SYLLABUS

Name: ***Databases (MakAu>SI6DB19)***
Name in Polish:
Name in English: ***Databases***

Information on course:

Course offered by department: Faculty of Automatic Control, Electronics and Computer Science
Course for department: Silesian University of Technology

Default type of course examination report:

EGZ

Language:

English

Course homepage:

https://platforma.polsl.pl/rau2/course/view.php?id=664

Short description:

The goal of the course is to make students acquainted with various methods of using database systems. Course participants become familiar with fundamentals of database management. The course serves as foundation to courses involving creation of working applications that utilize databases.
Pre-requisite qualifications: Theory of Computer Science, Fundamentals of Computer Programming. Students are supposed to have basic computer programming skills.

Description:

ECTS: 4
Total workload: 120 hours (65 contact hours, 55 students' own work hours)
Forms of contact hours:
Lecture 30h
Laboratory 30h
Other (e.g. test and reports revision and discussion) 5h
Student's own work: preparation for classes, writing reports, preparation for tests and exam: 55h
Lectures:
Usage of databases – functions and architecture of Database Management System (DBMS).
Relational model – relations, relationships, keys.
Relational algebra – selections, projections, joins.
Structured Query Language (SQL) - Data Definition Language (DDL), Data Manipulation Language (DML), Data Query Language (DQL).
Searching in relational database using SELECT phrase.
Advanced searching - grouping data, aggregations, views, outer joins, nested queries, correlations.
Preserving database referential integrity - primary and foreign keys.
Security in databases - users, roles, rights.
Developing databases – functional dependencies, normal forms, Entity Relationshop Diagrams.
Concurrent access to databases – locks, transactions, isolation levels.
Programming in databases – stored procedures, functions, triggers.
Architectures of modern database systems – client-server and 3-trier architectures.
Fundamentals of Object-Relational Mapping.
Nonrelational models - NoSQL databases, data warehouses.

Laboratory:
Basic and advanced SQL language – SELECT statements
SQL DDL/DCL – preparing users, rights, preserving referential integrity
Transactions and isolation levels
Constructing triggers and stored procedures
Preparing Entity Relationship Diagrams

Bibliography:

Primary resources:
H.Garcia-Molina, J.D.Ullman, J.Widom: Database Systems: The Complete Book (2nd Edition)
R.Elmasri, S.Navathe: Fundamentals of Database Systems (7th Edition)
C.J. Date: Database Design and Relational Theory: Normal Forms and All That Jazz (Theory in Practice)
Secondary resources:
B.Forta: SQL in 10 Minutes, Sams Teach Yourself
S.M. Vasilik: SQL Practice Problems: 57 beginning, intermediate, and advanced challenges for you to solve using a "learn-by-doing" approach

Learning outcomes:

Course-specific learning outcomes:
at the completion of the course, student:
-knows paradigms of the relational model, SQL language (written exam) K1A_W09
-understands basic techniques to operate on databases (laboratory report, written exam) K1A_W16
-can build safe database systems, using at least one of the database management systems (laboratory report, written exam) K1A_U01, K1A_U24

Assessment methods and assessment criteria:

Databases course consists of two components: lecture and laboratory. According to SUT regulations, lecture attendance is optional (however highly recommended), whereas laboratory exercises are obligatory.

During the laboratories students have to complete all exercises and prepare individual reports. Each report should be completed within two weeks period. Reports should be prepared in the electronic form. Every report must be accepted by a teacher. Laboratories missed by students for justifiable reasons may be made up at times agreed upon with the teacher.

The exam consists of three independent parts: SQL, ERD, and the theoretical TEST. Every part must be passed to get credit from the subject. Every part is graded in the scale from 2 to 5 and 2.75 is the lowest positive grade. The final grade is calculated as the average of all grades. The final grade may be adjusted if students got positive (+) or negative (-) marks for their work during laboratories.

The syllabus is valid from academic year 2024/25 and its content cannot be changed during the semester.

Course credits in various terms:

<without a specific program>

Type of credits	Number	First term	Last term
European Credit Transfer System (ECTS)	4	2021/2022-L	