



## Subject card

Subject name and code	Databases, PG_00047666						
Field of study	Informatics						
Date of commencement of studies	October 2020		Academic year of realisation of subject		2021/2022		
Education level	first-cycle studies		Subject group		Obligatory subject group in the field of study		
Mode of study	Full-time studies		Mode of delivery		at the university		
Year of study	2		Language of instruction		Polish		
Semester of study	3		ECTS credits		6.0		
Learning profile	general academic profile		Assessment form		exam		
Conducting unit	Department of Software Engineering -> Faculty of Electronics, Telecommunications and Informatics						
Name and surname of lecturer (lecturers)	Subject supervisor		prof. dr hab. inż. Krzysztof Goczyla				
	Teachers		dr inż. Aleksandra Nabożny  dr inż. Aleksandra Karpus  prof. dr hab. inż. Krzysztof Goczyla  dr inż. Michał Wróbel  mgr inż. Małgorzata Pykała				
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	15.0	15.0	0.0	60
	E-learning hours included: 0.0						
	Adresy na platformie eNauczanie:						
Learning activity and number of study hours	Learning activity	Participation in didactic classes included in study plan		Participation in consultation hours		Self-study	SUM
	Number of study hours	60		26.0		64.0	150
Subject objectives	The objective of the subject is to learn a student on basic functions of database management system, on design of relational databases and querying them in SQL, on transactional processing, data security nad related problems. The problems concerning distributed and parallel processing are also presented, together with some issues of NoSQL databases.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K6_U06] can analyse the operation of components, circuits and systems related to the field of study, measure their parameters and examine technical specifications	The student is able to analyze the effectiveness of SQL query implementation and apply the appropriate indexes.	[SU1] Assessment of task fulfilment
	[K6_U42] can apply tools and methods of designing, optimization, monitoring, management, increasing reliability and protection from safety hazards in local and distributed information systems and applications	The student is able to introduce data security mechanisms into the database model and its implementation.	[SU4] Assessment of ability to use methods and tools
	[K6_W04] Knows and understands, to an advanced extent, the principles, methods and techniques of programming and the principles of computer software development or programming devices or controllers using microprocessors or programmable elements or systems specific to the field of study, and organisation of systems using computers or such devices	The student knows how to embed SQL statements into programs written in procedural languages, and also knows what for and how to use 4GL languages.	[SW1] Assessment of factual knowledge
	[K6_W03] Knows and understands, to an advanced extent, the construction and operating principles of components and systems related to the field of study, including theories, methods and complex relationships between them and selected specific issues - appropriate for the curriculum	The student knows how to create a security model for a relational database, using SQL constructs.	[SW1] Assessment of factual knowledge
	[K6_U07] can apply methods of process and function support, specific to the field of study	The student is able to analyze simple business processes in terms of database construction.	[SU2] Assessment of ability to analyse information
Subject contents	1. Database system architecture 2. Functions of a Database Management System (DBMS) 3. Entity sets, entity attributes, entity keys, relationships 4. Entity relationship diagrams (ERDs) - general concepts 5. Creating entity relationships diagrams 6. Relational database - definitions 7. Integrity rules: entity integrity, referential integrity 8. From an entity relationship diagram to a relational database schema 9. Relational algebra: set-theoretic operators 10. Relational algebra: relational operators 11. SQL - an overview, origins, standards 12. Creating tables 13. Populating tables with data 14. Simple queries 15. SQL expressions - simple and conditional 16. Queries with aggregate functions 17. Queries with grouping 18. Queries with joins 19. Queries with outer joins 20. Nested queries 21. Queries for UPDATEs, deletes and bulk inserts 22. Views, operations on views, updatable views 23. Cursors, sequential processing of query results 24. Normalization of relational databases: 2nd and 3rd normal form 25. Boyce-Codd normal form 26. Normalization of relational databases: 4th and 5th normal form 27. Transactional processing in databases - basics 28. Isolation levels in transactions 29. Transactional processing and SQL standards 30. Rules for development of correct database applications in concurrent environments 31. Identification, authentication and authorization in databases 32. Authorization of SQL operations on data: views, GRANT and REVOKE statements 33. Distributed database systems - transparency rules, architecture, fragmentation, replication 34. Non-relational databases - introduction, object-relational datatypes; applications. Introduction to NoSQL databases. CAP Theorem.		
Prerequisites and co-requisites	No prerequisites		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Practical exercise	50.0%	25.0%
	Written exam	50.0%	50.0%
	Project	50.0%	25.0%
Recommended reading	Basic literature	P.Beynon-Davies. "Systemy baz danych". WNT 2000. C.J.Date. "Wprowadzenie do systemów baz danych". WNT 2000. M.Gruber. "SQL", wydanie drugie. Helion 2000 K.Goczyła, A.Landowska., M.Piechówka. "Bazy danych". Materiały do wykładu. Gdańsk, 2009	
	Supplementary literature	No requirements	
	eResources addresses		

Example issues/ example questions/ tasks being completed	<p>1. Formulate queries do a relational database 2. What are operators of relational algebra?</p> <p>3. When is the second, third and fourth normal form violated?</p> <p>4. What do ACID rules mean?</p> <p>5. Design and implement a relational database</p> <p>6. Design transacions ina relational database.</p>
Work placement	Not applicable