GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Statistics and data analysis, PG_00061705						
Field of study	Recycling and Energy Recovery						
Date of commencement of studies	October 2026		Academic year of realisation of subject	2027/2028			
Education level	first-cycle studies		Subject group	Obligatory subject group in the field of study			
Mode of study	Full-time studies		Mode of delivery	at the university			
Year of study	2		Language of instruction	English			
Semester of study	3		ECTS credits	6.0			
Learning profile	general academic profile		Assessment form	assessment			
Conducting unit	Department of Geotechnical and Hydraulic Engineering -> Faculty of Civil and Environmental Engineering -> Faculties of Gdańsk University of Technology						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Wojciech Artichowicz				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	20.0	20.0	20.0	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	80.0	150	
Subject objectives	The aim of the subject is to teach students the basics of statistics, and its practical utilization. During lectures the teorethical background of statistical methods is presented, whereas dirong tutorials practical exercises are performed. The focus of the practice is engineering, business and scientific activity. At the course attendees gain: • Basics of statistics and probability theory • Basic skills of working with data • Basic skills of data science tools: Libre Office Calc, Tableau®, Python, Jupyter Notebook • Awareness of existence of data science community, f.e.: Kaggle						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K6_W02] analyzes engineering and technological issues and problems in the area of raw materials and energy recovery using appropriate and appropriate analytical, numerical and experimental tools and methods	Is able to determine the possibility of using data analysis and statistics tools to solve problems in the field of raw materials and energy recovery.	[SW3] Assessment of knowledge contained in written work and projects
	[K6_W01] demonstrates knowledge and understanding of mathematics and other exact sciences and engineering disciplines at the level necessary to solve theoretical, engineering and technological problems and issues.	Is able to apply knowledge of statistics to analyze data and compare two or more groups.	[SW3] Assessment of knowledge contained in written work and projects
	[K6_U06] uses information technology to improve data analysis and design support.	Knows and is able to choose tools appropriate to conduct statistical analysis of data.	[SU1] Assessment of task fulfilment [SU2] Assessment of ability to analyse information [SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools
	[K6_U01] applies knowledge of mathematics and other exact sciences and engineering disciplines to solve theoretical, engineering and technological problems and issues.	Is able to apply knowledge of statistics to analyze data and compare two or more groups.	[SU1] Assessment of task fulfilment [SU2] Assessment of ability to analyse information [SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools

Subject contents	Course content – lecture **Lectures and tutorials** 1.Introduction (what is statistics, how do engineers, medicians, biologists use it, tools used for statistical computing) 2. Probability (definitions, interpretations and approaches of computing), combinatorical computation of probability 3. Conditional probability, totla probability, Bayes theorem 4. Random variable (discrete and continuous), examples of random variables (f.e. normal distribution) 5. Sample collection methods and design of experiments 6. Descriptive statistics and graphical data exploration 7. Estimation theory (maximum likelihood method, least squares method, etc.), point and interval estimation 8. Statistical inference, confidence intervals 9. Statistical hypotheses testing, parametric hypostheses, nonparametric hypotheses 10. Pseudo random number generators, permutation tests, bootstrap estimation 11 Regression and correlation 12. ANOVA 13 Regression and correlation - advanced approach 14. Data analysis 15. Machine learning 16. End test **Workshops:** 1. Data anlysis with Tableau 2. Introduction to Jupyter Notebook for statistical computing
Prerequisites and co-requisites	Basics of advanced mathematics: algebra and calculus Basic computer skills.
Assessment methods and criteria	

Subject passing criteria	Passing threshold	Percentage of the final grade
Project (datase analysis)	80.0%	30.0%
End test	60.0%	70.0%

Recommended reading	Basic literature	Jay L. Devore, Probability and Statistics for Engineering and the Sciences. 8th edition. Norman Lloyd Johnson, Statistics and experimental design in engineering and the physical sciences. "An Introduction to statistical Learning Theory With Applications in Python" G. James, D. Witten, T. Hastie, R. Tibrishani, J. Taylor. Link to pdf
	Supplementary literature	SciPy Stats documentation. scikit-learn library documentation.
	eResources addresses	
Example issues/ example questions/ tasks being completed		
Practical activites within the subject	Not applicable	

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