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	19.

2. Data about the subject

2.1 Subject name	*DataBase*				
2.2 Course responsible / lecturer	Lect. dr. eng. Cenan Călin - Calin.Cenan@cs.utcluj.ro				
2.3 Teachers in charge of seminars / laboratory / project	Lect. dr. eng. Cenan Călin - Calin.Cenan@cs.utcluj.ro				
2.4 Year of study	II	2.5 Semester	3	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*				DD
	DI – Impusă, DOp – opțională, DFac – facultativă				DI

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									11
(b) Supplementary study in the library, online and in the field									18
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays									11
(d) Tutoring									1
(e) Exams and tests									3
(f) Other activities:									

3.4 Total hours of individual study (suma (3.3(a)…3.3(f)))	44
3.5 Total hours per semester (3.2+3.4)	100
3.6 Number of credit points	4

4. Pre-requisites (where appropriate)

4.1 Curriculum	Mathematics, Computer Programming
4.2 Competence	Set theory, IT fundamentals

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	**C2** - Designing hardware, software and communication components
	• **C2.1** - Describing the structure and functioning of computational, communication and software components and systems

	• **C2.2** - Explaining the role, interaction and functioning of hardware, software and communication components • **C2.3** - Building the hardware and software components of some computing systems using algorithms, design methods, protocols, languages, data structures, and technologies • **C2.4** - Evaluating the functional and non-functional characteristics of the computing systems using specific metrics • **C2.5** - Implementing hardware, software and communication systems **C3** - Problems solving using specific Computer Science and Computer Engineering tools • **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 2/3 experiments and interpreting their results • **C3.3** - Applying solution patterns using specific engineering tools and mehods **C3.4** - Evaluating, comparatively and experimentally, the available alternative solutions for performance optimization C3.5 - Developing and implementing informatic solutions for concrete problems **C4** - Improving the performances of the hardware, software and communication systems • **C4.1** - Identifying and describing the defining elements of the performances of the hardware, software and communication systems. • **C4.2** - Explaining the interaction of the factors that determine the performances of the hardware, software and communication systems • **C4.3** - Applying the fundamental methods and principles for increasing the performances of the hardware, software and communication systems • **C4.4** - Choosing the criteria and evaluation methods of the performances of the hardware, software and communication systems • **C4.5** - Developing professional solutions for hardware, software and communication systems based on performance optimization
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 and database applications
7.2 Specific objectives	Assimilate theoretical knowledge on relational databases, Structured Query Language SQL language Presentation of Database Management Systems DBMS Getting practical skills for designing and implementing database and development of database application

8. Contents

8.1 Lectures	Hours	Teaching methods	Notes
Introduction. Database, Database Management Systems	2	PDF & PPT Presentations; Demonstrations and model presentations on board; small exercises to increase interaction	
Structured Query Language – SQL part 1	2		
Structured Query Language – SQL part 2	2		
Database Management Systems Architecture; E–R Model	2		
Relational Model	2		
Entities; Relations; Constraints; Views	2		
Database Design; Normal forms	2		
Database Design; Optimization	2		
Physical database design; Indexes	2		
Relational Algebra; Relational Calculus; QBE	2		
Procedural extensions: stored procedures, triggers	2		

Other data formats: XML, JSON	2		
Database administration; Security	2		
Database Applications	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. Hector Garcia-Molina, Jeff Ullman, and Jennifer Widom - *First Course in Database Systems*, Prentice Hall, 2001
4. Ryan K. Stephens, Ronald R. Plew, - *Teach Yourself SQL in 21 Days*, Prentice Hall, 1999

8.2 Applications - Seminars / Laboratory / Project	Hours	Teaching methods	Notes
DataBase Management System presentation all applications are based on Oracle or and SQL Server or and MySQL or and PostGreSQL and or SQLIte	2	Exposure and applications	Computers, Oracle, MS SQL Server, MySQL, PostGreSQL, SQLite
Database administration	2		
Tables; Relationships; Database diagrams	2		
Indexes; Constraints; Views	2		
CRUD operations: INSERT, UPDATE, DELETE Structured Query Language – SQL	2		
Presentation of other databases – part 1	2		
Presentation of other databases – part 2	2		
Database design – simple examples	2		
Database design – more complex examples	2		
Procedural extensions – part 1	2		
Procedural extensions – part 2; Database Applications	2		
more Database Applications	2		
Project Work – Database Applications	2		
Final laboratory work evaluation	2		

Bibliography:

1. Raghu Ramakrishnan and Johannes Gehrke - *Database Management Systems*, McGraw-Hill Science, 2002
2. Hector Garcia-Molina, Jeff Ullman, and Jennifer Widom - *First Course in Database Systems*, Prentice Hall, 2001
3. Ryan K. Stephens, Ronald R. Plew, - *Teach Yourself SQL in 21 Days*, Prentice Hall, 1999
4. Philip Greenspun - *SQL for Web Nerds*, http://philip.greenspun.com/sql/
5. SQL Tutorial maintained by Andrew Cumming - SQL Zoo Tutorial https://sqlzoo.net/

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 is a topic of Computer Engineering and Information Technology field, combining fundamental aspects and practical software tools. Explaining to students the principles of database implementation, database design and implementing database application . 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 problems and answers to theoretical questions	2.5 hours written evaluation face to face or using TEAMS platform, if necessary	60% (a grade greater than 5 is mandatory)
Seminar	-	-	-
Laboratory	Presentation of implemented databases Knowing Structured Query Language Project Work: Database Applications	Ongoing evaluation Final presentation	40% (a grade greater than 5 is mandatory)
Project	-	-	-

Minimum standard of performance: Solving practical laboratory work, implementing a database and a database application, solving the SQL Structured Query Language problem and another two out of the four other subjects.
Grade calculus: 40% lab + 60% final exam
Conditions for participating in the final exam: Lab ≥ 5 Conditions for promotion: final exam ≥ 5

Date of filling in: 26.02.2025	Responsible	Title, First name Last name	Signature
	Course	Lect.dr.eng. Călin CENAN	
	Applications	Lect.dr.eng. Călin CENAN	

Date of approval in the department	Head of department, Prof.dr.eng. Rodica Potolea
Date of approval in the Faculty Council	Dean, Prof.dr.eng. Vlad Mureşan