce-Codd Normal Form (BCNF).
VI: Third Normal form, BCNF vs 3NF.
VII: Fourth and Fifth Normal form.

6. Introduction to SQL

I: Applications of the databases.
II: Database systems versus file systems.
III: Vision of the data.
IV: Database models.
V: Database languages.
VI: Transaction management.
VII: Structure of a database system.
VIII: Users of databases.

7. Aggregations, modifications, and advanced operations

I: Aggregations and design of aggregations.
II: Modification of data.
III: Classification, insert tuples in a relation, remove tuples from a relation and update the value of some components of existing tuples.

8. Views and data definition

I: Vision concept.
II: Applications of views.
III: Views in SQL.
IV: Syntax.
V: Reasons why a list is not updatable.
VI: View on a basic table.
VII: View on a concatenation of relationships.
VIII: Define tables, rows and columns.
IX: Insert index keys.

X: Create relationships between tables.
XI: Assign data types.

9. Restrictions and dissipators (triggers)

I: Restrictions on stored procedures and dissipators.
II: Restrictions on subqueries.
III: Restrictions on views.
IV: Definition, use and syntax of the trigger.
V: Components and names of triggers.
VI: Types of dissipators.
VII: Order of activation of dissipators.

10. Persistent storage modules

I: Storage and file structure.
II: Indexing, association, hashing.
III: Indexes.
IV: Processing of queries.
V: Optimization of queries.

11. Embedded SQL systems. CLI, and JDBC

I: Introduction to the development of Applications with Databases.
II: Embedded SQL and Dynamic SQL.
III: Access to databases: ODBC, SQLJ, SQL / CLI.
IV: 4GL environments and databases.
V: Other technologies for data access: JDBC and ADO.NET.

12. Authorization

I: Security violations.
II: Control of access to the database.
III: Types of authorization.
IV: Authorizations and views.
V: Granting privileges.
VI: Elimination of privileges.
VII: The concept of role or paper.
VIII: Limitations of the SQL authorization.

13. Transactions

I: Introduction.
II: Sentences for a transaction.
III: Nested transactions.
IV: Transactions and stored procedures.

14. Object oriented database

I: What is a BDOO?
II: Architecture of A BDOO.
III: Development with OO Databases.
IV: Three Approaches to the Construction of OO Databases.

V: Impact of Object Orientation in Software Engineering.
VI: Advantages in BDOOs.
VII: Performance.

15. Semi-structured data and XML

I: Semi-structured Data Model.
II: Structure of the data in XML.
III: HTML vs. XML IV: Basic XML syntax.
V: DTD and XML-Schema.
VI: XML Query Data Model.
VII: XML Query algebra.
VIII: XML Query language.

16. Data Warehouse and Data Mining

I: Data Warehouse, Introduction to Data Warehouses.
II: Introduction to data mining.
III: Exploitation of data warehouses OLAP tools.
IV: Classification problems.
V: Supervised learning.
VI: Methods of grouping.
VII: Unsupervised learning.
VIII: Design of data warehouses.
IX: Maintenance of data warehouses.
X: Web Mining.

IV. BIBLIOGRAPHY

- Hector García-Molina, Jeff Ullman, y Jennifer Widom. Database Systems: The Complete Book (DS:CB). Editorial: Upper Saddle River, N.J.: Pearson Prentice Hall, 2009.
- C. J. Date. Introduction to database systems. Pearson Prentice Hall, 2001.
- Enrique Rivero Cornelio, Carlos Guardia Rivas, José Carlos Reig Hernández. Relational databases: physical design (DB2-oriented for IBM z / OS). Publisher Universidad Pontificia de Comillas de Madrid, 2004.
- Abiteboul,S; Hull and Vianu, V. Foundations of Databases. Addison-Wesley Publishing Company, 1995.
- Ullman, Jeffrey D. Principles of Database and Knowledge Base Systems, Vol I Computers Science Press, 1988.
- Mendelzon, A. Introduction to relational databases. Ed. Pearson, 2000.
- Silberschatz, A.; Korth, H.F.; Sudarshan, S. Database fundamentals. 3th edition. Madrid, McGraw-Hill, 1998.
- Inmon, W.H.. Building the Data Warehouse. John Wiley, 2002.

- Elmasri, R.; Navathe, S.B. Fundamentals of Database Systems 3rd Edition, Addison-Wesley, 2000

- Berry, M. Data mining techniques. 1997.

- Bray, T.; Hollander, D.; Layman, A. Name-spaces in XML. World Wide web Consortium. W3C Recommendation, 1999.

- Urman, S. ORACLE 8. PL/SQL Programing. Osborne McGraw-Hill, Madrid, 1998.