GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Databases, PG_00047666
Field of study	Informatics

Date of commencement of studies	October 2022	Academic year of realisation of subject	2023/2024
Education level	first-cycle studies	Subject group	Obligatory subject group in the field of study
			Subject group related to scientific research 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 Goczyła
	Teachers	dr inż. Aleksandra Karpus
		mgr inż. Małgorzata Pykała
		dr inż. Teresa Zawadzka
		prof. dr hab. inż. Krzysztof Goczyła
		dr hab. inż. Agnieszka Landowska

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						

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. Ralational database - definitions 7. Integrity rules: enitity 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, authenticatrion 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 - intriduction, 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	Adresy na platformie eNauczanie: Bazy danych - 2023 - Moodle ID: 30717 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=30717

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