



Subject card

Subject name and code	Inference in Multivariate Statistics, PG_00044136						
Field of study	Mathematics						
Date of commencement of studies	October 2023	Academic year of realisation of subject			2023/2024		
Education level	second-cycle studies	Subject group			Optional subject group		
Mode of study	Full-time studies	Mode of delivery			blended-learning		
Year of study	1	Language of instruction			Polish		
Semester of study	2	ECTS credits			5.0		
Learning profile	general academic profile	Assessment form			exam		
Conducting unit	Faculty of Applied Physics and Mathematics						
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Anna Szafrńska					
	Teachers	dr inż. Anna Szafrńska					
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	15.0	0.0	15.0	60
	E-learning hours included: 30.0						
Additional information: E-Learning course (lecture, laboratory, seminar): https://enauczanie.pg.edu.pl/moodle/course/view.php?id=37001							
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	60.0	125		
Subject objectives	Classical statistical introduction to data science. Computer laboratory oriented on practicable R packages tools.						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	[K7_W01] Has enhanced knowledge of basic branches of mathematics.	Is able to estimate parameters of distributions using analytical methods.			[SW1] Assessment of factual knowledge		
	[K7_W09] Knows the rules of stochastic modeling in financial and actuarial mathematics or in natural sciences, in particular physics, chemistry or biology.	Models random phenomena using the language of statistics with computer support.			[SW2] Assessment of knowledge contained in presentation [SW1] Assessment of factual knowledge		
	[K7_U08] Knows probability distributions and their properties; is able to use them in practical issues, is familiar with the basics of statistics (estimation issues and hypothesis testing) and the basics of statistical data processing.	Uses mathematical statistics techniques in the analysis of random phenomena.			[SU1] Assessment of task fulfilment		
[K7_W12] Knows well at least one symbolic computation software package and one statistical data processing package.	Is able to analyze empirical data using R packages.			[SW1] Assessment of factual knowledge			
Subject contents	Elements of R. Styles, patterns and structures of data science. Functional analysis notations in data science. Statistical models. Introductory inference theory. Regression. Clustering methods. Introduction to classification and algorithms in data science. Classification methods. Multidimensional data problems. Elements of principal components. K-means algorithm.						
Prerequisites and co-requisites	Courses completed: Probability Theory, Mathematical Statistics.						

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Test	50.0%	30.0%
	Project 2	50.0%	15.0%
	Oral	50.0%	30.0%
	Seminar	0.0%	10.0%
	Project 1	50.0%	15.0%
Recommended reading	Basic literature	<p>J.Kogan, Introduction to Clustering Large and High-Dimensional Data, Cambridge University Press, 2007.</p> <p>T.Panek, J.Zwierzchowski, Statystyczne metody wielowymiarowej analizy porównawczej, Oficyna Wydawnicza SGH, 2013.</p> <p>I.Koch, Analysis of Multivariate and High Dimensional Data, Cambridge University Press, 2014.</p> <p>R.Johnson, D.Wichern, Applied Multivariate Statistical Analysis, Pearson, 2014.</p>	
	Supplementary literature	<p>W.K.Hardle, L.Simar, Applied Multivariate Statistical Analysis, Springer, 2015.</p> <p>C.Chatfield, A.J.Collins, Introduction to Multivariate Analysis, CRC, 2017.</p>	
	eResources addresses	<p>Adresy na platformie eNauczanie: Wnioskowanie w wielowymiarowej statystyce 2023/2024 - Moodle ID: 37001 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=37001</p>	
Example issues/ example questions/ tasks being completed	<p>Given a joint multidimensional distribution find its marginal and conditional distributions. Find principal components of a covariance matrix. Using the k-means method, cluster the given data set.</p>		
Work placement	<p>Not applicable</p>		