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| The title of the course | Databases I |
| Faculty | Faculty of Mechanical Engineering and Computer  Science |
| The level of studies | Undergraduate (BA) |
| Semester | Winter |
| The form of classes and number of hours | Lectures (15) and self-directed learning practicals (30) |
| Language of instruction | English |
| The number of ECTS | 3 |
| Teacher | prof. dr hab. Vasyl Martsenyuk |
| The aims of the course (maximum 500 characters) | The subject of the course focuses on the basic issues of creating and using relational databases. Students are introduced to the most important concepts belonging to database theory, database classification, their structure and the functioning of database engine mechanisms. As part of the course, the SQL language is presented and discussed in detail as the basic tool designed to work with databases. In addition, issues related to the basics of proper modeling and creation of database structures are presented, taking into account the normalization of tables, data integrity, fidelity of reality representation and good practices. Both lectures and classes are conducted on the basis of the MS SQL Server relational database management environment. |
| The content of the course: main topics and key ideas | 1. Introduction, types and classification of databases, characteristics of individual types of databases, applications of databases, features, functions and requirements for databases, review of modern RDBMS (Relational Database Management Systems). 2. Relational databases: introduction and description of basic concepts (relationship, table, record, tuple, attribute, domain, primary key, foreign key, uniqueness, integrity constraints, query, subquery, view, join, relationship algebra operations, etc.), data types in SQL Server 2016. 3. Basics of query development and programming in T-SQL. 4. Collective operators. JOINs: cross, internal, multiple, external. 5. Designing table expressions – part I: derived tables, CTE. 6. Designing table expressions – part II: views, built-in functions returning tables. 7. Advanced issues of creating queries: window functions, data presentation, reverse data presentation, grouping sets. 8. Modifying data: inserting, updating, deleting, merging. 9. Elementary DDL commands – creating and modifying tables. 10. Creating temporal tables. 11. Data and index structures in SQL Server. 12. Programmable objects – part I: variables, batches, elements of execution flow control. 13. Introduction to the issue of creating user-defined functions, stored procedures and triggers. 14. Programmable objects – part II: cursors, temporary tables, dynamic SQL code, error handling. |
| Didactics methods | Lectures with practical demonstrations, students develop informational model and relational database implementations for self-directed learning. |
| Course requirements | Computer laboratory for self-directed learning |
| Literature (basic and supplementary) | 1. Steve Suehring, MySQL Bible, http://debracollege.dspaces.org/bitstream/123456789/392/1/MySQL%20Bible%20by%20Steve%20Suehring.pdf 2. Managing and Using MySQL, 2nd Edition, http://ommolketab.ir/aaf-lib/4ivpltr2tiwawr6enle7xodhcvwgqm.pdf |
| The effects of the education - knowledge - skills - social competences | Knowledge: student has knowledge of the structure of the SQL query language, syntax of individual commands, clauses and techniques for creating most components of relational databases; has the necessary knowledge in the field of modeling data structures with the use of selected IT tools, is aware of the existence and necessity of applying good practices in the creation of database systems.  Skills: student can efficiently use SQL language in terms of obtaining the requested information from the database system. Can select and use the right IT tool for this purpose; can properly model database structures, properly selecting and using known methods, techniques and IT tools, taking into account the adopted design assumptions; they are aware of and able to properly and precisely document the created database systems and formulate the principles of their operation that are understandable to others.  Social competences: Student is aware of the social role played by an educated IT engineer, shows responsibility for the works he creates and has the ability to pass on his knowledge to others in a clear and understandable way. |