GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	, PG_00071334		
Field of study	Transport		
Date of commencement of studies	October 2024	Academic year of realisation of subject	2025/2026
Education level	first-cycle studies	Subject group	
Mode of study	Full-time studies	Mode of delivery	at the university
Year of study	2	Language of instruction	Polish
Semester of study	4	ECTS credits	3.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Transportation Engineering -> Faculty of Civil and Environmental Engineering -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Roksana Licow	
	Teachers		

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	15.0	0.0	30.0	0.0	0.0	45

E-learning hours included: 0.0

eNauczanie source address: https://enauczanie.pg.edu.pl/2025/course/view.php?id=4474

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	45	0.0	0.0	45

Subject objectives

The main objective of the course is to present issues from the field of computer science used in the transport environment.
As part of the course, the following topics are discussed:
databases in the SQL language,
information technology,
artificial intelligence,
machine learning,
IoT (Internet of Things),
Big Data (large datasets),
Data Mining (data exploration / extracting knowledge from data).

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_U05] able to use IT graphic techniques suitable for tasks typical of designing, construction, operation, and diagnosing means and transportation systems.	The student is able to design a concept of a transport database. The student can transfer the designed concept into a database using the SQL language. The student is able to use the data stored in the database and then implement it in a spreadsheet, and **perform data analysis using Microsoft Power Pivot.	[SU1] Assessment of task fulfilment [SU2] Assessment of ability to analyse information
[K6_W03] has knowledge of informatics, electronics, telecommunications, automation and control, information technologies, computer graphics, geodesy and satellite navigation which is useful for understanding how it can be applied in transport	After completing the course, the student has knowledge of information technologies supporting the following areas of transport: transport infrastructure (linear and point infrastructure), diagnostics, traffic engineering, transport safety (cybersecurity), capital and personnel management.	[SW2] Assessment of knowledge contained in presentation [SW3] Assessment of knowledge contained in written work and projects

Subject contents

Course content – lecture

1. Introduction to databases in the SQL language.
2. Discussion of the concepts: entity, attribute, record, primary key, foreign key.
3. Computer support in the design of infrastructure and rolling stock.
4. Examples of databases in the transport environment.
5. Traffic engineering using IT technologies.
6. IT in transport management.
7. Artificial intelligence and machine learning.
8. IoT (Internet of Things).
9. IT in transport safety.
10. Operations on datasets, use of the JOIN clause to combine tables.
11. Data Mining application in solving problems during the analysis of large datasets.
12. Data analysis in a spreadsheet using Microsoft Power Pivot.
13. Database system architecture. Stored procedures. Transactions.
14. Revision for the test.
15. Test.

Course content – laboratory

1. Designing databases in SQL concept development, design, implementation in the program, data analysis, queries (4 databases).
2. Analysis of large datasets from vibroacoustic measurements.
3. Analysis of datasets related to road noise.

Prerequisites and co-requisites

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Test	60.0%	50.0%
Projekt 1	50.0%	25.0%
Projekt 2	50.0%	25.0%

Recommended reading

Basic literature

1. Hector Garcia-Molina, Jeffrey D. Ullman, Jennifer Widom Database Systems: The Complete Book, Helion, 2011.
2. Krzysztof Sacha Software Engineering, Polish Scientific Publishers PWN, Warsaw, 2010.
3. PostgreSQL documentation: https://www.postgresql.org/docs/8.3/index.html
4. Antoni Ligęza Data Aggregation and Grouping. Aggregation Functions. GROUP BY and HAVING Options. Lecture materials.

Supplementary literature

1. J. Dutkiewicz, J. Okulewicz: Simulation Modeling of a Suburban Railway Line. Scientific Papers of the Warsaw University of Technology, No. 119, 2017.
2. M. Kornaszewski, M. Sierociński: Network Information Systems in Polish Railway Transport During the Period of Political and Technological Transformation. Scientific Papers of the Warsaw University of Technology, 2014.
3. The Process of Preparing Train Timetables Organization and Management. Autobusy Technika, Eksploatacja, Systemy Transportowe, No. 12/2016 (1805).
4. Report of the Railway Business Forum: Problems of the Polish Railway Sector in the Area of Information Technology, 2010, Poznań.
5. M. Rudowski: Contemporary IT Solutions and Trends vs. Current Challenges in Polish State Railways (PKP). Problemy Kolejnictwa, Issue 175, June 2017.

eResources addresses

Example issues/ example questions/ tasks being completed

Design a concept of a transport database related to transport safety in Microsoft SQL Server Management Studio.

Explain the concepts: entity, attribute, record, foreign key, primary key.

For what purpose is the delayed selection clause HAVING used?

Practical activites within the subject

Not applicable

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