

SYLLABUS

Database design

University year 2025 - 2026

1. Information regarding the programme

1.1. Higher education institution	Babeş Bolyai University, Cluj Napoca
1.2. Faculty	Faculty of Mathematics and Computer Science
1.3. Department	Department of Computer Science
1.4. Field of study	Mathematics
1.5. Study cycle	Bachelor
1.6. Study programme/Qualification	Mathematics Computer Science
1.7. Form of education	Full time

2. Information regarding the discipline

2.1. Name of the discipline	Database design				Discipline code	MLE5236
2.2. Course coordinator	Lect. PhD. Emilia-Loredana Pop					
2.3. Seminar coordinator	Lect. PhD. Emilia-Loredana Pop					
2.4. Year of study	2	2.5. Semester	3	2.6. Type of evaluation	E	2.7. Discipline regime Compulsory

3. Total estimated time (hours/semester of didactic activities)

3.1. Hours per week	4	of which: 3.2 course	2	3.3 seminar/laboratory/project	2
3.4. Total hours in the curriculum	56	of which: 3.5 course	28	3.6 seminar/laboratory/project	28
Time allotment for individual study (ID) and self-study activities (SA)					hours
Learning using manual, course support, bibliography, course notes (SA)					21
Additional documentation (in libraries, on electronic platforms, field documentation)					15
Preparation for seminars/labs, homework, papers, portfolios and essays					15
Tutorship					10
Evaluations					8
Other activities:					
3.7. Total individual study hours		69			
3.8. Total hours per semester		125			
3.9. Number of ECTS credits		5			

4. Prerequisites (if necessary)

4.1. curriculum	Data Structures and Algorithms
4.2. competencies	Average programming skills in a high level programming language

5. Conditions (if necessary)

5.1. for the course	Lecture room with a video projector
5.2. for the seminar /lab activities	Seminar / Lab room with SQL Server, Visual Studio and video projector

6. Specific competencies acquired

Professional/essential competencies	- mathematical processing of data, analysis and interpretation of some phenomena and processes - analysis, testing and using of software system
Transversal competencies	- application of rigorous and efficient work rules, manifestation of responsible attitudes towards the didactic-scientific field, to bring optimal and creative values to own potential in specific situations, with respect to professional ethics principles and norms - use of efficient information resources and techniques to learn and develop the professional abilities in Romanian language and in an international language

7. Objectives of the discipline (outcome of the acquired competencies)

7.1 General objective of the discipline	- To get acquainted with the fundamental concepts concerning databases. - To gain a thorough understanding of the relational data model.
7.2 Specific objective of the discipline	- To manage (create, modify, remove) relational databases in SQL Server. - To analyze data using complex SQL queries. - To optimize SQL queries.

8. Content

8.1 Course	Teaching methods	Remarks
1. Introduction to Databases	Interactive presentation Conversation Examples Explanation	
2. The Relational Data Model	Interactive presentation Conversation Examples Explanation	
3. SQL Queries	Interactive presentation Conversation Examples Explanation	
4. Functional Dependencies	Interactive presentation Conversation Examples Explanation	
5. Normal Forms	Interactive presentation Conversation Examples Explanation	

6. The Relational Algebra	Interactive presentation Conversation Examples Explanation	
7. The Physical Structure of Databases	Interactive presentation Conversation Examples Explanation	
8-9. Indexes. Trees. Hash files	Interactive presentation Conversation Examples Explanation	
10. Evaluating the Relational Algebra Operators	Interactive presentation Conversation Examples Explanation	
11. Conceptual Modeling	Interactive presentation Conversation Examples Explanation	
12. Object Oriented Databases, Data Streams	Interactive presentation Conversation Examples Explanation	
13. Transactions, Concurrency Control	Interactive presentation Conversation Examples Explanation	
14. Problems	Interactive presentation Conversation Examples Explanation	

Bibliography

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<http://infolab.stanford.edu/~ullman/fcdb.html>

*** Azure Stream Analytics - technical documentation, <https://azure.microsoft.com/en-us/services/stream-analytics/>

8.2 Seminar / laboratory	Teaching methods	Remarks
Seminar	Problems solving	
1. SQL - Data Definition Language	Conversation Problems Examples Explanation	
2. SQL - Data Manipulation Language	Conversation Problems Examples Explanation	
3. Stored Procedures, Dynamic SQL, Cursors	Conversation Problems Examples Explanation	
4. Functions, Views, Triggers	Conversation Problems Examples Explanation	
5. Indexes (I)	Conversation Problems Examples Explanation	
6. Indexes (II)	Conversation Problems Examples Explanation	
7. Problems	Conversation Problems Examples Explanation	
Laboratory	Teaching programs in which real life problems can be solved	
1-2. Database Design	Conversation Problems Examples Explanation	
3-4. SQL Queries	Conversation Problems Examples Explanation	
5. Altering the Database	Conversation Problems Examples Explanation	
6-7. Indexes	Conversation Problems Examples	

	Explanation	
Bibliography		
Course bibliography		

9. Corroborating the content of the discipline with the expectations of the epistemic community, professional associations and representative employers within the field of the program

- The course is oriented towards the problems a graduate student should solve at his / her future workplace. The acquired knowledge is considered as mandatory by software companies.
- The course is part of the academic curriculum of all major universities in Romania and abroad.
- The course structure follows the IEEE and ACM Recommendations concerning the Computer Science curriculum.

10. Evaluation

Activity type	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 Percentage of final grade
10.4 Course	to know and apply the concepts described at the course	written exam	50%
	to solve Databases problems		
10.5 Seminar/laboratory	to be able to apply the concepts from the course and seminar to design / alter a database, to analyze data with SQL queries, to optimize queries	lab evaluation	25%
		practical exam	25%
10.6 Minimum standard of performance			
- To pass, a student must get a grade of at least 5 (on a scale of 1 to 10) on the written exam, practical exam and lab evaluation. - To attend the exam, a student must have at least 6 laboratory attendances and at least 5 seminar attendances, according to the Computer Science Department's decision.			

11. Labels ODD (Sustainable Development Goals)¹

Not applicable.

¹ Keep only the labels that, according to the [Procedure for applying ODD labels in the academic process](#), suit the discipline and delete the others, including the general one for *Sustainable Development* – if not applicable. If no label describes the discipline, delete them all and write „*Not applicable.*”.

Date:
28.04.2025

Signature of course coordinator
Lect. PhD. Emilia-Loredana Pop

Signature of seminar coordinator
Lect. PhD. Emilia-Loredana Pop

Date of approval:
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Signature of the head of department
Assoc.prof.phd. Adrian STERCA