

(faculty stamp)

## COURSE DESCRIPTION

<b>1. Course title: DATABASES</b>		<b>2. Course code:</b>		
<b>3. Validity of course description:</b> from 2012				
<b>4. Level of studies:</b> 1st cycle of higher education				
<b>5. Mode of studies:</b> stationary				
<b>6. Field of study:</b> MACROFACULTY				
<b>7. Profile of studies:</b> ogólnoakademicki				
<b>8. Programme:</b>				
<b>9. Semester:</b> 6				
<b>10. Faculty teaching the course:</b> Instytut Informatyki, RAu2				
<b>11. Course instructor:</b> Pawel Kasprowski, PhD				
<b>12. Course classification:</b> common subjects				
<b>13. Course status:</b> obligatory				
<b>14. Language of instruction:</b> English				
<b>15. Pre-requisite qualifications:</b> basic knowledge of any programming language				
<b>16. Course objectives:</b> The purpose of the subject is to teach students how to develop and use modern database systems.				
<b>17. Description of learning outcomes:</b>				
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	K_W12, K_W15
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	K_W12, K_W15
W3	Student knows how DBMS security system works and how it may be configured.	exam, reports, tests	lecture, laboratory	K_W15
W4	Student knows the purpose of transactions in DBMS and understands isolation levels.	exam, reports, tests	lecture, laboratory	K_W15
U1	Student has skills to prepare the database schema with normalized relations using SQL DDL language.	exam, reports, tests	lecture, laboratory	K_U22
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	K_U22
K1	Student understands why the database should be	exam,	lecture,	K_K5

	normalized.	reports	laboratory	
K2	Student understands how the database should be used in applications and how the database should be maintained by administrators.	exam, reports	lecture, laboratory	K_K2
<b>18. Teaching modes and hours</b> <b>Lecture / BA /MA Seminar / Class / Project / Laboratory</b> Lecture, Laboratory				
<b>19. Syllabus description:</b> <b>Lectures:</b> 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-tier architectures. Nonrelational models - NoSQL databases, data warehouses <b>Laboratory:</b> Six exercises <ol style="list-style-type: none"> <li>1. SQL language</li> <li>2. Advanced SQL language – SELECT statement</li> <li>3. SQL DDL/DCL – preparing users, rights, preserving referential integrity</li> <li>4. Transactions and isolation levels</li> <li>5. Constructing triggers and stored procedures</li> <li>6. Preparing Entity Relationship Diagrams</li> </ol>				
<b>19. Examination:</b> Written exam: practical and theoretical parts				
<b>20. Primary sources:</b> 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)				

**21. 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

**23. Total workload required to achieve learning outcomes**

Lp.	Teaching mode :	Contact hours / Student workload hours
1	Lecture	30/20
2	Classes	
3	Laboratory	30/25
4	Project	
5	BA/ MA Seminar	
6	Other	10/15
	Total number of hours	70/60

**24. Total hours:** 130

**25. Number of ECTS credits:** 5

**26. Number of ECTS credits allocated for contact hours:** 5

**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)