University of Gdańsk

Subject card

Subject name and code	Statistics I, PG_00189026						
Field of study	Mathematics						
Date of commencement of studies	October 2026		Academic year of realisation of subject		2028/2029		
Education level	Bachelor's studies		Subject group		Obligatory subject group in the field of study 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		5.0		
Learning profile	academic		Assessment form		exam		
Conducting unit	Institute of Mathematics -> Faculty of Mathematics, Physics and Informatics -> Rector						
Name and surname of lecturer (lecturers)	Subject supervisor		dr Nikodem Mrożek				
	Teachers						
Lesson types	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		3.0		62.0	125
Subject objectives	Introducing students to the concepts of descriptive statistics, estimators, hypothesis testing methods, and their practical application using statistical software.						

Learning outcomes

Course outcome	Subject outcome	Method of verification
[MATL3_W08] knows and understands at an advanced level the basics of computational techniques and programming that support the work of a mathematician and understands their limitations	The student knows and is able to use selected statistical programs to solve problems using descriptive statistics methods.	[SW2] presentation/project/paper/ report [SW5] implementation of a problem task
[MATL3_W05] knows and understands at an advanced level selected concepts, methods and theorems of probability and statistics, as well as basic examples both illustrating specific concepts in this field and allowing to refute false hypotheses or invalid reasoning	The student knows and understands selected concepts of descriptive statistics, estimators and methods of hypothesis testing.	[SW4] test/exam - oral or written
[MATL3_U05] is able to correctly use the concepts of probability and statistics, is able to apply the theorems and methods of these fields and is able to interpret the obtained results	The student is able to practically use the concepts of descriptive statistics, estimators and hypothesis testing methods using statistical programs.	[SU4] test/exam - oral or written [SU5] implementation of a problem task
[MATL3_U07] is able to plan a way to solve a complex problem and prepare a correct record of this solution, providing strict and precise justification for the correctness of his/her reasoning	The student is able to identify a statistical problem and solve it using the concepts of descriptive statistics, estimators and hypothesis testing methods.	[SU4] test/exam - oral or written

Subject contents

1. Elements of descriptive statistics - measures of central tendency, dispersion, skewness, and kurtosis. 2.Correlation coefficients and linear regression.3. Selected probability distributions appearing in statistics:normal distribution, chi-square, Student's t-distribution, Snedecor's F-distribution.4. Basic statistics and theirdistributions - estimators of mean and variance.5. Estimation of distribution parameters. Basic properties ofestimators - unbiasedness, consistency, efficiency. Cramer-Rao inequality.6. Methods of obtainingestimators (method of moments, maximum likelihood estimation).7. Interval estimation. Confidence intervalsfor the mean and variance.8. Verification of statistical hypotheses: Type I and II errors, power of the test,Neyman-Pearson lemma, testing for normality, and testing parametric hypotheses in models assumingnormal distribution of the studied variable.9. Non-parametric tests (Kolmogorov-Smirnov test, Wilcoxon test,Pearson's chi-square test).10. Practical exercises on the above topics using R and Statistica packages.

Prerequisites and co-requisites

Knowledge of the basics of mathematical analysis and probability theory.

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
tasks performed during classes	51.0%	20.0%
observation of the student's attitude	51.0%	0.0%
exam	51.0%	80.0%

Recommended reading

Basic literature	1. L. Gajek, M. Kałuszka, Wnioskowanie statystyczne dla studentów, WNT Warszawa 1990.2. J. Greń, Modele i zadania statystyki matematycznej, PWN Warszawa 1972.3. W. Krysicki, J. Bartos, W. Dyczka, K. Królikowska, M. Wasilewski, Rachunek prawdopodobieństwa i statystyka matematyczna w zadaniach - część II, PWN W-wa 2004.4. A. Plucińska, E. Pluciński, Probabilistyka: Rachunek prawdopodobieństwa. Statystyka matematyczna. Procesystochastyczne, Wydawnictwa Naukowo - Techniczne Warszawa 2000.5. A. Jokiel-Rokita, R. Magiera. Modele i metody statystyki matematycznej w zadaniach, Oficyna Wydawnicza GiS, Wrocław2003.
Supplementary literature	T. Górecki, Podstawy statystyki z programem R, Wydawnictwo BTC 2011
eResources addresses	

Example issues/ example questions/ tasks being completed	not applicable
Work placement	Not applicable

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