SYLLABUS

1. Information regarding the programme

1.1 Higher education institution	**Babeș 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 and Computer Science**

2. Information regarding the discipline

2.1 Name of the discipline			**Databases**				
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 Type of discipline	**Compulsory**
2.8 Code of the discipline		MLE5027					

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	2
3.4 Total hours in the curriculum	56	Of which: 3.5 course	28	3.6 seminar/laboratory	28
Time allotment:					hours
Learning using manual, course support, bibliography, course notes					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	Lab room with SQL Server, Visual Studio

6. Specific competencies acquired

Professional competencies	C 5.1 Identifying basic concepts for data organization in databases C 5.2 Identifying and explaining basic models for data organization and management in databases C 5.3 Using methodologies and database design environments for specific problems C 5.4 Evaluating the quality of various Database Management Systems in terms of their structure, functionality and extensibility C 5.5 Developing projects involving databases
Transversal competencies	CT1 - Applying organized and efficient work rules, responsible attitudes towards the didactic and scientific field, in order to creatively capitalize on one's own potential, while respecting the professional ethics principles and rules CT3 - Use efficient methods and techniques for learning, knowledge gaining, researching and developing abilities for knowledge capitalization and accommodation to the requirements of a dynamic society

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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ULLMAN, J., WIDOM, J., A First Course in Database Systems, 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

Type of activity	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 Share in the grade (%)
10.4 Course	• to know and apply the concepts described at the course	• written exam	50%
	• to solve Databases problems		
10.5 Seminar/lab activities	• 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 performance standards			
➢ 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: http://www.cs.ubbcluj.ro/wp-content/uploads/Hotarare-CDI-15.03.2017.pdf.			

Date	Signature of course coordinator	Signature of seminar coordinator
24.04.2023	Lect. PhD. Emilia-Loredana Pop	Lect. PhD. Emilia-Loredana Pop

Date of approval

Signature of the head of department

Prof. PhD. Laura Dioșan