GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Mathematical Statistics, PG_00049864		
Field of study	Economic Analytics		
Date of commencement of studies	October 2021	Academic year of realisation of subject	2022/2023
Education level	first-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	Full-time studies	Mode of delivery	at the university
Year of study	2	Language of instruction	Polish
Semester of study	3	ECTS credits	5.0
Learning profile	general academic profile	Assessment form	exam
Conducting unit	Katedra Statystyki i Ekonometrii -> Faculty of Management and Economics		
Name and surname of lecturer (lecturers)	Subject supervisor	dr Błażej Kochański	
	Teachers	dr Błażej Kochański	

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	30.0	0.0	30.0	0.0	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	10.0	55.0	125

Subject objectives

Main aim of the course is to teach students the basic concepts of probability and their application in mathematical modeling. After the course students will be able to perform the procedure of testing of statistical hypotheses (parametric and nonparametric) using professional statistical packages.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_U09] Has the ability to understand and analyse economic and financial phenomena on a macro and microeconomic scale.	Based on the acquired knowledge, a student draws correct conclusions regarding real statistical problems. A student is able to correctly use statistical inference.	[SU1] Assessment of task fulfilment [SU4] Assessment of ability to use methods and tools
[K6_W02] Knows how to describe economic phenomena using quantitative methods with the use of IT tools.	A student has the ability to select a sample, evaluate its nature, and then select an appropriate statistical technique to assess the significance of its parameter (parametric test) and distribution (non-parametric test). A student is also able to perform research on the basis of data from many populations.	[SW1] Assessment of factual knowledge
[K6_U08] Has the ability to use mathematical and IT tools to analyse economic phenomena and make decisions by economic entities.	Based on the acquired knowledge, a student draws correct conclusions regarding real statistical problems. A student is able to correctly use statistical inference.	[SU1] Assessment of task fulfilment [SU4] Assessment of ability to use methods and tools
[K6_U13] Can improve through systematic acquisition of knowledge and skills.	A student can analyze a problem, choose the right tools and present the results. A student is able to participate in the preparation of business projects taking into account economic aspects, using statistical tools and methods.	[SU1] Assessment of task fulfilment [SU2] Assessment of ability to analyse information

Subject contents	Probability space: the classic scheme, drawing with replacement and without replacement. Geometric Probability. Conditional probability, total probability, Bayes' formula. Independence of events. Discrete random variable: probability distribution function and cumulative distribution. A review of selected distributions of discrete random variables: the distribution of single-point, two-point, Binomial, Poisson. Continuous random variable: probability density function and cumulative distribution. A review of selected distributions of continuous random variables: uniform distribution, exponential, normal, chi-square, Student's t. The basic numerical characteristics of discrete and continuous random variables. Population and sample; Sampling schemes; the sample distributions. Basic statistics and their distributions; Estimators and their properties; Methods of obtaining estimators; Point estimation; Interval estimation; Testing of statistical hypotheses; The level of significance and power of the test; Parametric tests for one-dimensional population. Parametric tests for two-dimensional population. Tests for multidimensional population. Analysis of variance. Nonparametric tests; Normality tests; Test of independence (chi-square test); Tests of randomness. Sign tests. Tests for outliers; Tests used in the analysis of correlation and regression.
Prerequisites and co-requisites	Mathematics, descriptive statistics.
Assessment methods and criteria	

Subject passing criteria	Passing threshold	Percentage of the final grade
Final exam (lecture)	60.0%	50.0%
Final test (laboratory)	60.0%	50.0%

Recommended reading	Basic literature	1. McClave J. T., Benson P. G., Sincich T. (2008), Statistics for Business and Economics, Pearson/Prentice Hall. 2. Aczel A. D. (1989), Complete Business Statistics, Irwin. 3. Kot S., Jakubowski J., Sokołowski A. (2011), Statystyka, Difin
	Supplementary literature	1. Discovering statistics using R, Andy Field, Jeremy Miles, Zoe Field, Sage, 2012. 2. G. Jay Kerns, Introduction to Probability and Statistics using R, Third Edition, 2018. 3. Chihara L. M., Hesterberg T. C. (2011), Mathematical Statistics with Resampling and R, Wiley.
	eResources addresses	Adresy na platformie eNauczanie: Statystyka matematyczna 2022/2023 - Moodle ID: 24347 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=24347
Example issues/ example questions/ tasks being completed	1. Theoretical and empirical probability distribution and central limit theorem. 2. Point and interval estimation, precision of the estimator, the minimum sample size required to obtain a specific precision. 3. Parametric and nonparametric hypothesis testing. The final exam will test your knowledge of all the course material taught in the entire course.	
Work placement	Not applicable	