COURSE DESCRIPTION CARD - SYLLABUS

Course name
Database systems [S1Inf1>SBD]

Course

Field of study
Computing

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

5,00

Coordinators

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Lecturers

Prerequisites

A student starting this course should have a basic knowledge of the fundamentals of programming, computer system architecture and operating systems. He should have the ability to obtain information from the indicated sources. He should also understand the need to expand his competencies and have a willingness to cooperate as part of a team. In addition, in terms of social competence, the student must present such attitudes as honesty, responsibility, perseverance, cognitive curiosity, creativity, personal culture, respect for other people.

Course objective

To provide students students with basic knowledge of database technology necessary for the correct design, use and implementation of database systems. To develope students' skills in solving problems arising in the management of database systems.

Course-related learning outcomes

Knowledge:
has well-ordered, theoretically grounded general knowledge in the area of databases, (K1st_W4)
has detailed knowledge of design and implementation of databases and software engineering,

(K1st_W5)
has basic knowledge about the life cycle of software information systems, (K1st_W6)
has basic knowledge of methods, techniques and tools used in solving simple computer tasks in the field of databases (K1st_W7)

Skills:
is able - according to given specification - to design and implement a simple information system, using proper methods, techniques and tools (K1st_U4)
is able to assess the correctness of functioning of the database system and is able to perform efficiency tests (K1st_U9)
is able to build simple database systems using at least one of the most popular database management systems (K1st_U10)
is able to develop and implement data processing algorithms using one of the popular tools (K1st_U11)

Social competences:
understands that knowledge and skills in the field of databases are becoming obsolete very quickly (K1st_K1)
knows examples and understands the causes of malfunctioning information systems that led to serious financial, social losses (K1st_K2)

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

The learning outcomes outlined above are verified as follows:
Formative assessment:
(a) for lectures:
- On the basis of answers to questions on the material discussed in previous lectures;
b) in terms of exercises:
- on the basis of the evaluation of the current progress of the tasks.
Summative evaluation:
Verification of the knowledge acquired during the lectures is carried out by a written exam in the next semester, i.e. after the completion of the entire lecture series devoted to the problems of database systems.
Verification of the established learning outcomes of the laboratory is realized by:
- evaluation of the student's preparation for individual sessions of laboratory classes,
- conducting a final credit test on the knowledge of the issues presented in the laboratory (about 10 tasks).
To receive a passing grade in the laboratory, it is necessary to get at least a sufficient grade in the credit test. The following grading scale is adopted depending on the number of points obtained: <0;50%>: ndst, (50%;60%>: dst, (60%;70%>: dst+, (70%;80%>: db, (80%;90%>: db+, (90%;100%>: bdb.

Programme content

The course curriculum includes the following topics: Introduction to database systems; concept and architecture of database systems; database system life cycle; database conceptual schema modeling, EER diagrams, transformation of database conceptual schema to implementation schema, relational data model, relation algebra, relational calculus of tuples, SQL language, normalization of logical database schemas, design of logical schemas of relational databases, logical organization of data, basic physical structures of data, indexes, tree and bitmap indexes.
As part of the lab, students will learn:
1. A declarative language for accessing relational databases called SQL, presented in a breakdown of the following topics:
- Simple queries.
- Advanced data selection.
- Grouping of data.
- Joins and collective operators.
- Subqueries.
- Advanced mechanisms in queries.
- Data manipulation language (DML).
- Data definition language (DDL).

- Views.
2 Principles of database modeling:
- Entity relationship modeling.
- Principles of entity relationship transformation to a selected implementation model.

Course topics

The course covers the following topics:
1. Introduction to database systems;
2. The relational data model: data structures and constraint integrity of the relational data model and relational algebra.
3. Conceptual data modeling using ERD diagrams. UML class diagrams.
4. Transforming a conceptual database node into a relational database schema.
5. Relational database schema normalization.
6. Other data models: object-oriented database model; multidimensional data model.
In the lab, students will learn:
1. SQL, a declarative language for accessing relational databases, presented in the following sections:
- Simple queries.
- Advanced data selection.
- Data grouping.
- Joins and collective operators.
- Subqueries.
- Advanced query mechanisms.
- Data manipulation language (DML). - Data Definition Language (DDL).
- Perspectives.
2. Database Modeling Principles:
- Entity-Relationship Modeling.
- Principles for Transforming Entity-Relationship Diagrams into a Relational Data Model.

Teaching methods

1. lecture: multimedia presentation, presentation illustrated by examples given on the blackboard,
2. laboratory exercises: multimedia presentation, presentation illustrated by examples given on the blackboard, practical exercises, workshops.

Bibliography

Basic:
1. Garcia-Molina H., Ullman J.D., Widom J., Implementacja systemów baz danych, WNT, 2003
2. J.D. Ullman, J. Widom, Podstawowy wykład z systemów baz danych, WNT, W-wa, 2000
3. Elmasri R., Navathe S., Wprowadzenie do systemów baz danych, Wyd. Helion, (4th Edition), 2005
4. Hernandez, M. J. Projektowanie baz danych: przewodnik krok po kroku, Helion, 2014
5. Jakubowski: Podstawy SQL. Ćwiczenia praktyczne. HELION.
6. M. Gruber: SQL. HELION
7. R. Coburn: SQL dla każdego. HELION
8. M. Szeliga: ABC języka SQL. HELION

Additional:
1. Database Management Systems, 2nd edition, R. Ramakrishnan, J. Gehrke, WCB/McGraw-Hill, 2001

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