GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Database Structures, PG_00047893		
Field of study	Informatics		
Date of commencement of studies	October 2024	Academic year of realisation of subject	2026/2027
Education level	first-cycle studies	Subject group	Optional subject group 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	3	Language of instruction	Polish
Semester of study	5	ECTS credits	2.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department Of Software Engineering -> Faculty Of Electronics Telecommunications And Informatics -> Wydziały Politechniki Gdańskiej		
Name and surname of lecturer (lecturers)	Subject supervisor	prof. dr hab. inż. Krzysztof Goczyła	
	Teachers	prof. dr hab. inż. Krzysztof Goczyła	

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	15.0	0.0	0.0	15.0	0.0	30

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	30	6.0	14.0	50

Subject objectives

The purpose of the course is to deliver to students comprehensive knowledge about file structures used at the physical level of databases.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[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 define authorization rules for access to data.	[SW1] Assessment of factual knowledge
[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 the basic and advanced file organizations used in database systems at the physical level.	[SW1] Assessment of factual knowledge

Subject contents

1. Peculiarities of physical access to data on disks 2. Serial files 3. Sequential files organization, reorganization 4. Sorting sequential files by simple merge 5. Sorting sequential files by natural merge 6. Sorting sequential files by polyphase merge 7. Sorting sequential files with a large in-memory buffers 8. Indexed-sequential files organization 9. Indexed files organization, primary and secondary indexes 10. B-trees organization 11. Searching in B-trees 12. Inserting into B-trees 13. Deleting from B-trees 14. B+-trees as clustered indexes 15. Files with static hashing organization 16. Extendable hashing 17. Linear hashing 18. Bitmapped indexes 19. Multi-dimensional indexing: R-trees, Quadtrees 20. RAID systems efficiency and reliability issues 21. Solid-state storage devices

Prerequisites and co-requisites

A database systems course is required

<table>
<tr><td>Assessment methods and criteria</td><td colspan="2"><table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>Project</td><td>50.0%</td><td>50.0%</td></tr>
<tr><td>Midterm colloquium</td><td>50.0%</td><td>50.0%</td></tr>
</table></td></tr>
<tr><td rowspan="3">Recommended reading</td><td>Basic literature</td><td>T. Pankowski. Podstawy baz danych. PWN, 1992 H. Garcia-Molina, J.D.Ullman, J. Widom Implementacja systemów baz danych. WNT 2003. N. Wirth. Algorytmy+Struktury danych=Programy. WNT 2004. K. Goczyła. "Struktury baz danych". Materiały do wykładu. Gdańsk, 2009.</td></tr>
<tr><td>Supplementary literature</td><td>No requirements</td></tr>
<tr><td>eResources addresses</td><td>Adresy na platformie eNauczanie:</td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td colspan="2">1. Show graphically a B-tree with given parameters

2. Sort an exemplary file using a given method

3. What is clustered index?

4. Describe hashing for disk files

5. Explain the inverted file structure and usage for text files indexing

6. Show an exemplary B-tree transormations by a sequence of inserts/deletes.</td></tr>
<tr><td>Work placement</td><td colspan="2">Not applicable</td></tr>
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