

SYLLABUS

1. Data about the program of study

1.1	Institution	Technical University of Cluj-Napoca
1.2	Faculty	Automation and Computer Science
1.3	Department	Automation
1.4	Field of study	Automation, Applied Informatics and Intelligent Systems
1.5	Cycle of study	Bachelor
1.6	Program of study/Qualification	Automation and Applied Informatics
1.7	Form of education	Full time

2. Data about the subject

2.1	Subject name	Databases	Subject code	27.00
2.2	Subject area	Databases		
2.2	Course responsible/lecturer	Assoc. Prof. Eng. PhD Delia-Alexandrina Mitrea – Delia.Mitrea@cs.utcluj.ro		
2.3	Teachers in charge of seminars	Assoc. Prof. Eng. PhD Delia-Alexandrina Mitrea – Delia.Mitrea@cs.utcluj.ro Senior Lect. Eng., PhD, Calin Ovidiu Cenan – Calin.Cenan@cs.utcluj.ro Eng., PhD, Cristi Mocan – Cristi.Mocan@cs.utcluj.ro		
2.4	Year of study	2	2.5 Semester	2
			2.6 Assessment	Written Examination
				E
2.7	Subject category	Formative category		
		Optionality		
				FD
				DOB

3. Estimated total time

3.1	Number of hours per week	4	of which	3.2	Course	2	3.3	Seminar		3.3	Laboratory	2	3.3	Project	
3.4	Total hours in the curriculum	56	of which	3.5	Course	28	3.6	Seminar		3.6	Laboratory	28	3.6	Project	
3.7 Individual study:															
(a) Manual, lecture material and notes, bibliography														46	
(b) Supplementary study in the library, online and in the field														12	
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays														6	
(d) Tutoring														3	
(e) Exams and tests														2	
(f) Other activities														0	
3.8 Total hours of individual study (summ (3.7(a)...3.7(f)))						69									
3.9 Total hours per semester (3.4+3.8)						125									
3.10 Number of credit points						5									

4. Pre-requisites (where appropriate)

4.1	Curriculum	Linear Algebra, Special Mathematics, Computer Programming
4.2	Competence	Basics of Computer Use, Computer Programming

5. Requirements (where appropriate)

5.1	For the course	N/A
5.2	For the applications (Laboratories)	Attendance compulsory

6. Specific competences

Professional competences	C2 - Operating with fundamental concepts of computer science, information technology and communications C2.1 Description of the operation and structure of computing systems, communication networks and their applications in systems engineering using knowledge related to programming languages, environments and technologies, programming engineering and specific tools (algorithms, schemes, models, protocols, etc.). C2.2 Reasoned use of concepts from informatics and computer technology in solving well-defined problems in systems engineering and in applications that require the use of hardware and software in industrial systems or in computer systems.
Cross competences	N/A

7. Expected learning outcomes

Knowledge	- Structured Query Language (SQL) - DataBase Management Systems (both relational and NoSQL) and their characteristics - Relational database design using the Entity-Relationship (E-R) model - The normalization rules - The physical level of the database - About web applications that communicate with databases and corresponding scripting languages (e.g. PHP)
Skills	- Designing and implementing a consistent database using an appropriate Database Management System (DBMS) - Appropriately employing SQL statements, respectively solving various types of queries, including complex and recursive ones - Appropriately building web applications that communicate with databases
Responsibilities and autonomy	- Master the database design tools, the DBMS functions, the SQL language, as well as HTML and the scripting languages to build consistent databases and web applications that communicate with them. - Adapt knowledge and skills according to technology evolution - Timely solve and present the weekly homework and the mini project.

8. Course objectives

7.1	General objective	Design, implementation, and use of Databases
7.2	Specific objectives	The appropriate understanding of the data models Design, implementation, and query of databases in an efficient manner Working with databases in the context of a Database Management System (DBMS) Design and implementation of software applications for accessing and processing data from the database

9. Contents

8.1. Lecture (syllabus)	No of hours	Teaching methods	Notes
Introduction – History of Databases and Fundamental Notions	2		
Database Management Systems and the Database Architecture	2		

Data modeling. Classic data models (the hierarchical model , the network model, the relational data model) and modern trends (Object-Oriented, Object-Relational, NoSQL, NewSQL)	2	Slides, discussions with students, examples and exercises on the blackboard/ whiteboard	
The relational data model (detailed)	2		
The entity-relationship (E/R) model	2		
Relational Algebra. Relational Data Manipulation Languages (DML)	2		
Structured Query Language (SQL)	2		
Relation Normalization	2		
The physical level of the database (1)	2		
The physical level of the database (2)	2		
Web applications that interact with databases	2		
MySQL databases	2		
Oracle Databases (Oracle Academy)	2		
Revisions and Discussions	2		
Bibliography			
R. Dollinger, Baze de Date si Gestiunea Tranzactiilor, Ed. Albastra 1998			
R. Ramakrishnan, J. Gerhrke, Database Management Systems, McGraw Hill, 2002			
P. Mitrea, Accesibilitate WEB, Multimedia, Paralelism si Arhitecturi Distribuite pentru Baze de Date de Inalta Performanta, Ed. U.T. Press, 2008			
Th. Borangiu &al, DB2 UDB: Fundamente si Administrare, Editura AGIR, 2006			
Joe Celko, Joe Celko's data and databases concepts in practice, Morgan Kaufman, 1999			
S. Wanigasooria, "Database Administration Developments and Research in Contemporary Digital Environments", Research, June 2024, [Online]:			
https://www.researchgate.net/publication/381513891_Database_Administration_Developments_and_Research_in_Contemporary_Digital_Environments			
8.2. Seminars /Laboratory/Project	No. hours	Teaching methods	Notes
Introduction to SQL. SELECT phrase. Queries; interactive website http://www.sqlzoo.net	2	Slides, practical exercises on the blackboard and on computers, individual study from the dedicated bibliography, homework	
Advanced SQL queries; interactive website http://www.sqlzoo.net	2		
Creating the database in Microsoft SQL Server 2008/ Management Studio or Oracle Academy, using the SQL language and the functionalities of the environment. SQL statements for inserting, updating and deleting data. Definition of Constraints and Integrity Rules.	2		
SQL queries in Microsoft SQL Server or Oracle	2		
Views. Defining Views, updating, deleting in SQL Server or Oracle Academy. Batch files.	2		
Creating a simple web page using HTML and PHP.	2		
Creating a dynamic web page, using HTML, PHP and MySQL. Passing parameters between HTML and PHP. Connecting to the Database and interacting with the DB through insertion, update and deletion operations.	2		
Creating a simple website.	2		
Improving the appearance of the website, using Cascaded Style Sheets (CSS).	2		
NoSQL Data Structures and Database Management Systems in Practice	2		
Exercises	2		
Individual activity – generating a dynamic website	2		
Individual activity – generating a dynamic website	2		
Final evaluation	2		

Bibliography

- [1] R. Dollinger, Utilizarea sistemului **SQL Server**, Ed. Albastra, 2001
 [2] Th. Borangiu & al., DB2 UDB- Exerciții, Editura AGIR, 2006
 [3] Joe Celko, Joe Celko's data and databases concepts in practice , Morgan Kaufman, 1999

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

Most of the software applications developed in companies store data in databases, then communicate with the database and with the DBMS by defining the data as well as by means of their manipulation languages, incorporated in dedicated programming environments.

11. Evaluation

Activity type	11.1 Assessment criteria	11.2 Assessment methods	11.3 Weight in the final grade
11.4 Course	Understanding and assimilation of the knowledge taught in the course	Written Examination	70%
11.5 Laboratory	Practical abilities	Test of the skills acquired in the laboratory, at the end of the semester	30%
11.6 Minimum standard of performance			
Minimum performance standard: Knowledge of Data Models and SQL Query Language; both the grade from the laboratory and the grade from the written exam must be at least 5.			

Date of filling in:		Title Surname Name	Signature
09.07.2026	Lecturer	Assoc. Prof., Eng., PhD, Delia-Alexandrina Mitrea	
	Teachers in charge of application	Assoc. Prof., Eng., PhD, Delia-Alexandrina Mitrea	
		Senior Lect. Eng., PhD, Calin Ovidiu Cenan	
		Eng., PhD, Cristinel Mocan	

Date of approval in the department Automation

Head of department
Prof.dr.ing. Honoriu Vălean

Date of approval in the faculty Automation and Computer Science

Dean
Prof.dr.ing. Vlad Muresan