

## GDAŃSK UNIVERSITY

## Subject card

Subject name and code	Mathematical Statistics, PG_00021039								
Field of study	Mathematics								
Date of commencement of studies	October 2022		Academic year of realisation of subject			2022/2023			
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	1		Language of instruction			Polish			
Semester of study	1		ECTS credits			4.0			
Learning profile	general academic profile		Assessment form			assessment			
Conducting unit	Zakład Równań Różniczkowych i Zastosowań Matematyki -> Instytut Matematyki Stosowanej -> Faculty of Applied Physics and Mathematics								
Name and surname	Subject supervisor		dr Agata Gołaszewska						
of lecturer (lecturers)	Teachers	-	dr Agata Gołaszewska						
Lesson types and methods	Lesson type	Lecture	Tutorial	Laboratory	Projec	t	Seminar	SUM	
of instruction	Number of study hours	30.0	30.0	0.0	.0 0.0		0.0	60	
	E-learning hours included: 0.0								
Learning activity and number of study hours	Learning activity	Participation in classes includ plan	n didactic ed in study	Participation in consultation hours		Self-study		SUM	
	Number of study hours	60		5.0				100	
Subject objectives	Develop technical skills in probability modeling and statistical inference for the practical application of statistical methods in students future education and professional career (applied statistics, data science).								
Learning outcomes	Course outcome		Subject outcome			Method of verification			
	K7_U09		Students are able to frame problems using multiple mathematical and statistical frameworks and solve problems using standard techniques and theorems.			[SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools			
	K7_W02		Student recognizes statistical tests and statistics distributions. Student knows the Rao- Blackwell theorem, theorem of factorization, Neyman-Pearson's theorem and Cramer-Rao inequality.			[SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects			
	K7_W01		Student knows the basic theorems of mathematical statistics, CLT and the law of large numbers.			[SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects			
	K7_U08		Student identifies exact distributions arising in statistics. Identifies sufficient statistics. Constructs unbiased estimators with minimum variance using the Rao-Blackwell theorem, the least squares method and the maximum likelihood estimators.			[SU1] Assessment of task fulfilment [SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools			
Subject contents	Sample space, statistical model, statistics; The concept of a statistical model. The empirical distribution function and the basic theorem of statistics. Position statistics, sample quantiles. Sufficient statistics, factorization criterion. Complete statistics. Estimators and Minimum Variance Estimators (ENMW). Rao-Balckwell theorems, determination (ENMW). Introduction to the method of determining estimators. Least Squares Method (EMNK), . Introduction to the verification of statistical hypotheses. Introduction to analysis of variance.								

Prerequisites	Probability theory, measure theory, matematical analysis.						
	Subject pessing criteria	Dessing threshold	Dereentage of the final grade				
and criteria	Exam on the content of the lecture with the possibility of exemption with a minimum grade of 4.5 from exercises	51.0%	50.0%				
	Written reports from self-made statistical analyzes - the form of projects	51.0%	25.0%				
	Subject to additional scoring: own work, active participation in classes	51.0%	5.0%				
	Final colloquium	51.0%	20.0%				
Recommended reading	Basic literature	Krysicki, Bartos, Dyczka, Królikowsł prawdopodobieństwa i statystyka m Statystyka medyczna", PWN R. Zieliński, "Siedem wykładów wpr matematycznej" J. Bartoszewicz, "Wykłady ze statys M. Krzyśko, "Statystyka matematyc R. Magiera, Modele i metody statys Wydawnicza GiS (2002) A. Jokiel-Rokita, R. Magiera, "Mode matematycznej w zadaniach", Oficy	zka, Królikowska, Wasilewski, "Rachunek i statystyka matematyczna w zadaniach, tom 2, ", PWN wykładów wprowadzających do statystyki kłady ze statystyki matematycznej", PWN 1996 /ka matematyczna", UAM Poznań 2008 metody statystyki matematycznej, Oficyna 102) Magiera, "Modele i metody statystyki daniach", Oficyna Wydawnicza GIS, Wrocław 2005				
	Supplementary literature	J. R. Barra, "Fundamentals of Statistics", S.D. Silvey, "Statistical Inference", Chapman and Hall / CRC (1975)Petrie Aviva, Sabin Caroline, "Medical Statistics at a Glance", Wiley and Sons (2019)M. Górkiewicz, J. Kołacz, "Statystyka medyczna", Wydawnictwo UJ (2001)R. Pruim, Foundations and Applications of Statistics: An Introduction Using R, AMS (2011)					
Everente in ever (	Adresy na platformie eNauczanie:						
Example issues/ example questions/ tasks being completed	statistical analysis on a specific statistical model. State with evidence the Fundamental Theorem of Statistics. Provide the Factorization Criterion with proof. Discuss the construction of the ENMW. Be able to give Rao's theorem. Discuss the relationship between sufficient and complete statistics						
Work placement	Not applicable						