



Subject card

Subject name and code	Theory of optimisation, PG_00057292						
Field of study	Ocean Engineering						
Date of commencement of studies	February 2023	Academic year of realisation of subject			2022/2023		
Education level	second-cycle studies	Subject group			Obligatory subject group in the field of study Subject group related to scientific research in the field of study		
Mode of study	Part-time studies	Mode of delivery			e-learning		
Year of study	1	Language of instruction			Polish		
Semester of study	1	ECTS credits			3.0		
Learning profile	general academic profile	Assessment form			assessment		
Conducting unit	Institute of Ocean Engineering and Ship Technology -> Faculty of Mechanical Engineering and Ship Technology						
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Klaudia Wrzask					
	Teachers	dr inż. Klaudia Wrzask					
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	9.0	9.0	0.0	0.0	0.0	18
	E-learning hours included: 18.0						
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	18	5.0		52.0	75	
Subject objectives	Getting knowledge and skills to define, classify and solve optimization problems in technology						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	[K7_W01] has a deepened and widened knowledge on certain fields of maths, used to formulate, solve and verify complex problems in ocean-technology	The student knows the basic concepts and theorems of linear programming, dynamic programming, non-linear programming. He knows the elements of multi-criteria optimization.			[SW1] Assessment of factual knowledge		
	[K7_U02] can plan and conduct research experiments on selected problems in ocean technology using various research methods	He/She is able to use mathematical methods for the description of decision processes in selected problems in the field of ocean engineering			[SU1] Assessment of task fulfilment		
[K7_W02] has a widened knowledge in the range of modelling technological processes, including knowledge necessary to describe and assess the functioning of selected elements of ocean technology objects and systems	The student knows the classifications of problems and decision models and the possibilities of solving them			[SW1] Assessment of factual knowledge			

Subject contents	<p>1. Classification of problems and decision models. Ways of solving decision problems</p> <p>2. Basic concepts of linear programming. Simplex method. Application of linear programming to solve simple optimization problems</p> <p>3. Dynamic programming. Bellman's principle of optimality</p> <p>4. Nonlinear optimization problems. Decision optimization in the case of functions of one variable and multi variables without restrictions and with restrictions</p> <p>5. Multi-criteria optimization6. Probabilistic methods in decision making.</p> <p>6. Probabilistic methods in decision making.</p> <p>7. Numerical methods of solving optimization problems</p>											
Prerequisites and co-requisites	Knowledge of mathematics at the level of the first degree. Field of study : Ocean Engineering											
Assessment methods and criteria	<table border="1" data-bbox="451 824 1487 931"> <thead> <tr> <th data-bbox="451 824 794 864">Subject passing criteria</th> <th data-bbox="794 824 1139 864">Passing threshold</th> <th data-bbox="1139 824 1487 864">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="451 864 794 896">tutorial</td> <td data-bbox="794 864 1139 896">60.0%</td> <td data-bbox="1139 864 1487 896">50.0%</td> </tr> <tr> <td data-bbox="451 896 794 931">lecture</td> <td data-bbox="794 896 1139 931">60.0%</td> <td data-bbox="1139 896 1487 931">50.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	tutorial	60.0%	50.0%	lecture	60.0%	50.0%
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tutorial	60.0%	50.0%										
lecture	60.0%	50.0%										
Recommended reading	Basic literature	<p>1. Lisowski, J., Metody Optymalizacji, Wydawnictwo Uniwersytetu Morskiego w Gdyni, 2022</p> <p>2. Stachurski, A. Wprowadzenie do optymalizacji, Oficyna Wydawnicza Politechniki Warszawskiej, 2009.</p>										
	Supplementary literature	<p>1. Amborski, K., Podstawy metod optymalizacji, Oficyna Wydawnicza Politechniki Warszawskiej, 2009.</p> <p>2. D'Souza A.F., Design of control systems, Prentice Hall, 1988</p> <p>3. 2 Kukula K., Badania operacyjne w przykladach i zadaniach, PWN, Warszawa 2011</p> <p>4. Milkiewicz F., Podstawy optymalizacji, Wydawnictwo PG, 1995</p> <p>5. Stengel R. F., Optimal control and estimation, Dover Publications Inc., New York, 1994.</p>										
	eResources addresses	<p>Adresy na platformie eNauczanie: Teoria optymalizacji, Oceanotechnika, niest, W, sem.1, lato 22/23, (PG_00057180) - Moodle ID: 30017 https://enauzanie.pg.edu.pl/moodle/course/view.php?id=30017</p>										
Example issues/ example questions/ tasks being completed	<p>1. Provide a necessary and sufficient condition for the existence of an extreme of the function of multi variables</p> <p>2. Give basic theorems of linear programming</p> <p>3. Give the method of indeterminate Lagrange multipliers</p>											
Work placement	Not applicable											