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| **1. Course title:** Relational databases | | | | |
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| **2. Code:** | | **3. Type (lecture, practice etc.):** lecture+seminar | | |
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| **4. Contact hours:** 2+2 hoursper week | | **5. Number of credits (ECTS):** 5 | | |
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| 6. Preliminary conditions (max. 3): | | | | |
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| **7. Announced:** fall semester, spring semester, both | | | | |
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| **8. Limit for participants:** 150 | | | | |
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| **10. Responsible teacher (faculty, institute and department):**  Dr. Mátyás Koniorczyk (Faculty of Science, Institute of Mathematics and Informatics, Department of Applied Mathematics) | | | | |
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| 11. Teacher(s) and percentage: | | Mátyás Koniorczyk | | 50% |
| Géza Makkai | | 50% |
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| **12. Language:** English | | | | |
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| 13. Course objectives and/or learning outcomes:  Objectives:  The aim of the course is to develop skills and basic professional knowledgeof designing, implementing and using relational databases.  Learning outcomes: students completing the course will  *have a knowledge* on the basic concepts of relational databases (schema, dependencies, normal forms, transactions, design techniques, etc.), on the sql language, on the role of relational databases in software systems. They use the suitable professional vocabulary of the topic.  They will be *able* to use relational databases, recognize design and implementation issues in relational database systems.  They will be *open* to apply relational datbases and develop special knowledge on particlular relational database management software, they will *intend* to use the obtained knowledge in professionally solving database-related problems.  They will be *able in a stand-alone way* to design, implement and use small-sized relational databases and perform basic tasks of database administration. | | | | |
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| 14. Course outline   1. Data and database. Logical and physical independence. Data models: entity-relation models, relational models. Databases in system architecture. Typical roles of database personnel and users. Database system software. History of database systems. (No seminar this week.) 2. Entity-relation modeling. Seminar: Building entity-relation models. 3. Mathematical background of relational databases. Relations and their operations. Schema. Seminar: properties of relation operations. 4. Relational database systems. The SQL language, DDL, DML, DCL. Schema, relations and relation operations in SQL. Seminar: set up an open-source database management system and collect some experience. 5. Relational database design diagrams. Consistency of databases. Constraints, foreign keys. Active elements, triggers. Indices. Seminar: database design with diagrams. 6. Further exercises with database design and use (seminar only). 7. Theory of relational database design. Functional dependencies. Dependency sets and their closure. Faithful and dependency preserving decompositions. Practice: illustration of the learned concepts. 8. Normal forms:I-IV., Boyce-Codd. Related dependencies. Seminar: normalizng databases: examples and counterexamples. 9. Transactions, transaction handling. ACID properties. Isolation. States of transactions. Serializability. (No seminar.) 10. Scheduling in relational databases. Lock-based and timestamp based techniques. (No seminar). 11. Further exercises 12. Further exercises 13. Further exercises | | | | |
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| **15. Mid-semester works**  Seminars end with tasks to be finished as a homework. Besides, each student is given a more complex task on the 9th week, which has to be submitted along with the documentation of the solution. | | | | |
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| **16. Course requirements and grading**  A mark is given for sumbitted more complex tasks. The solution has to be presented at the final oral exam, where a theoretical topic has to be presented, too. A mark is given for both. The final mark is the mean of the three marks. The homework can be amended once. | | | | |
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| 17. List of readings   1. A. Silberschatz, H. Korth, S. Sudarshan: Database System Concepts, McGraw-Hill Education; 6 edition (2010) | | | | |
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| 18. Recommended texts, further readings   1. MySQL online oktatóanyagok (pl. https://www.tutorialspoint.com/mysql/ , 2017.) 2. PostgreSQL online oktatóanyagok (pl. https://www.tutorialspoint.com/postgresql/, 2017) | | | | |
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| **Date** | 13 April, 2017 | **Prepared by** |  | |
| Dr. Mátyás KONIORCZYK  responsible teacher | |
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| **Endorsed by** | | |  | |
| XXX program supervisor | |