GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Graph Data Presentations, PG_00044134		
Field of study	Mathematics		
Date of commencement of studies	October 2023	Academic year of realisation of subject	2023/2024
Education level	second-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	1	Language of instruction	Polish
Semester of study	1	ECTS credits	5.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Probability Theory and Biomathematics -> Faculty of Applied Physics and Mathematics		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Magdalena Lemańska	
	Teachers	dr inż. Magdalena Lemańska	

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	5.0	60.0	125

Subject objectives

The aim of the course is to familiarize students with the methods of data presentation using graph theory.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_K03] Can work as a team; understands the necessity of systematic work on all projects that are long-term in nature, understands and appreciates the importance of intellectual honesty in one's own activities and the activities of other people; behaves ethically.	Student knows the basics graph algorithms and knows how to use them. He can model certain phenomena using the Petri Nets. He knows different types of trees used in computer science. Can present data on flat graphs.	[SK2] Assessment of progress of work [SK5] Assessment of ability to solve problems that arise in practice
[K7_W05] Has enhanced knowledge of a selected branch of mathematics: knows most classical definitions and theorems and their proofs, Understands problems being examined, Knows relations between problems from particular field with other branches of mathematics, theoretical and applied	Student is able to use various programs (R, Neo4j) and modules built into them and program by himself using the above mentioned tools.	[SW3] Assessment of knowledge contained in written work and projects
[K7_U10] In a selected field, can examine evidence, in which, if necessary, also can use tools from other branches of mathematics, can identify one's own interests and develop them; in particular, is able to establish contact with specialists in their field, e.g. understand their lectures intended for young mathematicians.	The student lead some graph theory proofs using induction method. Can write the given algorithm in different programming languages.	[SU2] Assessment of ability to analyse information

<table>
<tr><td>Subject contents</td><td>1. How to save a graph in computer memory?

2. Basic graph algorithms: Dijkstra albgorithm, Floyd- Warshall algoritm, algorithms of flow in networks, traveling salesman problem, the problem of Chinese postman

3. Petri nets.

4 Graph isomorphism

5. Planar graphs

6. Dofferent types of trees and their properties (spanning trees, decision trees, binary trees, arithmetics trees, algorithms concernig tres)</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>Laboratory</td><td>50.0%</td><td>33.0%</td></tr>
<tr><td>Project</td><td>50.0%</td><td>33.0%</td></tr>
<tr><td>Final test</td><td>50.0%</td><td>34.0%</td></tr>
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<tr><td>Recommended reading</td><td>
<table>
<tr><td>Basic literature</td><td>Geir Agnarsson, Raymond Greenlaw, Graph Theory: Modelling, Applications and Algotithms, Pearson Education Inc, 2007

Wolfgang Reisig, Sici Petriego, WNT, 1988

Jacek Wojciechjowski, Krzysztof Pieńkosz, Grafy i sieci, PWN 2013</td></tr>
<tr><td>Supplementary literature</td><td>Peter H. Starke, Sieci Petri, PWN 1987

Seymour Lipschitz, Marc Lipson, Discrete Mathematics, Schaum's Outlines, 1997</td></tr>
<tr><td>eResources addresses</td><td>Adresy na platformie eNauczanie:
Grafowe prezentacje danych 2023/2024 - Moodle ID: 31267
https://enauczanie.pg.edu.pl/moodle/course/view.php?id=31267</td></tr>
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<tr><td>Example issues/ example questions/ tasks being completed</td><td>Find the minimum cut and the maximum flow in a given network.

Apply the Dijkstra (Floyd Warshall) algorithm to a given graph.

Prove that each planar graph can be colored with five colors.

Decide whether graphs are isomorphic.

Find the reachibility graph for a given Petri net.</td></tr>
<tr><td>Work placement</td><td>Not applicable</td></tr>
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