GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Graphtheoretic Modelling of Systems, PG_00058938		
Field of study	Informatics		
Date of commencement of studies	October 2023	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	Part-time studies	Mode of delivery	at the university
Year of study	4	Language of instruction	Polish
Semester of study	7	ECTS credits	8.0
Learning profile	general academic profile	Assessment form	exam
Conducting unit	Department of Algorithms and Systems Modelling -> Faculty of Electronics, Telecommunications and Informatics		
Name and surname of lecturer (lecturers)	Subject supervisor	dr Marcin Jurkiewicz	
	Teachers	dr Marcin Jurkiewicz	

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	8.0	162.0	200

Subject objectives	The goal of the course is gaining skills in the area of the analysis of algorithms and graph-theoretic modeling selected real-life problems.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_U08] while identifying and formulating specifications of engineering tasks related to the field of study and solving these tasks, can:n- apply analytical, simulation and experimental methods,n- notice their systemic and non-technical aspects,n- make a preliminary economic assessment of suggested solutions and engineering work n	Student performs a programming task.	[SU1] Assessment of task fulfilment
[K6_U43] can analyse date and formulate, apply and assess appropriate formal models and algorithms for solving problems in the field of information systems and applications	Student is able to use graph-theoretic methocs in order to model selected topics.	[SU1] Assessment of task fulfilment
[K6_W41] Knows and understands, to an advanced extent, the operation and evaluation criteria of data processing, storage and transfer methods, including computational algorithms, artificial intelligence and data mining	Student knows selected elements of algorithms' design.	[SW1] Assessment of factual knowledge
[K6_W01] Knows and understands, to an advanced extent, mathematics necessary to formulate and solve simple issues related to the field of study	Student knows mathematical foundations restricted to the design of graph algorithms.	[SW1] Assessment of factual knowledge
[K6_U01] can apply mathematical knowledge to formulate and solve complex and non-typical problems related to the field of study and perform tasks, in an innovative way, in not entirely predictable conditions, by:n- appropriate selection of sources and information obtained from them, assessment, critical analysis and synthesis of this information,n- selection and application of appropriate methods and toolsn	Student is able to apply graph-theoretic modeling methods.	[SU1] Assessment of task fulfilment

Subject contents

1. Introduction. 2. Introduction to graph theory (selected definitions). 3. Introduction to the analysis of algorithms. 4. Basic data structures used for graph representation. 5. Single source shortest paths and their applications. 6. Shortest paths between all pairs of vertices. 7. Applications of path algorithms in practical situations. 8. The traveling salesman problem - algorithms and applications. 9. Problems of computing spanning trees and their practical applications. 10. The maximum flow problem in graphs. 11. Matchings in graphs and their applications. 12. Introduction to the graph coloring problem - definitions, models and applications. 13. Generalizations of the graph coloring problem. 14. Selected graph coloring algorithms and their applications. 15. An overview of selected techniques of designing graph algorithms.

Prerequisites and co-requisites

The basic knowledge on the analysis of algorithms and computer programming.

Assessment methods and criteria

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

Recommended reading

Basic literature	1. D. Dereniowski, Lectures available on the eLearning platform 2. T.H. Cormen, C.E. Leiserson, R.L. Rivest, C. Stein, Introduction to algorithms, WNT, 2004. 3. M.M. Sysło, N. Deo, J.S. Kowalik, Discrete optimization algorithms: with Pascal programs, PWN, 1993.
Supplementary literature	1. M. Kubale Ed., Discrete optimization. Models and methods of graph coloring, WNT, 2001.
eResources addresses	Adresy na platformie eNauczanie:

Example issues/ example questions/ tasks being completed	
Work placement	Not applicable