**syllabus**

## 1. Information regarding the programme

| | |
|---|---|
| 1.1 Higher education institution | **Babeş-Bolyai University** |
| 1.2 Faculty | **Faculty of Mathematics and Computer Science** |
| 1.3 Department | **Department of Computer Science** |
| 1.4 Field of study | **Computers and Information Technology** |
| 1.5 Study cycle | **Bachelor** |
| 1.6 Study programme / Qualification | **Artificial Intelligence** |

## 2. Information regarding the discipline

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2.1 Name of the discipline (en) (ro) | **Baze de date / 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 DF** |
| 2.8 Code of the discipline | MLE5027 | | | | | | |

**3. Total estimated time** (hours/semester of didactic activities)

| | | | | | |
|---|---|---|---|---|---|
| 3.1 Hours per week | 5 | Of which: 3.2 course | 2 | 3.3 seminar/laboratory | 1 S<br>2 LP |
| 3.4 Total hours in the curriculum | 70 | Of which: 3.5 course | 28 | 3.6 seminar/laboratory | 42 |
| Time allotment: | hours | | | | |
| Learning using manual, course support, bibliography, course notes | 15 | | | | |

| | |
|---|---|
| Additional documentation (in libraries, on electronic platforms, field documentation) | 5 |
| Preparation for seminars/labs, homework, papers, portfolios and essays | 16 |
| Tutorship | 11 |
| Evaluations | 8 |
| Other activities: ..... | |
| 3.7 Total individual study hours | 55 |
| 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** | C4.1 Identifying and describing technologies, programming environments and various concepts that are specific to programming engineering<br>C4.2 Explaining the role, interaction and operation patterns of software system components<br>C4.3 Developing specifications and designing information systems using specific methods and tools |

| | |
|---|---|
| | C4.4. Managing the life cycle of hardware, software and communication systems based on performance evaluation<br>C4.5 Developing, implementing and integrating software solutions |
| **Transversal competencies** | CT1 Honorable, responsible, ethical behavior, in the spirit of the law, to ensure the professional reputation<br>CT3 Demonstrating initiative and pro-active behavior for updating professional, economical and organizational culture knowledge |

**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<br>• 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<br>• To analyze data using complex SQL queries<br>• To optimize SQL queries |

**8. Content**

| 8.1 Course | Teaching methods | Remarks |
|---|---|---|
| **1. Introduction to Databases** | Interactive presentation<br>Conversation<br>Examples<br>Explanation | |
| **2. The Relational Data Model** | Interactive presentation<br>Conversation<br>Examples<br>Explanation | |
| **3. SQL Queries** | Interactive presentation<br>Conversation<br>Examples<br>Explanation | |

| | | |
|---|---|---|
| **4. Functional Dependencies** | Interactive presentation<br>Conversation<br>Examples<br>Explanation | |
| **5. Normal Forms** | Interactive presentation<br>Conversation<br>Examples<br>Explanation | |
| **6. The Relational Algebra** | Interactive presentation<br>Conversation<br>Examples<br>Explanation | |
| **7. The Physical Structure of Databases** | Interactive presentation<br>Conversation<br>Examples<br>Explanation | |
| **8-9. Indexes. Trees. Hash files** | Interactive presentation<br>Conversation<br>Examples<br>Explanation | |
| **10. Evaluating the Relational Algebra Operators** | Interactive presentation<br>Conversation<br>Examples<br>Explanation | |
| **11. Conceptual Modeling** | Interactive presentation<br>Conversation<br>Examples<br>Explanation | |
| **12. Object Oriented Databases, Data Streams** | Interactive presentation<br>Conversation<br>Examples<br>Explanation | |
| **13. Transactions, Concurrency Control** | Interactive presentation<br>Conversation<br>Examples<br>Explanation | |
| **14. Problems** | Interactive presentation<br>Conversation<br>Examples<br>Explanation | |
| Bibliography | | |

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*** Azure Stream Analytics - technical documentation, https://azure.microsoft.com/en-us/services/stream- analytics/

| 8.2 Laboratory - 5 Databases homework | Teaching methods | Remarks |
|---|---|---|
| **1. Database Design** | Conversation<br>Problems<br>Examples<br>Explanation | |
| **2. SQL Queries** | Conversation<br>Problems<br>Examples | |

| | | |
|---|---|---|
| | Explanation | |
| **3. Altering the Database** | Conversation<br>Problems<br>Examples<br>Explanation | |
| **4. Stored procedures. Views. Triggers.** | Conversation<br>Problems<br>Examples<br>Explanation | |
| **5. Indexes** | Conversation<br>Problems<br>Examples<br>Explanation | |

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*** Azure Stream Analytics - technical documentation, https://azure.microsoft.com/en-us/services/stream- analytics/

| 8.3 Seminar | Teaching methods | Remarks |
|---|---|---|
| **1-2. Database Design. SQL. Data Definition Language (DDL)** | Conversation<br>Problems<br>Examples<br>Explanation | The Seminar has 2 hours and it is held each two weeks time. |
| **3-4. SQL Queries. 1. SQL. Data Manipulation Language (DML)** | Conversation<br>Problems<br>Examples<br>Explanation | |
| **5-6. Stored Procedures. Global Variables. Dynamic Execution.** | Conversation<br>Problems<br>Examples<br>Explanation | |
| **7-8. Functions. Views. Triggers. Coursors.** | Conversation<br>Problems<br>Examples<br>Explanation | |
| **9-10. Indexes (I)** | Conversation<br>Problems<br>Examples<br>Explanation | |
| **11-12. Indexes (II)** | Conversation<br>Problems<br>Examples<br>Explanation | |
| **13-14.Problems** | Conversation<br>Problems<br>Examples<br>Explanation | |

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*** Azure Stream Analytics - technical documentation, https://azure.microsoft.com/en-us/services/stream- analytics/

**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.<br>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 |
|---|---|---|
| 25.04.2023 | Lect. PhD. Emilia-Loredana Pop | Lect. PhD. Emilia-Loredana Pop |

Date of approval

Signature of the head of department

Prof. PhD. Laura Dioșan