



Subject card

Subject name and code	Inference and classification in data analysis, PG_00044133						
Field of study	Mathematics						
Date of commencement of studies	October 2022	Academic year of realisation of subject			2024/2025		
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			4.0		
Learning profile	general academic profile	Assessment form			assessment		
Conducting unit	Divison of Differential Equations and Applications of Mathematics -> Institute of Applied Mathematics -> Faculty of Applied Physics and Mathematics						
Name and surname of lecturer (lecturers)	Subject supervisor	Beata Jackowska-Zduniak					
	Teachers	mgr inż. Katarzyna Tessmer Beata Jackowska-Zduniak					
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	15.0	0.0	15.0	0.0	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		5.0		35.0	100
Subject objectives	To teach analysis of observed data with respect to their structure, model and randomness and to teach algorithms of the statistical decision scheme. To teach using the appropriate statistical algorithms and getting the correct interpretation. To teach statistical methods of data classification, methods of their evaluation and getting the correct interpretation.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	K6_W05	Students know the examples of selected mathematical and statistical notions as well as the examples of applications of given methods and algorithms.	[SW1] Assessment of factual knowledge
	K6_U12	Students are capable to analyse the data with respect to their structure, randomness and the applicable statistical algorithm(s). Students are capable to exploit the appropriate algorithm and correctly interpret the results. Students demonstrate the ability to present mathematical issues and analysis results to the wider audience.	[SU5] Assessment of ability to present the results of task [SU4] Assessment of ability to use methods and tools [SU1] Assessment of task fulfilment
	K6_K01	Students know how to extend their knowledge in the statistical data analysis and data classification and grouping methods by using the existing and appearing literature - the handbooks as well as the new bibliography.	[SK5] Assessment of ability to solve problems that arise in practice
	K6_W08	Students know the mathematical foundations of statistical algorithms. Students know basic statistical methods implemented in R and data analysis and visualisation methods.	[SW3] Assessment of knowledge contained in written work and projects
	K6_U11	Students are capable to analyse the data with respect to their structure, randomness and the applicable statistical algorithm(s). Students are capable to exploit the appropriate algorithm and correctly interpret the results. Students determine the parameter estimators of discrete and continuous probability distributions. Students use the test statistic probability distribution. Students apply central limit theorem to determine the test statistic distribution.	[SU4] Assessment of ability to use methods and tools [SU2] Assessment of ability to analyse information
Subject contents	Introductory analysis of data - tables, distributions, graphical presentation. Point and interval estimation. Hypothesis verification. Linear regression. Multiple regression. ANOVA. Cluster analysis - k-means algorithm.		
Prerequisites and co-requisites	Courses completed: Probability Calculus.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Colloquim 1	51.0%	30.0%
	Colloquim 2	51.0%	30.0%
	Project (1 [20%], 2 [20%])	51.0%	40.0%
Recommended reading	Basic literature	<p>1. W. Kryszewski, J. Bartos, W. Dyczka, K. Królikowska, M. Wasilewski, Rachunek prawdopodobieństwa i statystyka matematyczna w zadaniach, Statystyka matematyczna 2, Wyd. Naukowe PWN, Warszawa, 2004.</p> <p>2. S. Wierzchoń, M. Kłopotek, Algorytmy analizy skupień, Wyd. WNT, Warszawa, 2015.</p> <p>3. L. Gajek, M. Kałuszka, Wnioskowanie Statystyczne - modele i metody, III wyd. rozszerzone, WNT, Warszawa 1996.</p>	
	Supplementary literature	<p>1. P. Biecek, Przewodnik po pakiecie R, Gis, Wrocław, 2008.</p> <p>2. J. Jakubowski i R. Sztencel, Wstęp do Rachunku Prawdopodobieństwa, SCRIPT, Warszawa 2001.</p>	
	eResources addresses	Adresy na platformie eNauczanie:	

<p>Example issues/ example questions/ tasks being completed</p>	<p>For a given probability distribution with parameter <math>a</math>, determine a maximum - likelihood estimator for a parameter <math>a</math>.</p> <p>A random sample <math>(X,Y)</math> has a realisation of size <math>k</math> of : <math>(x_i, y_i), i = 1, \dots, k</math>. Find parameters <math>a</math> and <math>b</math> of a linear regression line equation <math>y = ax + b</math> using the method of least squares.</p> <p>Basic methods and tools in statistical data exploration.</p>
<p>Work placement</p>	<p>Not applicable</p>

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