COURSE DESCRIPTION CARD - SYLLABUS

Course name
Databases [N2EiT1>BD]

Course

Field of study
Electronics and Telecommunications

Year/Semester
2/3

Area of study (specialization)
–

Profile of study
general academic

Level of study
second-cycle

Course offered in
Polish

Form of study
part-time

Requirements
elective

Number of hours

Lecture
15

Laboratory classes
15

Other
0

Tutorials
15

Projects/seminars
0

Number of credit points

6,00

Coordinators

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Lecturers

Prerequisites

A student taking this course should have a basic knowledge of set theory. They should also have experience in application programming in C# and/or Java. Additionally, they should possess the ability to gather information from the specified sources and demonstrate a willingness to collaborate as part of a team.

Course objective

The purpose of the course is to provide students with a basic knowledge of databases, including database models, the SQL language, and its extensions. As part of the course, students will learn the principles of database design and optimization, as well as the principles of database access and the development of database applications.

Course-related learning outcomes

Knowledge:
1. Possesses extensive and in-depth knowledge of set algebra and relational algebra.
2. Demonstrates a thorough understanding of the assumptions underlying the relational data model.
3. Has knowledge of the design principles of relational databases, including the entity-relationship model

and optimization and normalization principles.
4. Understands the construction of the physical layer of databases.
Skills:
1. Capable of designing and implementing databases; proficient in creating a database application using one of the popular database management systems.
2. Able to modify data in the database and retrieve the required information using SQL language.
3. Proficient in programming in PL/SQL language.
4. Skilled in developing C# / Java applications that interact with databases.
Social competencies:
1. Recognizes the limitations of their own knowledge and skills and acknowledges the importance of further training and education.
2. Understands the significance of the information society for the country's development

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

The knowledge gained in the lecture is verified through written or oral exams. In the written form, students are required to answer 7-10 questions, which may include both test-style and open-ended questions. These questions are scored differently and divided into three or four scoring groups. In the case of an oral exam, the student randomly selects one question from each scoring group. For each question drawn, the student may receive an additional question related to the drawn question. The evaluation takes into account the range and depth of the answers provided. Each exam typically consists of 50-60 questions. To pass the exam, students must receive a minimum of 50% of the total possible points.

The skills acquired in the exercises are evaluated based on the students' activity during the exercises. Each activity is graded on a scale of 2 to 5. The final grade is determined by calculating the average of all activity grades. If the group size exceeds 20 students, preventing sufficient individual activity assessment, an additional colloquium is conducted. The colloquium consists of 2-4 open-ended questions or tasks, which are also graded on a scale of 2 to 5. The final grade is calculated by averaging the activity grades, as well as the grades from the colloquium questions. The skills acquired in the laboratory exercises are assessed based on the tasks performed in the final class. These tasks are divided into 5-6 subtasks, each scored differently. While the subtasks form a whole, they can be completed independently. Failing to complete a subtask does not affect the grades of the remaining subtasks. The passing threshold is set at 50% of the total points. The criteria for evaluation and passing are as follows:
number of points grade
<=50 % 2,0
51% - 60% 3,0
61% - 70% 3,5
71% - 80% 4,0
81% - 90% 4,5
91% - 100% 5,0

Programme content

The program includes basic information about databases. It discusses relational databases in detail. It presents basic SQL commands and also introduces popular database tools and development software.

Course topics

Lectures:
1. Basic definitions: information, data, data processing
2. Models of databases
3. Codd's postulates
4. Mathematical basics of relational databases
5 Entity relationship diagrams
6. SQL language basics, overview of built-in SQL language functions (string manipulation, arithmetic functions, operations on data/time types)
7 PL SQL language
8. Views, sequences, triggers, indexes
9. Database users. Controlling access to databases (permissions, roles).

10. Overview of database management systems (features, applications)
11. Basic elements of database applications
12. Optimization of databases, normal forms of databases
13. Physical layer of databases
14. Access to databases from the level of C# and Java language.

Laboratory exercises:
1. Basics of SQL language
2. DQL and DML commands
3. Advanced SQL queries
4. Creating PL SQL procedures
5. Creating triggers in PL SQL
6 . Simple database applications
7. Accessing databases from applications created in C#/Ja

Conversation exercises:
1. Basic elements of relationship algebra
2 Entity Relationship Diagrams - description and definition of databases
3. Database optimization - normal forms
4. Advanced SQL queries

Teaching methods

1. Lectures:
a) Multimedia presentations illustrated with examples presented on the blackboard.
b) Case analysis performed directly in database management systems or runtime environments for programming languages. Students actively participate by asking questions and suggesting results that can be obtained.

2. Laboratory exercises: Performance of tasks given by the instructor (practical exercises carried out using running database management systems and runtime environments for C# and/or Java programming languages), supplemented by multimedia presentations.

3. Conversation exercises: Performance of tasks given by the instructor (practical exercises), supplemented by multimedia presentations.

Bibliography

Basic:
1. Wieczerzycki W., Bazy danych, Wydaw.FPWSNT, 1994.
2. Beynon-Davies P., Systemy baz danych (tł. Lech Banachowski, Marcin Banachowski), Wydawnictwo Naukowo-Techniczne, 1998.
3. Reese G.. Java : aplikacje bazodanowe : najlepsze rozwiązania, Helion 2003.

Additional:
1. Hernandez, Michael J., Database design for mere mortals: a hands-on guide to relational database design, Addison-Wesley 2005
2. PL/SQL Users Guide and Reference, Release 2 (9.2) Part No. A96624-01

Breakdown of average student's workload

	Hours	ECTS
Total workload	125	6,00
Classes requiring direct contact with the teacher	55	2,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	70	4,00