COURSE DESCRIPTION CARD - SYLLABUS

Course name
Database systems [S1SI1E>SBD]

Course

Field of study
Artificial Intelligence

Year/Semester
2/3

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
English

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

5,00

Coordinators

dr inż. Serhii Baraban
serhii.baraban@put.poznan.pl

Lecturers

Prerequisites

A student starting this course should have basic knowledge of the basics of programming, computer systems architecture, operating systems, algorithms and data structures. A student should have the elementary ability to write and test a computer program and should be capable of finding information of its own from the indicated sources. A student should also have teamwork skills.

Course objective

The aim of the course is to provide students with basic knowledge in the field of database systems technology necessary for the correct design and implementation of a database system and its applications. Moreover, the aim is also to teach students to use the database system, in particular, to search for data using the standard SQL query language. Developing students" skills in solving practical problems related to the management of database systems.

Course-related learning outcomes

Knowledge:
1. The student has basic, theoretically grounded knowledge of database systems.
2. Has detailed knowledge of the relational data model (data structures, operations, integrity

constraints).
3. Has detailed knowledge of the design and implementation of logical schemas of relational databases (conceptual modeling, transformation into a logical relational database schema, normalization of the logical schema of a database).
4. Has basic knowledge of physical and index structures used in modern database systems.
5. Has basic knowledge of the concept of the transaction and its properties.
6. Has detailed knowledge of the SQL query language.

Skills:
1. The student has basic skills concerning the design and implementation of a database system.
2. The student is able to program in SQL.
3. The student can design and implement index structures to improve the performance of the database system.

Social competences:
1. The student understands that the field of database systems is still an ongoing field of scentific research, and understands the need for continuous training and improvement of own qualifications and competences.
2. Is aware of the importance of knowledge and scientific research related to the issues of data storage and processing, including database systems, in solving practical problems related to the design, implementation and operation of information 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:
Lecture: the knowledge acquired during the lecture is verified by a written exam consisting of 5-7 open exercices of varying complexity. Passing threshold: 50% of the exam points.
Laboratory classes: an evaluation based on a written test.

Programme content

Lecture:
1. Introduction to database systems: basic definitions, basic types of database systems, commercial DBMSs, DBMS functionality.
2. Database life cycle.
3. Conceptual modeling (conceptual data models, principles of designing conceptual schemas of databases).
4. Relational data model (basics of the relational model, data structures, operators, integrity constraints).
5. From conceptual schemas to the logical schemas of relational databases.
6. Normalization of relational database schemas.
7. File organizations (unordered, ordered, hash), data structures (row store, column store).
8. Index structures.
9. Transaction and its properties, transaction processing (serializability, transactional recovery).
Laboratory classes:
1. Constructing simple database queries.
2. Using advanced constructions for data selection.
3. Data aggregation.
4. Using joins.
5. Using subqueries.
6. Constructing "Top-N" queries.
7. DML commands: defining new data, modifying existing data, deleting data.
8. DDL commands: defining new data structures, modifying and deleting existing data structures.
9. Practical exercise: conceptual modeling and transformation into a logical relational database schema.
10. Software interfaces for databases.

Course topics

The specific topics, discussed in the course lab, are:

1. SQL - a language for accessing databases.
2. Relational database modelling - practical exercise.
3. NoSQL databases: exercises in the MongoDB system.

Teaching methods

Lecture: multimedia presentations, whiteboard examples and exercices.
Laboratory classes: multimedia presentations, whiteboard examples, practical assignements, teamwork.

Bibliography

Basic
R. Elmasri, S. B. Navathe, Fundamentals of Database Systems, 7th ed., Benjamin/Cummings.
H. Garcia-Molina, J. Ullman, J. Widom, Database Systems; The Complete Book, 2nd ed., Morgan Kaufmann.
A. Silberschatz, H. Korth, and S. Sudarshan, Database System Concepts, 7th ed., McGraw-Hill.
R. Ramakrishnan, J. Gehrke, Database Management Systems, 3rd ed., McGraw-Hill.
Additional
P. E. O'Neil, E. O'Neil, Database: Principles, Programming, and Performance, Morgan Kaufmann.

Breakdown of average student's workload

	Hours	ECTS
Total workload	125	5,00
Classes requiring direct contact with the teacher	62	2,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	63	2,50