GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Graph Theory, PG_00070541		
Field of study	Mathematics		
Date of commencement of studies	October 2024	Academic year of realisation of subject	2025/2026
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	2	Language of instruction	Polish
Semester of study	4	ECTS credits	4.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Institute of Applied Mathematics -> Faculty of Applied Physics and Mathematics -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Magdalena Lemańska	
	Teachers	dr inż. Magdalena Lemańska	

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	30.0	15.0	0.0	0.0	15.0	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	35.0	100

Subject objectives

The aim of the course is to familiarize students with graph theory, which is widely used in various fields of science.

Learning outcomes

Course outcome	Subject outcome	Method of verification
K6_U10	Students can analyze theorems and apply them in various fields of science. They can analyze algorithms, prove their correctness, and write simple graph programs.	[SU4] Assessment of ability to use methods and tools
K6_W08	The student uses technical documentation and the Internet to find a solution to a problem.	[SW3] Assessment of knowledge contained in written work and projects

Subject contents

Course content – lecture
1. Graph Coloring (edge coloring, vertex coloring, chromatic polynomials). 2. Planar Graphs (properties of planar graphs, Euler's Theorem, Kuratowski's Theorem, map coloring). 3. Elements of Ramsey Theory. 4. Domination in Graphs (basic domination chain, properties of the classical domination number, different types of domination in graphs). 5. Matroid Theory 6. Chess Problems in the language of Graph Theory 7. Matroid Theory 8. Selected Graph Algorithms (finding shortest paths, flows in networks, the traveling salesman problem, the Chinese salesman problem).

Course content – exercises
The exercises will cover the topics discussed during the lectures.

Course content – seminar
Seminar: A list of topics related to the issues covered in the lecture will be provided.

Prerequisites and co-requisites

Passed exam in Discrete Mathematics

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
	50.0%	50.0%
	50.0%	50.0%

Recommended reading	Basic literature	Robert J. Wilson, Introduction to graph theory, Pearson Education Limited, 5th Edition. Victor Bryant, Aspects of combinatorics, Cambridge University Press.
	Supplementary literature	Maurice Clerc, Graph Colouring, CRC Press
	eResources addresses	
Example issues/ example questions/ tasks being completed	1. State and prove König's theorem. 2. State Euler's theorem for planar graphs and its corollaries. 3. Give bounds on the classical domination number. 4. Give examples of graphs with given domination numbers.	
Practical activites within the subject	Not applicable	

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