



## Subject card

Subject name and code	Statistics and data analysis, PG_00061711						
Field of study	Environmental Engineering						
Date of commencement of studies	October 2025		Academic year of realisation of subject		2025/2026		
Education level	second-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	1		Language of instruction		Polish		
Semester of study	1		ECTS credits		5.0		
Learning profile	general academic profile		Assessment form		assessment		
Conducting unit	Department Of Geotechnical And Hydraulic Engineering -> Faculty Of Civil And Environmental Engineering - > Wydziały Politechniki Gdańskiej						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Wioletta Gorczewska-Langner				
	Teachers						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	15.0	10.0	0.0	0.0	40
	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	40		3.0		88.0	131
Subject objectives	The aim of the course is to familiarize students with the basics of statistics and its practical applications. The lecture part of the course covers the theory of the subject, while in practical exercises, students learn how to apply statistics in engineering, scientific, and business work. Additionally, in the laboratory sessions, practical data analysis skills are practiced based on the topics introduced during the exercises and lectures. Throughout the course, participants acquire skills that include working with data, processing it, and analyzing it using tools such as Tableau®.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	K7_W01		The course participant learns an applied approach to probability theory and statistics. They can utilize probabilistic reasoning to reduce the costs of engineering and business activities.		[SW3] Assessment of knowledge contained in written work and projects		
	[K7_W12] has knowledge of contemporary and useful principles on data acquisition, filtration, processing and analysis		The student learns the principles of working with data in a data science approach. Additionally, they learn to use relevant dedicated tools, such as Tableau® and Jupyter Notebook.		[SW3] Assessment of knowledge contained in written work and projects		
	[K7_U05] can rely on scientific sources for modern methods and technologies, and propose trends in the development of methods and rules for acquiring, filtering, processing and analyzing data		As part of the course, participants familiarize themselves with sources of knowledge and tools that enable further development in the field of statistics and data science.		[SU1] Assessment of task fulfilment [SU5] Assessment of ability to present the results of task		
	K7_U09		The student is capable of directing their need for further self-improvement and acquiring the necessary educational materials for this purpose.		[SU4] Assessment of ability to use methods and tools		

Subject contents	Lectures and Exercises:  <div><div>1. Introduction to Statistics (what is statistics, how to use statistics for decision-making in industrial processes, medical research, and environmental studies, presentation of computational tools for performing statistical calculations and their capabilities)</div><div>2. Probability (definitions, calculation approaches), combinatorial probability calculations</div><div>3. Conditional probability, independence, Bayes' theorem.</div><div>4. Random Variables (discrete, continuous), examples of random variables (e.g., normal distribution)</div><div>5. Sampling Methods and Experimental Design</div><div>6. Descriptive Statistics and Graphical Data Exploration (initial data analysis)</div><div>7. Estimation Theory (estimator properties, methods for obtaining estimators, e.g., least squares, method of moments, etc.), calculation of estimator values (point and interval estimation)</div><div>8. Statistical Inference, Confidence Intervals</div><div>9. Statistical Hypothesis Testing: Parametric Hypotheses (tests for the mean, standard deviation), Non-parametric Hypotheses I (Chi-squared tests, Kolmogorov-Smirnov test, etc.)</div><div>10. Generating Pseudorandom Numbers, Statistical Permutation Tests, Bootstrap Estimation</div><div>11. Correlation Analysis</div><div>12. Regression Analysis</div><div>13. Advanced Regression and Correlation Methods</div><div>14. Data Analysis Methods</div><div>15. Midterm Examination</div></div>   <		
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