COURSE DESCRIPTION CARD - SYLLABUS

Course name
Management of SQL and NoSQL databases [N1Inf1>SQL]

Course

Field of study
Computing

Year/Semester
3/5

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
Polish

Form of study
part-time

Requirements
compulsory

Number of hours

Lecture
16

Laboratory classes
24

Other
0

Tutorials
0

Projects/seminars
0

Number of credit points

5,00

Coordinators

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Lecturers

Prerequisites

A student starting this subject should have basic knowledge of the basics programming, computer system architecture, operating systems and database systems data He should have the ability to obtain information from indicated sources. He should also understand the need to expand his competences and be ready to do so starting cooperation within a team. Moreover, in terms of social competences, the student must present attitudes such as honesty, responsibility, perseverance, cognitive curiosity, creativity, personal culture, respect for other people.

Course objective

1. Providing students with basic knowledge of database systems technology necessary for correct design, use and implementation of database systems and their applications. 2. Developing students' skills in solving management problems database systems.

Course-related learning outcomes

Knowledge:
has structured, theoretically based general knowledge of conventional bases
data and NoSQL databases (K1st_W4)

has detailed knowledge of database systems management, including transactional mechanisms database recovery after failure (K1st_W5)
has basic knowledge of the life cycle of SQL and NoSQL database systems (K1st_W6)
knows basic methods, techniques and tools used to solve simple tasks IT in the field of database management, (K1st_W7)

Skills:
is able to obtain knowledge from various sources, including literature and databases, and apply it appropriately
interpret, draw conclusions and justify your opinions (K1st_U1)
is able to use appropriate methods when solving the problem of data processing in databases algorithms (K1st_U4)
is able to critically analyze the functioning of the database system and prepare tests functional and effective operation of the IT system using the database system data (K1st_U9)
is able, in accordance with a given specification, to develop and implement a model of a fragment of reality, formulate the functional specification of the IT system and implement the system IT using a database system using one of the popular DBMSs (K1st_U10)
is able to formulate data processing algorithms and implement them using at least one of the popular tools (K1st_U11)
is able to plan and implement the self-education process and knows the possibilities of further education (K1st_U19)

Social competence:
understands that in IT, in the field of databases, knowledge and skills very quickly become obsolete (K1st_K1)
is aware of the importance of database knowledge in solving engineering problems and knows examples and understands the causes of malfunctioning IT systems (K1st_K2)
is able to think and act in an entrepreneurial way (K1st_K3)

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Checking the assumed learning outcomes is carried out by:
- continuous assessment in each class (oral answers) - rewarding the growth of skills using the learned principles and methods,
- assessment of knowledge and skills demonstrated in a problem-based written exam (student can use any teaching materials)
Verification of the assumed laboratory learning outcomes is carried out by:
- assessment of the student's preparation for individual laboratory sessions
- conducting a final exam in the form of a test (approx. 20-30 questions)
- student's completion of tasks on specific topics.
Obtaining a positive grade in the laboratory requires: (1) completing tasks from mandatory topics and (2) obtain at least a satisfactory grade on the test. The following grading scale is adopted depending on the number of points obtained: <0;50%>: n/a, (50%;60%>: dst, (60%;70%>: dst+, (70%;80%>: db, (80%;90%>: db+, (90%;100%>: vdb.
The student has the opportunity to increase his grade by completing additional tasks on topics optional.

Programme content

The subject program covers the following topics: transaction model; transactional processing; managing concurrent transaction execution; sequencing of transaction execution; reproducibility of transaction execution; algorithms for managing concurrent transaction execution; database recovery after failure; checkpoints, data access authorization; processing i query optimization, data buffer management, log file management, NoSQL databases - basic concepts and solutions, XML data model.
During the laboratory, students will learn:
1) selected technologies for accessing relational databases (JDBC, JPA),

2) user authentication methods,
3) rules for granting permissions and methods of authorizing operations in the database,
4) (ADDITIONAL TOPIC) SQL command optimization process including:
- introduction to SQL optimization,
- displaying execution plans for SQL commands.
- indexes,
- data access methods,
- statistics,
- hints for SQL commands,
- connection methods,
- tips,
5) concurrency management:
- transactions,
- concurrent access anomalies,
- insulation levels,
- locks.
6) NoSQL databases on the example of MongoDB and Redis (ADDITIONAL TOPIC).
7) elements of the PL/SQL language
Some of the above-mentioned program content is implemented as part of the student's own work.

Course topics

none

Teaching methods

Lecture: multimedia presentation, illustrated with examples given on the board.
Laboratory exercises: multimedia presentation, presentation illustrated with examples on the board and completing the tasks given by the teacher - practical exercises.

Bibliography

Basic
1. Garcia-Molina H., Ullman J.D., Widom J., Database systems. Complete manual. 2nd edition, Helion 2011
2. Elmasri R., Navathe S., Introduction to database systems, Ed. Helion, (4th Edition), 2005
3. Date, C.J. Introduction to database systems, WNT 2000
Supplementary
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	42	2,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	83	3,00