SYLLABUS

1. Data about the program of study

1.1 Institution	The Technical University of Cluj-Napoca
1.2 Faculty	Faculty of Automation and Computer Science
1.3 Department	Computer Science
1.4 Field of study	Computer Science and Information Technology
1.5 Cycle of study	Bachelor of Science
1.6 Program of study/Qualification	Computer science/ Engineer
1.7 Form of education	Full time
1.8 Subject code	46.1

2. Data about the subject

2.1 Subject name	*DataBase Design*				
2.2 Course responsible/lecturer	S.l. dr. eng. Călin Cenan – Calin.Cenan@cs.utcluj.ro				
2.3 Teachers in charge of seminars/ laboratory/ project	Conf. dr. eng. Delia Mitrea – Delia.Mitrea@cs.utcluj.ro				
2.4 Year of study	IV	2.5 Semester	1	2.6 Type of assessment (E - exam, C - colloquium, V - verification)	E
2.7 Subject category	*DF – fundamentală, DD – în domeniu, DS – de specialitate, DC – complementară*				DS
	DI – Impusă, DOp – opțională, DFac – facultativă				DOp

3. Estimated total time

3.1 Number of hours per week	4	of which:	Course	2	Seminars		Laboratory	2	Project
3.2 Number of hours per semester	56	of which:	Course	28	Seminars		Laboratory	28	Project
3.3 Individual study:									
(a) Manual, lecture material and notes, bibliography									22
(b) Supplementary study in the library, online and in the field									20
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays									12
(d) Tutoring									13
(e) Exams and tests									2
(f) Other activities:									

3.4 Total hours of individual study (suma (3.3(a)…3.3(f)))	69
3.5 Total hours per semester (3.2+3.4)	125
3.6 Number of credit points	5

4. Pre-requisites (where appropriate)

4.1 Curriculum	Database
4.2 Competence	

5. Requirements (where appropriate)

5.1. For the course	Board, video projector, computer; student present in mandatory 50% of days for admission to the final exam
5.2. For the applications	Computers, specific software; student present in mandatory 100% of days for admission to the final exam.

6. Specific competence

6.1 Professional competences	**C3 -** Problems solving using specific Computer Science and Computer Engineering tools (2 credits) **C3.1 -** Identifying classes of problems and solving methods that are specific to computing systems **C3.2 -** Using interdisciplinary knowledge, solution patterns and tools, making experiments and interpreting their results

	C3.3 - Applying solution patterns using specific engineering tools and mehods
	C3.4 - Comparatively and experimentaly evaluation of the alternative solutions for performance optimization
	C3.5 - Developing and implementing information system solutions for concrete problems
	C5 - Designing, managing the lifetime cycle, integrating and ensuring the integrity of hardware, software and communication systems (2 credits)
	C5.1 - Specifying the relevant criteria regarding the lifetime cycle, quality, security and the computing system's interaction with the environment and the human operator
	C5.2 - Using interdisciplinary knowledge for adapting the computing system to the specific requirements of the application field
	C5.3 - Using fundamental principles and methods for ensuring the security, the safety and ease of exploitation of the computing systems
	C5.4 - Proper utilization of the quality, safety and security standards in the field of information processing
	C5.5 - Creating a project including the problem's identification and analysis, its design and development, also proving an understanding of the basic quality requirements
6.2 Cross competences	N/A

7. Discipline objective (as results from the *key competences gained*)

7.1 General objective	Developing general skills in databases design and database programming
7.2 Specific objectives	Assimilate theoretical knowledge on relational databases design and SQL language extensions
	Presentation of database transactions
	Getting practical skills for designing and programming databases

8. Contents

8.1 Lectures	Hours	Teaching methods	Notes
Main steps to design a database; Data vs. Information	2		
Historical roots of database ; Types of Databases	2		
Business Rules; Data Models: Hierarchical, Network, Relational, Entity-Relationship, Object Oriented	2		
Degrees of Data Abstraction; Conceptual Model; Internal Model; External Model; Physical Model	2		
Entity-Relationship concepts and terminology; Entity-Relationship diagrams; Tables; Keys, Attribute specifications; Data types; Data dictionary; Integrity constraints	2		
Relationships; Connectivity and Cardinality; Strength and Participation; Entity Supertypes and Subtypes	2	PDF & PPT Presentations; Demonstrations and model presentations on board; small exercises to increase interaction	
Developing an ER Diagram; Optimization of Database – Normalization; Functional dependencies, 1NF, 2NF, 3NF, Boyce-Codd Normal Form (BCNF); 4NF, 5NF; Denormalization	2		
Constraints, Indexes; Data Definition Commands; Data Manipulation Commands	2		
Extended SQL – Transact-SQL; Writing Stored Procedures; Triggers	2		
Data / Information; Systems development life cycle: Planning, Analysis, Detailed Systems Design, Implementation	2		
Transaction Management and Concurrency Control; Transactions; Logs; Locks	2		
Data Warehouse - Need for Data Analysis; Decision Support Systems; Data Warehouse Architectures	2		
Facts, Dimensions, Attributes, Attribute Hierarchies; Data Mining	2		

Database administration; Security	2		

Bibliography

1. Alexandru Leluţiu - *Perenitatea Concepteleor Promovate de BAZELE de DATE*, Ed. Albastra, 2003
2. Raghu Ramakrishnan and Johannes Gehrke - *Database Management Systems*, McGraw-Hill Science, 2002
3. Peter Rob and Carlos Coronel - *Database Systems: Design, Implementation, and Management*, Crisp Learning, 2006
4. Rebecca M. Riordan - *Designing Relational Database Systems*, Microsoft Press, 1999
5. Matt Shepker - *Writing Stored Procedures for Microsoft SQL Server*, Sams, 2000
6. Mark Spenik and Orryn Sledge - *Microsoft SQL Server 2000 DBA Survival Guide*, Sams, 2001

8.2 Applications – Seminars/Laboratory/Project	Hours	Teaching methods	Notes
Database and DataBase Management Systems - Microsoft SQL Server – Project domains	2	Exposure and applications	Computers, MS SQL Server, Oracle
Developing ER diagrams - Microsoft Visio	2		
Visio – SQL Server synchronization – First evaluation of project work: Domain analysis	2		
Design of Database Structures – Tables, Keys, Relationships	2		
Design of Database Structures – Indexes, Constraints, Views	2		
Update Data; Query Data - Second evaluation of project work: Database structures	2		
Simple Stored Procedures; Functions	2		
Stored Procedures - Cursors	2		
Triggers	2		
Transactions	2		
Data Warehouse	2		
Third evaluation of project work	2		
MS SQL Server administration	2		
Final laboratory evaluation - Final project evaluation	2		

Bibliography

1. Alexandru Leluţiu - *Perenitatea Concepteleor Promovate de BAZELE de DATE*, Ed. Albastra, 2003
2. Raghu Ramakrishnan and Johannes Gehrke - *Database Management Systems*, McGraw-Hill Science, 2002
3. Peter Rob and Carlos Coronel - *Database Systems: Design, Implementation, and Management*, Crisp Learning, 2006
4. Matt Shepker - *Writing Stored Procedures for Microsoft SQL Server*, Sams, 2000
5. Mark Spenik and Orryn Sledge - *Microsoft SQL Server 2000 DBA Survival Guide*, Sams, 2001

*Se vor preciza, după caz: tematica seminariilor, lucrările de laborator, tematica și etapele proiectului.

9. Bridging course contents with the expectations of the representatives of the community, professional associations and employers in the field

Database Design is an advanced topic in Computer Engineering and Information Technology field, combining fundamental aspects and practical software tools. Explaining to students the principles of database designing and database programming. Course content it is similar to database courses in other universities in the country and abroad.

10. Evaluation

Activity type	Assessment criteria	Assessment methods	Weight in the final grade
Course	Solving 4 problems and answers to questions of theory	2.5 hours written evaluation face to face or using TEAMS platform, if necessary	60%
Seminar			
Laboratory	Implementing an application	Ongoing evaluation face to face or on-line using TEAMS platform, if necessary	40%
Project			
Minimum standard of performance:			
Solving practical laboratory work and projects, designing databases and a database programming; solving the			

problems and other subjects presented at the examination.
Grade calculus: 50% lab + 50% final exam
Conditions for participating in the final exam: Lab ≥ 5
Conditions for promotion: final exam ≥ 5

Date of filling in:	**Titulari**	**Titlu Prenume NUME**	**Semnătura**
	Course	Lect.dr.eng. Calin Cenan	
	Applications	Assoc.prof.dr.eng. Delia Mitrea	

Date of approval in the department	Head of department Prof.dr.ing. Rodica Potolea
Date of approval in the Faculty Council	Dean Prof.dr.ing. Liviu Miclea