



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Databases [S1ETI2>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

30

Laboratory classes

30

Other

0

Tutorials

0

Projects/seminars

0

Number of credit points

4,00

Coordinators

dr inż. Tomasz Bilski

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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:

- has knowledge of procedural, object-oriented programming, artificial intelligence, databases and computer graphics
- has knowledge in the field of information systems, including the architecture of computers and operating systems, theory, technology and operation of computer networks, knows the properties and

principles of operation of various network devices

Skills:

- is able to obtain information from literature, databases and other sources, integrate it, interpret it and draw conclusions, formulate and justify opinions, as well as prepare and give an oral presentation and documented study on issues related to the field of education in Polish and English
- is able to use object-oriented and database programming languages in the field of applications and configuration of IT systems, is able to use software enabling graphical presentation and analysis of experimental results.

Social competences:

- is able to work on a given task independently and cooperate in a team, assuming various roles, demonstrates professionalism and responsibility for decisions made,
- is aware of the importance of engineering activities and their non-technical aspects, including the impact on the environment, and understands the need to provide information related to technology and IT in a generally understandable manner.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Theoretical knowledge is verified during test. 3 <50%-60%)

3,5 <60%-70%)

4 <70%-80%)

4,5 <80%-90%)

5 <90%-100%)

Test topics are provided to students at the beginning of the semester.

Practical skills are verified during laboratory classes and during tests. To 3 <50%-60%)

3,5 <60%-70%)

4 <70%-80%)

4,5 <80%-90%)

5 <90%-100%)

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 tasks. Tasks performed individually with a use of computer hardware, software tools 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	60	2,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	40	1,50