



Subject card

Subject name and code	, PG_00057625						
Field of study	Mathematics						
Date of commencement of studies	October 2022	Academic year of realisation of subject			2023/2024		
Education level	second-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	2	Language of instruction			Polish		
Semester of study	4	ECTS credits			3.0		
Learning profile	general academic profile	Assessment form			assessment		
Conducting unit	Zakład Analizy Nieliniowej -> Instytut Matematyki Stosowanej -> Faculty of Applied Physics and Mathematics						
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. Karol Dziędziul					
	Teachers	dr hab. Karol Dziędziul Kazimierz Najmayer					
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	0.0	0.0	30.0	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	0.0		0.0	60	
Subject objectives	the aim of the course is to enrich the statistical approach with optimization methods. This gives you another machine learning method. all this is immersed in modern analytical methods, such as frames, the Kadison Singer hypothesis						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	K7_U04	Moore Penrose's theory allows a wider look at the method of solving classical methods of ordinary and partial differential equations. This theory is applied to a limited extent to the CUR method as an algebraic machine learning method.			[SU1] Assessment of task fulfilment		
	K7_W06	a concise view of machine learning methods			[SW3] Assessment of knowledge contained in written work and projects		
	K7_U13	solves design tasks using R or SAS software			[SU1] Assessment of task fulfilment [SU4] Assessment of ability to use methods and tools		
	K7_W08	i.e. SVM and kernel methods			[SW3] Assessment of knowledge contained in written work and projects		

Subject contents	<p>Essentially we have three main roots of that lecture: paper S. Smale, Y. Yao Online Learning Algorithm,</p> <p>Vapnik V., Statistical Learning Theory, Wiley-Interscience, 1 edition, 1998,</p> <p>Regularization: From Inverse Problems to Large-Scale Machine Learning</p> <p>Ernesto De Vito, Lorenzo Rosasco, and Alessandro Rudi, 2021. All others part are consequence of that choice.</p>		
Prerequisites and co-requisites	probability and three courses in statistics		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	lecture 50 lab 50%	50.0%	100.0%
Recommended reading	Basic literature	<p>PAULSEN, MRINALRAGHUPATHI An Introduction to the Theory. of Reproducing Kernel Hilbert Spaces .Cambridge University Press 2016</p> <p>Heinz Werner Engl, Martin Hanke, A. Neubauer Regularization of Inverse Problems</p> <p>Springer Science \& Business Media, 31 lip 1996</p> <p>S. Smale, Y. Yao Online Learning Algorithms, Found. Comput. Math. 145170 (2006), Springer</p> <p>Vapnik V., The Nature of Statistical Learning Theory, Springer, 2000. s. 38</p> <p>A. Christmann and I. Steinwart. Support Vector Machines. Springer, Berlin, 2008</p>	
	Supplementary literature	W. Rudin Functional Analysis	
	eResources addresses	<p>Adresy na platformie eNauczanie:</p> <p>Metody analityczne w uczeniu statystycznym i maszynowym - Moodle ID: 38027</p> <p>https://enauczanie.pg.edu.pl/moodle/course/view.php?id=38027</p>	
Example issues/ example questions/ tasks being completed	Data will be given. Present result of machine learning		
Work placement	Not applicable		