# POZNAN UNIVERSITY OF TECHNOLOGY



EUROPEAN CREDIT TRANSFER AND ACCUMULATION SYSTEM (ECTS)

## **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 classe 30	es	Other D	
Tutorials 0	Projects/seminars 0	6		
Number of credit points 4,00				
Coordinators		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

Social competences:

experimental results.

- 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. To achieve positive result student should get more than 50% of points. Test topics are provided to students 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 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/ https://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