GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Basics of Data Analysis, PG_00047835		
Field of study	Biomedical Engineering, Biomedical Engineering, Biomedical Engineering		
Date of commencement of studies	October 2024	Academic year of realisation of subject	2026/2027
Education level	first-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	3	Language of instruction	Polish
Semester of study	6	ECTS credits	3.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Biomedical Engineering -> Faculty of Electronics, Telecommunications and Informatics		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Sebastian Molin	
	Teachers	dr hab. inż. Sebastian Molin	

Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	15.0	0.0	0.0	30
	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	30	3.0	42.0	75

Subject objectives	Obtaining the theoretical and practical part necessary for statistical evaluation of measurement results and the results of calculations.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_U04] can apply knowledge of programming methods and techniques as well as select and apply appropriate programming methods and tools in computer software development or programming devices or controllers using microprocessors or programmable elements or systems specific to the field of study	The student can apply programming techniques for data analysis, selecting appropriate tools and methods. They are capable of programming computer applications and microprocessor-based devices using programming languages and analytical libraries. They solve analytical problems by implementing algorithms and interpret results in the context of the field of study.	[SU4] Assessment of ability to use methods and tools
[K6_W01] knows and understands, to an advanced extent, mathematics necessary to formulate and solve simple issues related to the field of study	The student knows and understands advanced mathematical concepts necessary for data analysis. They can apply statistical and probabilistic methods to formulate and solve analytical problems. They are able to interpret data analysis results, using mathematical knowledge to draw conclusions and make decisions in the context of their field of study.	[SW1] Assessment of factual knowledge
[K6_U09] can carry out a critical analysis of the functioning of existing technical solutions and assess these solutions, as well as apply experience related to the maintenance of technical systems, devices and facilities typical for the field of studies, gained in the professional engineering environment	The student can critically analyze and evaluate existing technical solutions in data analysis. They utilize experience gained in an engineering environment to improve technical systems. They are capable of identifying and solving issues related to the maintenance and optimization of data analysis systems, adapting them to the specifics of the field of study.	[SU2] Assessment of ability to analyse information

Subject contents

1 Introduction. Statistical and computational methods.
2 Selected elements of probability theory. Random variables and their most important properties.
3 Gallery distributions: normal, t, F, exponential, logarithmic, and other.
4 Expected values, variances, covariances and correlation coefficients.
5 Generating random numbers. Monte Carlo simulation.
6 Properties of the normal distribution. Central limit theorem.
7 Presentation of the test in graphical form. Histograms. Interpretation of histograms.
8 Graphical analysis techniques. Autocorrelation plots.
9 Quantitative assessment techniques. The confidence interval, t-test equality of means.
10 F-test of equality of standard deviation. Levene test of equality of variances. Tests Chi-sguare compliance with established distribution
11 Kolmogorov-Smirnov test compliance with the assumed distribution.
12 The method of maximum likelihood, as the basis of modern data analysis. Examples interpretation of results.
13 Least squares method for measuring direct and indirect.
14 linear regression. Indicators of quality of the fit
15 Nonlinear regression. Indicators of quality of the fit, the phenomenon of interaction parameters, the causes

Prerequisites and co-requisites

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
lecture	60.0%	60.0%
laboratory	50.0%	40.0%

Recommended reading

Basic literature	1. The script of materials "Fundamentals of data analysis" 2. Brandt S .: Analysis of the data. Statistical and computational methods. WNT, Warszawa 1999.
Supplementary literature	1. NIST/SEMATECH e-Handbook of Statistical Methods, http://www.itl.nist.gov/div898/handbook/
eResources addresses	Adresy na platformie eNauczanie:

Example issues/ example questions/ tasks being completed

1. Verification of normal distribution of the variable under consideration.

2. Check the statistical significance of the result using the Student's t test.

Work placement

Not applicable

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