COURSE DESCRIPTION CARD - SYLLABUS

Course name
Databases [S1ETI1>BD]

Course

Field of study
Education in Technology and Informatics

Year/Semester
2/4

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
Polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
25

Laboratory classes
45

Other (e.g. online)
0

Tutorials
0

Projects/seminars
0

Number of credit points

4,00

Coordinators

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Lecturers

Prerequisites

Student should have basic knowledge on: operating systems, algebra, logic, programming methods and languages, data types and structures. Student should have abilities for information accessing from given sources and should be prepared to work in a team.

Course objective

Providing students with knowledge on databases foundations, including: designing, conceptual modelling, relational algebra, languages for relational databases with special emphasis on SQL, query formulation, database management with special emphasis on MS SQL Server, data security rules, storage system virtualization, data warehouses.

Course-related learning outcomes

Knowledge:
student has detailed knowledge on:
- relational database model (data structures, operations, integrity constraints),
- relational database design and implementation (entity-relationship model, transformation to relational database schema, normalization)

- physical structures, indexes used in modern databases,
- methods and rules for data protection.

Skills:
student can:
- built conceptual database model,
- perform operations in relational algebra,
- provide entity-relationship diagram,
- use common database management system,
- write queries in sql.

Social competences:
student understands that:
- using it tools must be law compliant,
- one of important database aspects is data protection,
- it is necessary to update knowledge about particular tools and database systems.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Learning outcomes presented above are verified as follows:
Theoretical knowledge is verified during test. To achieve positive result student should get more than 50% of points. Test topics are provided to students by email at the beginning of the semester.
Practical skills are verified during laboratory classes and during tests. To achieve positive result student should get more than 50% of points.

Programme content

Programme content of the module consists of the following issues
1) Foundations of databases.
2) Data Base Management System
3) Data Base lifecycle
4) Conceptual modelling.
5) Entity-relationship diagrams
6) Relational algebra.
6) Relational and non-relational databases
7) Normalization.
8) SQL.
9) Data protection
10) Data storage virtualization.
11) Data warehouses. Big data.

Course topics

Lecture consists of the following topics
1) Foundations of databases. Data categories. Database classifications. Applications. Database integrity. Transactions.
2) Conceptual modelling.
3) Entity-relationship diagrams.
4) Relational algebra.
5) Relational databases.
6) Normalization.
7) SQL (DDL, DML, TCL, DCL).
8) Database management systems.
9) Methods and rules for data protection (access control, authentication, encryption, backup), including legal requirements (e.g. GDPR).
10) Media and systems for data storage, cloud storage. Data storage virtualization.
11) Data warehouses. Big data.
Laboratory consists of the following topics
1) SQL basics.

2) Simple queries (selection, projection, aliases, NULL values, deleting repetitions, result ordering, operators, complex conditions).
3) Advanced selections (data types, time intervals, selections based on strings, functions, data conversions, CASE instruction, DECODE function).
4) Aggregation functions (grouping data in relations, GROUP BY and HAVING clauses, LISTAGG function).
5) JOIN (internal, equality joins, non-equality joins, natural joins, self joins, plain and hidden syntax).
6) Joins - advanced constructions (external joins, cartesian product, set operators).
7) Basics of subqueries (common subqueries, ANY/SOME, ALL operators).
8) Subqueries - advanced constructions (corelated subqueries, EXISTS operator).
9) Advanced queries (result restrictions, WITH clause, recursive queries, hierarchical queries).
10) Data Manipulation Language DML (INSERT, data modification, modifiable joins, sequences).
11) Data Definition Language DDL (CREATE, data types, default values, data base dictionary, integrity restrictions).
12) Views (creation, usage, different forms of views).

Teaching methods

Interactive lecture (with questions for students) with a use of multimedia presentation. Files with slides provided to students.
Laboratory classes in a form of practical exercises. Tasks performed
in person with a use of computer hardware, software tools (DBMS) and Internet resources.

Bibliography

Basic
C.J. Date, Wprowadzenie do systemów baz danych, Wydawnictwa Naukowo-Techniczne, Warszawa 2000 (in Polish, PUT Library signature: W 93773).
R. Elmasri R., S. Navathe, Wprowadzenie do systemów baz danych, Wyd. Helion, Gliwice, 2005 (in Polish, PUT Library signature: W 116833).
J.D. Ullman, J. Widom, Podstawowy kurs systemów baz danych, WNT, W-wa, 2011 (in Polish, PUT Library signature: 133861).
Additional
Ben-Gan Itzik, Podstawy języka T-SQL Microsoft SQL Server 2016 i Azure SQL Database, Wydawnictwo Promise, 2016 (in Polish).
http://www.sql-tutorial.net/
https://www.sqlpedia.pl/
http://webmaster.helion.pl/index.php/kursmysql-projektowanie-relacyjnych-baz-danych
https://www.w3schools.com/sql/default.asp

Breakdown of average student's workload

	Hours	ECTS
Total workload	100	4,00
Classes requiring direct contact with the teacher	75	3,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	25	1,00