SYLLABUS

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 and Computer Science**

2. Information regarding the discipline

2.1 Name of the discipline		**Databases**					
2.2 Course coordinator		**Lect. Dr. Sabina Surdu**					
2.3 Seminar coordinator		**Lect. Dr. Sabina Surdu**					
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	Lab room with SQL Server, Visual Studio

activities	

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 (to create, to modify) 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, Normal Forms	Interactive presentation	

	Conversation Examples Explanation	
5. The Relational Algebra	Interactive presentation Conversation Examples Explanation	
6. The Physical Structure of Databases	Interactive presentation Conversation Examples Explanation	
7-9. 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. Transactions, Concurrency Control	Interactive presentation Conversation Examples Explanation	
13. Data Streams	Interactive presentation Conversation Examples Explanation	
14. Problems	Interactive presentation Conversation Examples Explanation	

Bibliography

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ARASU, A., BABCOCK, B., BABU, S., DATAR, M., ITO, K., MOTWANI, R., NISHIZAWA, I., SRIVASTAVA, U., THOMAS, D., VARMA, R., WIDOM, J., STREAM: The Stanford Stream Data Manager, IEEE Data Engineering Bulletin 26(1): 19-26, 2003

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GRIPAY, Y., LAFOREST, F., LESUEUR, F., LUMINEAU, N., PETIT, J.-M., SCUTURICI, V.-M., SEBAHI, S., SURDU, S., ColisTrack: Testbed for a Pervasive Environment Management System, Proceedings of The 15th International Conference on Extending Database Technology (EDBT 2012), 574-577, 2012

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LIU, L., OZSU, M.T., Encyclopedia of Database Systems, Springer, 2009

RAMAKRISHNAN, R., GEHRKE, J., Database Management Systems (3rd Edition), McGraw-Hill, 2002

SILBERSCHATZ, A., KORTH, H., SUDARSHAN, S., Database System Concepts (6th Edition), McGraw-Hill, 2011

ȚÂMBULEA, L., Curs Baze de date, Facultatea de Matematică și Informatică, UBB, versiunea 2013-2014

ȚÂMBULEA, L., Baze de date, Litografiat, Cluj-Napoca, 2003

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		
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		
1. Database Design	Conversation Problems Examples Explanation	
2. SQL Queries	Conversation Problems Examples Explanation	
3. Altering the Database	Conversation Problems Examples Explanation	
4. 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 • to solve problems	• written exam	50%
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 • practical exam	50%
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
02.05.2020	Lect. Dr. Sabina Surdu	Lect. Dr. Sabina Surdu

Date of approval

Signature of the head of department

Prof. Dr. Anca Andreica