

SYLLABUS

1. Information regarding the programme

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| 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 | Calculatoare și Tehnologia Informației |
| 1.5 Study cycle | Bachelor |
| 1.6 Study programme / Qualification | Information Engineering |

2. Information regarding the discipline

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|----------------------------|---------------------------------------|--------------|----------|-------------------------|----------|------------------------|-------------------|
| 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 | | | | | 12 |
| Additional documentation (in libraries, on electronic platforms, field documentation) | | | | | 8 |
| Preparation for seminars/labs, homework, papers, portfolios and essays | | | | | 10 |
| Tutorship | | | | | 7 |
| Evaluations | | | | | 7 |
| Other activities: | | | | | |
| 3.7 Total individual study hours | | | | | 44 |
| 3.8 Total hours per semester | | | | | 100 |
| 3.9 Number of ECTS credits | | | | | 4 |

4. Prerequisites (if necessary)

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

5. Conditions (if necessary)

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| 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

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| Professional competencies | <p>C 5.1 Identifying basic concepts for data organization in databases</p> <p>C 5.2 Identifying and explaining basic models for data organization and management in databases</p> <p>C 5.3 Using methodologies and database design environments for specific problems</p> <p>C 5.4 Evaluating the quality of various Database Management Systems in terms of their structure, functionality and extensibility</p> <p>C 5.5 Developing projects involving databases</p> |
| Transversal competencies | <p>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</p> <p>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</p> |

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

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| 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 | |

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|--|---|--|
| | 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 | |

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| | 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 | | | |
| <p>➤ 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.</p> <p>➤ 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.</p> | | | |

Date

24.04.2024

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

Assoc. Prof. PhD. Adrian Ioan Sterca