



## 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 2021		Academic year of realisation of subject		2022/2023		
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. Krystyna Rudzińska-Kormańska  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		