



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 2022	Academic year of realisation of subject			2023/2024		
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_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		
	[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		

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	<table border="1" data-bbox="448 533 1487 640"> <thead> <tr> <th data-bbox="448 533 794 573">Subject passing criteria</th> <th data-bbox="794 533 1141 573">Passing threshold</th> <th data-bbox="1141 533 1487 573">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="448 573 794 607"></td> <td data-bbox="794 573 1141 607">50.0%</td> <td data-bbox="1141 573 1487 607">50.0%</td> </tr> <tr> <td data-bbox="448 607 794 640"></td> <td data-bbox="794 607 1141 640">50.0%</td> <td data-bbox="1141 607 1487 640">50.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade		50.0%	50.0%		50.0%	50.0%
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											