GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Optimization in Automatic Control, PG_00047548		
Field of study	Automatic Control, Cybernetics and Robotics		
Date of commencement of studies	October 2023	Academic year of realisation of subject	2024/2025
Education level	first-cycle studies	Subject group	Obligatory subject group 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	3	ECTS credits	2.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Decision Systems and Robotics -> Faculty of Electronics, Telecommunications and Informatics		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Henryk Kormański	
	Teachers	dr inż. Henryk Kormański	

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	15.0	0.0	15.0	0.0	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	2.0	18.0	50

Subject objectives

To acquaint students with the theoretical foundations of mathematical methods of optimization for problems without and with constraints. In addition, familiarization with computational analytical and numerical methods

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_W01] Knows and understands, to an advanced extent, mathematics necessary to formulate and solve simple issues related to the field of study	Has basic knowledge of static optimization.	[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	He can formulate the problem of optimization in mathematical form and solve it by analytical or numerical methods.	[SU4] Assessment of ability to use methods and tools

Subject contents

1. Introduction. Basic problems and terminology. Usage.
2. Mathematical notation of practical optimization problems.
3. Analytical methods for solving multi-variable optimization tasks without constraints.
4. Analytical methods for solving multi-variable optimization problems with constraints.
a) Lagrange Multipliers method
5. Overview of numerical methods for solving optimization tasks:
a) nongradient simple search methods;
b) nongradient algorithms for improvement directions;
c) simple gradient methods (without directional minimization);
d) gradient algorithms for Descent Direction Methods.

Prerequisites and co-requisites			
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	J.Nocedal, S.J.Wright, “Numerical Optimization”, Springer, 1999	
	Supplementary literature	J.Nocedal, S.J.Wright, “Numerical Optimization”, Springer, 1999	
	eResources addresses	Adresy na platformie eNauczanie:	
Example issues/ example questions/ tasks being completed			
Work placement	Not applicable		