(*faculty stamp*)

COURSE DESCRIPTION

1. Course title: FUNDAMENTALS OF DATABASE SYSTEMS	**2. Course code**
3. Validity of course description: 2018/2019	
4. Level of studies: BSc programme	
5. Mode of studies: intramural studies	
6. Field of study: COMPUTER SCIENCE	(FACULTY SYMBOL)
7. Profile of studies: COMPUTER SCIENCE	
8. Programme:	
9. Semester: 4	
10. Faculty teaching the course: Institute of Informatics, RAu2	
11. Course instructor: Paweł Kasprowski, PhD	
12. Course classification:	
13. Course status: compulsory	
14. Language of instruction: English	
15. Pre-requisite qualifications: Theory of Computer Science	
16. Course objectives: The purpose of the subject is to teach students how to develop and use modern database systems.	
17. Description of learning outcomes:	

Nr	Learning outcomes description	Method of assessment	Teaching methods	Learning outcomes reference code
W1	Student understands relational database model and the purpose of primary keys, foreign keys and relationships.	exam, reports, tests	lecture, laboratory	K1A_W12, K1A_W17
W2	Student understands the difference between procedural language and SQL language and knows the way that SQL may be used.	exam, reports, tests	lecture, laboratory	K1A_W12, K1A_W15
W3	Student knows how DBMS security system works and how it may be configured.	exam, reports, tests	lecture, laboratory	K1A_W15
W4	Student knows the purpose of transactions in DBMS and understands isolation levels.	exam, reports, tests	lecture, laboratory	K1A_W15, K1A_W17
U1	Student has skills to prepare the database schema with normalized relations using SQL DDL language.	exam, reports, tests	lecture, laboratory	K1A_U27
U2	Student is able to prepare SQL queries retrieving data using SELECT statement as well as SQL DML queries modifying data.	exam, reports, tests	lecture, laboratory	K1A_U27
K1	Student understands why the database should be normalized.	exam, reports	lecture, laboratory	K1A_K01
K2	Student understands how the database should be used in applications and how the database should be maintained by administrators.	exam, reports	lecture, laboratory	K1A_K04

18. Teaching modes and hours

Lecture / BA /MA Seminar / Class / Project / Laboratory

Lecture 30 h., Laboratory 45h

19. Syllabus description:

Lectures:

Usage of databases – functions and architecture of Database Management System (DBMS).

Relational model – relations, relationships, keys.

Relational algebra – selections, projections, joins.

Structured Query Language (SQL) - Data Definition Language (DDL), Data Manipulation Language (DML), Data Query Language (DQL).

Searching in relational database using SELECT phrase.

Advanced searching - grouping data, aggregations, views, outer joins, nested queries, correlations.

Preserving database referential integrity - primary and foreign keys.

Security in databases - users, roles, rights.

Developing databases – functional dependencies, normal forms, ERD diagrams.

Concurrent access to databases – locks, transactions, isolation levels.

Programming in databases – stored procedures, functions, triggers.

Architectures of modern database systems – client-server and 3-trier architectures.

Fundamentals of Object-Relational Mapping

Nonrelational models - NoSQL databases, data warehouses

Laboratory:

Basic and advanced SQL language – SELECT statements

SQL DDL/DCL – preparing users, rights, preserving referential integrity

Transactions and isolation levels

Constructing triggers and stored procedures

Preparing Entity Relationship Diagrams

Fundamentals of Object-Relational Mapping

Examples of Database Management Systems and their configuration

20. Examination: after 4th semester – written exam

21. Primary sources:

H.Garcia-Molina, J.D.Ullman, J.Widom: Database Systems: The Complete Book (2nd Edition)

R.Elmasri, S.Navathe: Fundamentals of Database Systems (7th Edition)

C.J. Date: Database Design and Relational Theory: Normal Forms and All That Jazz (Theory in Practice)

22. Secondary sources:

B.Forta: SQL in 10 Minutes, Sams Teach Yourself

S.M. Vasilik: SQL Practice Problems: 57 beginning, intermediate, and advanced challenges for you to solve using a "learn-by-doing" approach

Internet sources presented during the lectures and laboratories

23. Total workload required to achieve learning outcomes

Lp.	Teaching mode :	Contact hours / Student workload hours
1	Lecture	30/30
2	Classes	/
3	Laboratory	45/45
4	Project	/
5	BA/ MA Seminar	/
6	Other	/
	Total number of hours	75/75

24. Total hours:150

25. Number of ECTS credits: 6

26. Number of ECTS credits allocated for contact hours: 4

27. Number of ECTS credits allocated for in-practice hours (laboratory classes, projects): 4

26. Comments:

Approved:

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(date, Instructor's signature)

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(*date , the Director of the Faculty Unit signature)*