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	**Computer Science**
1.5 Study cycle	**Bachelor**
1.6 Study programme / Qualification	**Computer Science**

2. Information regarding the discipline

2.1 Name of the discipline		**Database Management Systems**				
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	**4**	2.6. Type of evaluation	**C**	2.7 Type of discipline	**Compulsory**
2.8. Code of the discipline		MLE5028				

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	25
Additional documentation (in libraries, on electronic platforms, field documentation)	15
Preparation for seminars/labs, homework, papers, portfolios and essays	25
Tutorship	11
Evaluations	18
Other activities:	

3.7 Total individual study hours	94
3.8 Total hours per semester	150
3.9 Number of ECTS credits	6

4. Prerequisites (if necessary)

4.1. curriculum	Data Structures and Algorithms Databases
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 5.3 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 concurrency control, database recovery, database security, query optimization, distributed databases
7.2 Specific objective of the discipline	• To create ADO.NET applications with data-bound controls • To handle concurrently running transactions using pessimistic and optimistic isolation levels • To optimize SQL queries

8. Content

8.1 Course	Teaching methods	Remarks
1-3. Introduction. Transactions, Concurrency Control	Interactive presentation Conversation Examples Explanation	
4. Database Recovery	Interactive presentation Conversation Examples Explanation	
5. Database Security	Interactive presentation Conversation Examples Explanation	
6-9. Evaluating Relational Operators. Query Optimization	Interactive presentation Conversation Examples Explanation	

10-11. Distributed Databases	Interactive presentation Conversation Examples Explanation	
12. Data Stream Processing - Azure Stream Analytics, Azure Machine Learning	Interactive presentation Conversation Examples Explanation	
13. Parallel Databases. Spatial Databases	Interactive presentation Conversation Examples Explanation	
14. Problems	Interactive presentation Conversation Examples Explanation	

Bibliography
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

KNUTH, D.E., Tratat de programare a calculatoarelor. Algoritmi fundamentali, Editura Tehnică, București, 1974

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

LITCHFIELD, D., ANLEY, C., HEASMAN, J., GRINDLAY, B., The Database Hacker's Handbook: Defending Database Servers, John Wiley & Sons, 2005

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/

*** Azure Machine Learning - technical documentation, https://azure.microsoft.com/en-us/services/machine-learning/

8.2 Seminar / laboratory	Teaching methods	Remarks
Seminar		
1. ADO.NET (I)	Conversation Problems Examples Explanation	
2. ADO.NET (II)	Conversation Problems Examples Explanation	
3. Transactions, Concurrency Control	Conversation Problems Examples Explanation	
4. Multiversioning	Conversation Problems Examples Explanation	
5. Performance Tuning in SQL Server (I)	Conversation Problems Examples Explanation	
6. Problems	Conversation Problems Examples Explanation	
7. Performance Tuning in SQL Server (II)	Conversation Problems Examples Explanation	
Laboratory		
1. Windows Forms application using ADO.NET to interact with a SQL Server database	Conversation Problems Examples Explanation	
2. Generic Windows Forms application - configuration file	Conversation Problems Examples Explanation	
3. Concurrency control	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 create applications that manage databases, to manage concurrent transactions	• 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

03.05.2020   Lect. Dr. Sabina Surdu   Lect. Dr. Sabina Surdu

Date of approval   Signature of the head of department

                                                 Prof. Dr. Anca Andreica