

SUBJECT IDENTIFICATION

1. SUBJECT TITLE

<i>Subject title:</i>	Database Design
<i>Tenured Professors:</i>	Prof. Felicia Ionescu
<i>Code:</i>	04.T.07.O.502
<i>Type:</i>	technical domain
<i>Number of course hours:</i>	28 hrs
<i>Number of application hours:</i>	28 hrs
<i>Number of credit points:</i>	4
<i>Semester:</i>	7
<i>Package:</i>	specialized curricular area
<i>Prerequisites:</i>	attending the following subjects: <ul style="list-style-type: none">- Computer programming- Data structures and algorithms- Object-Oriented programming

2. OBJECTIVES OF SUBJECT

- *The course* presents main theoretical aspects of relational and object-relational database systems (database integrity, relation normalization, transactions management, database recovery) and the principles of database systems and applications design, implementation and utilization.
- *Applications* develop students' abilities to use different practical database management systems (SQL Server, Oracle, MySQL, Microsoft Access). The students are involved in design and implementation of databases and applications using specific languages and interfaces (SQL, Transact-SQL, PL/SQL, ODBC, JDBC).

3. SPECIFIC COMPETENCIES

The main purpose of this subject is to develop the student abilities to design and implement relational databases and applications, using specific languages, libraries and interfaces, for different database management systems and computing platforms.

According to the specific skills standardized by ACPART grids for Information Engineering specialization, studying this course will offer students the skills:
 C3.2 Use of interdisciplinary knowledge, patterns of solutions and tools, performing experiments and interpretation of their results
 C3.5 Develop and implementation solutions for practical problems

4. SYLLABUS

a. Course:

Capitol	Content	Nr. Hours
1.	Basic concepts in database systems 1.1. Architecture of database systems 1.2. Classification of database systems 1.3. Data modeling – Entity-Relationship diagram	2
2.	Relational databases 2.1. Relations, domains and attributes 2.2. Integrity constraints (primary and foreign keys) 2.3. Indexes 2.4. Cursors, stored procedures and triggers	6
3.	SQL language 3.1. Data types and domains in SQL 3.2. Data definition instructions 3.3. Data manipulation instructions	2
4.	Queries in relational databases 4.1. Relational algebra and relational calculus 4.2. Queries in one and more relations 4.3. Expressing queries in SQL language	4
5.	Relational database design and implementation 5.1. Conceptual design of databases 5.2. Logical design of databases 5.3. Database normalization 5.3. Physical design of databases 5.4. Databases implementation	4
6.	Languages and interfaces for database applications programming 6.1. Procedural SQL extension languages (Transact-SQL) 6.2. SQL embedded languages (ESQL/C, SQLJ) 6.3. Interfaces for database applications programming (ODBC, JDBC)	2
7.	Transaction management and database recovery 8.1. Transaction properties and scheduling 8.2. Concurrency control of transactions 8.3. Database recovery	4
8.	Object-relational databases 8.1. Object-relational model 8.2. User-defined Types (UDT): atributes and methods, inheritance, references 8.3. Data collections in object-relational model: vectors and nested tables	4
	Total	28

b. Applications:

Laboratory 1.	Presentation of practical database management systems	4
Laboratory 2.	Database querying using SQL language	4

Laboratory 3.	Design and implementation of relational databases	4
Laboratory 4.	Development of cursors, stored procedures, triggers in procedural SQL extension languages (PL/SQL, Transact-SQL)	4
Laboratory 5.	Development of database applications using ODBC interface. Transactions	4
Laboratory 6.	Design and implementation of object-relational databases	4
Laboratory 7.	Laboratory evaluation	4
	Total	28

5. ASSESSMENT

a) *Activities assessed and their weighting:*

- Evaluation of activities during the semester
 - Laboratory evaluation: 40%;
- Final examination: 60%.

b) *Minimum passing requirements:*

According to the “**Graduating Regulations**”, scoring 50% out of evaluation of activities during the semester and 50% out of final examination is required.

c) *Final scoring:*

According to the “**Graduating Regulations**”, the final score is obtained rounding overall score, if minimal passing requirements are fulfilled.

6. BENCHMARKING

The lectures are presented using multimedia facilities.

The laboratory documentation is available for the students in electronic form. The laboratory works are executed by practical programming at the computer (using languages and toolsets selected for each work) and interpretation of results. We recommend students to study the documentation before presentation in the laboratory room.

7. BIBLIOGRAPHY

- Felicia Ionescu: *Baze de Date Relationale si Aplicatii*, Editura Tehnica, 2004
- C.J.Date: *An Introduction to Database Systems*, Addison-Wesley, 1995
- R. Dolliner: *Baze de Date si Gestiunea Tranzactiilor*, Editura Albastra, 1997
- *Oracle Database Management System*, <http://www.oracle.com>
- *SQL Server Database Management System*, <http://www.microsoft.com/sql>
- *MySQL Database Management System*, <http://www.mysql.com>
- *Microsoft Access Database Management System – Help*
- Felicia Ionescu: [*Indrumar de laborator de Proiectare Baze de Date*](#)

HEAD OF DEPARTMENT / CHAIR

Prof. Dr. Sever Pașca

TENURED PROFESSOR

Prof. dr. Felicia Ionescu

