University of Gdańsk

Subject card

Subject name and code	Optimization Theory I, PG_00206872		
Field of study	Mathematics		
Date of commencement of studies	October 2026	Academic year of realisation of subject	2026/2027
Education level	Master's studies	Subject group	Obligatory subject group in the field of study Optional subject group
Mode of study	full-time studies	Mode of delivery	at the university
Year of study	1	Language of instruction	Polish
Semester of study	2	ECTS credits	5.0
Learning profile	academic	Assessment form	credit
Conducting unit			
Name and surname of lecturer (lecturers)	Subject supervisor	dr Danuta Jaruszewska-Walczak	
	Teachers		

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	30.0	30.0	0.0	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	3.0	62.0	125

Subject objectives

To knowing students with the theory and main applications of optimization problems.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[MATMU2_U05] is able to apply new or adapt existing methods and tools from a selected field of mathematics and information and communication technologies in related fields	The student is able to construct and solve models of optimization problems in related fields of science	[SU4] test/exam - oral or written
[MATMU2_W01] knows and understands in depth the theory of selected areas of mathematics or related fields, the complex relationships between them and their development trends	The student knows and understands the classes of optimization problems, their applications and methods of solving, as well as the problems of approximation and optimization in normalized spaces and in Hilbert spaces	[SW4] test/exam - oral or written

Subject contents

Classification of optimization tasks. Application examples.
The problem of linear programming. Dual task. Transport task. The simplex method.
Representation of functionals.
The problem of minimizing functionals defined on subsets of normalized vector spaces. Separation of convex sets.
Approximation and optimization in Hilbert spaces. Optimization in cones. Normal equations.
Orthogonal polynomials and their extreme properties.

Prerequisites and co-requisites

Knowledge of the basics of mathematical analysis and linear algebra

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
exam	51.0%	50.0%
test	51.0%	50.0%

Recommended reading	Basic literature	D. G. Luenberger, *Teoria optymalizacji*. BNI,1974. E. Pollak, *Metody obliczeniowe optymalizacji*. MIR, 1974. M. M. Syslo, N. Deo, J. S. Kowalik, *Algorytmy optymalizacji dyskretnej*. PWN, 1995. I. Nykowski, Z.Galas, *Zbiór zadań z programowania matematycznego I II* PWN 1986. M. Brdyś, A. Ruszczyński, *Metody optymalizacji w zadaniach*, WNT 1985.
	Supplementary literature	Not required
	eResources addresses	
Example issues/ example questions/ tasks being completed	Not required	
Work placement	Not applicable	

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