GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Mathematical Statistics, PG_00049866
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	Part-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	Department of Economic Sciences -> Faculty of Management and Economics		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Karol Flisikowski	
	Teachers	dr inż. Karol Flisikowski	

Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	16.0	0.0	16.0	0.0	0.0	32
	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	32	10.0	83.0	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_U13] Can improve through systematic acquisition of knowledge and skills.	A student, on the basis of knowledge infer regarding the real statistical problems. A student can use appropriate inferencial statistical analysis.	[SU1] Assessment of task fulfilment [SU2] Assessment of ability to analyse information
	[K6_W02] Knows how to describe economic phenomena using quantitative methods with the use of IT tools.	A student can identify statistical inference problems and solve its tasks on the basis of single sample and multiple sample comparisons.	[SW1] Assessment of factual knowledge
	[K6_U09] Has the ability to understand and analyse economic and financial phenomena on a macro and microeconomic scale.	Student, on the basis of the acquired knowledge, draws correct real conclusions for given statistical problems.	[SU4] Assessment of ability to use methods and tools [SU1] Assessment of task fulfilment
	[K6_U08] Has the ability to use mathematical and IT tools to analyse economic phenomena and make decisions by economic entities.	A student can identify statistical inference problems and solve its tasks on the basis of single sample and multiple sample comparisons.	[SU1] Assessment of task fulfilment [SU4] Assessment of ability to use methods and tools

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%	40.0%
	Final test (laboratory)	60.0%	30.0%
	Final test (seminar)	60.0%	30.0%

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. Chihara L. M., Hesterberg T. C. (2011), Mathematical Statistics with Resampling and R, Wiley.
	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.
	eResources addresses	Adresy na platformie eNauczanie: Statystyka matematyczna 2022_23 - Moodle ID: 24209 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=24209

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