GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Optimizing database, PG_00070477		
Field of study	Technical Physics		
Date of commencement of studies	February 2026	Academic year of realisation of subject	2025/2026
Education level	second-cycle studies	Subject group	Specialty 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	1	Language of instruction	Polish
Semester of study	1	ECTS credits	4.0
Learning profile	general academic profile	Assessment form	exam
Conducting unit	Department of Theoretical Physics and Quantum Computing -> Faculty of Applied Physics and Mathematics -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Bartosz Reichel	
	Teachers	dr inż. Bartosz Reichel	

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	30.0	0.0	30.0	0.0	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	6.0	34.0	100

Subject objectives

Familiarization with advanced relational database structures such as the extension of procedural languages.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_K01] knows limitations of own knowledge, understands the need to learn and improve professional and personal competencies	Is able to solve a new problem by supplementing knowledge.	[SK5] Assessment of ability to solve problems that arise in practice
[K7_U02] has enhanced knowledge of programming languages and can use software packages	Ability to use query plans.	[SU1] Assessment of task fulfilment
[K7_W04] has enhanced knowledge of mathematical, numerical and simulation methods applied in the description and modelling of physical phenomena	Is able to formulate queries to databases, obtaining specific statistical data as a result.	[SW3] Assessment of knowledge contained in written work and projects

<table>
<tr><td>Subject contents</td><td>Course content – lecture
1.Introduction 2h The history of the development of Oracle databases, Oracle Installation, connection to the database, the configuration of the package. What are relational databases. The basic assumptions of the structural query language SQL (Structured Query Language). Basic concepts: tables, columns, rows. 2.Structure of Oracle database 2h Components of the Oracle database: data files, settings files, log files, backup files. 3. Strukture 4h Data types (character, numeric types representing date). BLOB data. Conversion types, combining the comparison. NULL in the Oracle database and other SQL databases (variations, traps). Tables, Indexes, Prospects. 4.Basics of SQL 4h Basic SQL query (SELECT, INSERT, DELETE, UPDATE, CREATE TABLE ...), allowing the testing of the database and obtain configuration information. Breakdown of queries on the DML (Data Manipulation Language), DDL (Data Definition Language), DCL (Data Control Language), TCL (Transactional Control Language). 5.Modeling of database, design of database 6g Tools to help database design from both the Oracle and beyond what. Analyze Query and software (Query Analyzer). The concept of their primary keys, foreign keys and their relationship. Normal forms. The process of normalization of data. How and when to normalize the data. What are data warehouses. 6. Basics of database administration 6h Tools for database management and user accounts and privileges from Oracle and external. Security and limiting access to an Oracle database. Special roles: SDB, SYSDBA, SYSOPER. Space system tables: XFS, TEMP, TOOLS, USERS. Matching the size of tablespaces. System Global Area - what it is and its use. Monitoring of the database and log interpretation....
Course content – laboratory
... The process of recovering lost data. Fragmentation and the reorganization of the data. 7. Working with Oracle database 2h Access to the Oracle database with the Java platform. NET (C #). Setting up development environments, libraries joining (Oracle C++ Call Interface - OCCI). 8. Migration to Oracle database from other relational databases 4h Migration to the Oracle database and differences in relation to Oracle"s most well-known relational databases such as PostgreSQL, MySQL, FireBird, SQLite, DB2, MSSQL

The lab task consists of tasks that generate reports. Report 1 - Data structure and generation (preparation of data sets for optimization) Report 2 - Queries (complex), finding bottlenecks Report 3 - Optimization</td></tr>
<tr><td>Prerequisites and co-requisites</td><td></td></tr>
<tr><td>Assessment methods and criteria</td><td>
<table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>Written exam</td><td>50.0%</td><td>50.0%</td></tr>
<tr><td>Projekt</td><td>50.0%</td><td>50.0%</td></tr>
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</td></tr>
<tr><td>Recommended reading</td><td>
<table>
<tr><td>Basic literature</td><td>1.M. Theriault, R. Carmichael, J. Viscusi, Oracle DBA Administrowanie bazą danych, Oracle Press 2001 2.R. Greenwald, R. Stackowiak, J. Stern, Oracle Database 11g To co najważniejsze, PWN 2009 (z serii O"Reilly) 3.Marie St. Gelais, Oracle9i DBA Fundamentals I English Student Subscription, Oracle 2002 (from Oracle Academy) 4.Ch. Koratamaddi, P. Vennapusa, Oracle Database 10g: Introduction to SQL English Student Subscription, Oracle 2006 5.P. Daux, J. Gallus, J. Speelpenning, Data Modeling and Relational Database Design English Student Subscription, Oracle 2002 6.J. L. Harrington, Relational Database Design Clearly Explained, Academic Press 2002</td></tr>
<tr><td>Supplementary literature</td><td>No requirements</td></tr>
<tr><td>eResources addresses</td><td></td></tr>
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</td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td>- describe database syntax from DML, DDL, DCL</td></tr>
<tr><td>Practical activites within the subject</td><td>Not applicable</td></tr>
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