



Subject card

Subject name and code	Optimization Methods, PG_00042192						
Field of study	Power Engineering, Power Engineering, Power Engineering, Power Engineering, Power Engineering						
Date of commencement of studies	October 2020	Academic year of realisation of subject			2022/2023		
Education level	first-cycle studies	Subject group			Optional subject group Subject group related to scientific research in the field of study		
Mode of study	Full-time studies	Mode of delivery			at the university		
Year of study	3	Language of instruction			Polish		
Semester of study	6	ECTS credits			3.0		
Learning profile	general academic profile	Assessment form			exam		
Conducting unit	Faculty of Electrical and Control Engineering						
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Kazimierz Duzinkiewicz					
	Teachers	dr hab. inż. Kazimierz Duzinkiewicz dr inż. Bartosz Puchalski					
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	30.0	0.0	0.0	45
	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	45	5.0		25.0	75	
Subject objectives	The course presents basic optimization methods from the group of different optimization problems: static - dynamic, continuous - discrete, linear-nonlinear, with a single variable - with multiple variables, with constraints- without constraints, single objective- multiobjective. The lecture will present the results of modern single objective optimization methods, supplemented with the basic results of multi-criteria optimization. Laboratory will be focused on numerical method of optimization supplied by MATLAB environment.						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	K6_W01	The student is able, by using the knowledge of mathematics, to define and solve selected optimisation problems.			[SW3] Assessment of knowledge contained in written work and projects		
	K6_U02	Students can design energy systems using optimisation methods.			[SU4] Assessment of ability to use methods and tools [SU3] Assessment of ability to use knowledge gained from the subject		

Subject contents	<p>1. Formulating optimization problems - examples from the energy sector.</p> <p>2. Methods for of solving problems with a single variable.</p> <p>3. Methods of of solving problems with many variables without constraints.</p> <p>4. Methods for of solving problems with many variables with constraints - problems of linear programming.</p> <p>5. Methods of of solving problems with many variables with constraints - problems of non-linear programming.</p> <p>6. Multiobjective problems and the approaches for solving them.</p>																	
Prerequisites and co-requisites	Basics of mathematical analysis - differential calculus																	
Assessment methods and criteria	<table border="1" data-bbox="450 801 1489 976"> <thead> <tr> <th data-bbox="450 801 794 837">Subject passing criteria</th> <th data-bbox="794 801 1139 837">Passing threshold</th> <th data-bbox="1139 801 1489 837">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="450 837 794 869">Laboratory</td> <td data-bbox="794 837 1139 869">0.0%</td> <td data-bbox="1139 837 1489 869">20.0%</td> </tr> <tr> <td data-bbox="450 869 794 900">Participation in the lecture</td> <td data-bbox="794 869 1139 900">0.0%</td> <td data-bbox="1139 869 1489 900">7.5%</td> </tr> <tr> <td data-bbox="450 900 794 931">Written exam</td> <td data-bbox="794 900 1139 931">50.0%</td> <td data-bbox="1139 900 1489 931">50.0%</td> </tr> <tr> <td data-bbox="450 931 794 976">Midterm colloquium</td> <td data-bbox="794 931 1139 976">0.0%</td> <td data-bbox="1139 931 1489 976">22.5%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	Laboratory	0.0%	20.0%	Participation in the lecture	0.0%	7.5%	Written exam	50.0%	50.0%	Midterm colloquium	0.0%	22.5%
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Example issues/ example questions/ tasks being completed	<p>1. What is the method of Lagrange multipliers</p> <p>2. What is the purpose of Simplex method?</p>																	
Work placement	Not applicable																	