

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. 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					22
Additional documentation (in libraries, on electronic platforms, field documentation)					20
Preparation for seminars/labs, homework, papers, portfolios and essays					24
Tutorship					10
Evaluations					8
Other activities:					
3.7 Total individual study hours	84				
3.8 Total hours per semester	140				
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	<ul style="list-style-type: none">• 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	<ul style="list-style-type: none">• 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	Interactive presentation Conversation Examples Explanation	
13. Transactions, Concurrency Control	Interactive presentation Conversation Examples Explanation	
14. Problems	Interactive presentation Conversation Examples Explanation	

Bibliography

ABADI, D.J., CARNEY, D., CETINTEMEL, U., CHERNIACK, M., CONVEY, C., LEE, S., STONEBRAKER, M., TATBUL, N., ZDONIK, S.B., Aurora: A New Model and Architecture for Data Stream Management, The VLDB Journal, 12(2):120–139, 2003

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

ARASU, A., CHERNIACK, M., GALVEZ, E., MAIER, D., MASKEY, A.S., RYVKINA, E., STONEBRAKER, M., TIBBETTS, R., Linear Road: A Stream Data Management Benchmark, Proceedings of The Thirtieth International Conference on Very Large Data Bases (VLDB 2004), 480-491, 2004

DATE, C.J., An Introduction to Database Systems (8th Edition), Addison-Wesley, 2003

GARCIA-MOLINA, H., ULLMAN, J., WIDOM, J., Database Systems: The Complete Book (2nd Edition), Pearson Education, 2009

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

KNUTH, D.E., Tratat de programare a calculatoarelor. Sortare și căutare, Editura Tehnică, București, 1976

LEVENE, M., LOIZOU, G., A Guided Tour of Relational Databases and Beyond, Springer, 1999

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	<ul style="list-style-type: none"> • to know and apply the concepts described at the course 	<ul style="list-style-type: none"> • written exam 	50%
	<ul style="list-style-type: none"> • to solve Databases problems 		
10.5 Seminar/lab activities	<ul style="list-style-type: none"> • to be able to apply the concepts from the course and seminar to design / alter a database, to analyze data with SQL queries, 	<ul style="list-style-type: none"> • lab evaluation 	25%
		<ul style="list-style-type: none"> • practical exam 	25%

	to optimize queries		
10.6 Minimum performance standards			
<ul style="list-style-type: none"> ➤ 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

02.05.2022

Signature of course coordinator

Lect. PhD. Emilia-Loredana Pop

Signature of seminar coordinator

Lect. PhD. Emilia-Loredana Pop

Date of approval

Signature of the head of department

Prof. PhD. Laura Dioşan