 GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Statistics and data analysis, PG_00059938
Field of study	Environmental Engineering

Date of commencement of studies	February 2026	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	Full-time studies	Mode of delivery	at the university
Year of study	1	Language of instruction	Polish
Semester of study	1	ECTS credits	3.0
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. Wioletta Gorczewska-Langner
	Teachers —

Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	15.0	15.0	0.0	0.0	45
	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	45	5.0	30.0	80

Subject objectives	The aim of the course is to familiarize students with the basics of statistics and its application aspects. As part of the lecture on the subject, the theory of issues is presented, as part of the exercises, practical aspects of using statistics in engineering, scientific and business work, while as part of the laboratory, practical skills of data analysis are practiced within the issues learned during the exercises and the lecture. As part of the course, the participant acquires, among other things, the ability to analyze data using tools such as Tableau®.

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[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, the course participant gets acquainted with the sources of knowledge and tools enabling further development in the direction statistics/data science.	[SU5] Assessment of ability to present the results of task [SU1] Assessment of task fulfilment
	K7_W01	The course participant learns application approach probability calculus and statistics. Can use inference probabilistic to constraint engineering costs and business.	[SW3] Assessment of knowledge contained in written work and projects
	K7_U09	The student is able to direct the need for further training and acquire the necessary educational materials for this purpose.	[SU4] Assessment of ability to use methods and tools
	[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 the data science approach. In addition, he learns to use the appropriate dedicated ones tools (Tableau®, Jupyter Notebook).	[SW3] Assessment of knowledge contained in written work and projects

Subject contents	Course content – lecture **Lecture and exercises:** 1. Introduction to statistics (what is statistics, how to use statistics to make decisions decisions in industrial processes, medical research and environmental research, presentation computational tools to perform statistical calculations and their capabilities) 2. Probability (definitions, computational approaches), combinatorial calculation of probabilities 3. Conditional probability, complete probability, Bayes' theorem. 4. Random variable (discrete, continuous), examples of random variables (e.g. normal distribution) 5. Sample selection methods and experiment planning 6. Descriptive statistics and graphical data mining (preliminary data analysis) 7. Theory of estimation (methods of obtaining least squares estimators, methods of moments etc.), calculating the values of estimators (point and interval estimation) 8. Statistical inference, confidence intervals 9. Testing statistical hypotheses: parametric hypotheses (tests for the mean, for the deviation standard), non-parametric hypotheses I (Chi2 tests, Kolmogorov-Smirnov test, etc.) 10. Pseudo-random number generation, statistical permutation tests, bootstrap estimation 11. Correlation analysis 12. Regression analysis 13. Regression and correlation - advanced methods 14. Methods of data analysis 15. Colloquium **Lab:** 1. Introduction to the Jupyter Notebook environment 2. Working with LibreOffice Calc or MS Excel 3. Working with Tableau
Prerequisites and co-requisites	Fundamentals of higher mathematics: algebra and mathematical analysis. Computer skills. Basic knowledge of MS Excel or LibreOffice Calc.

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
		60.0%	70.0%
		80.0%	30.0%

Recommended reading	Basic literature	• Jacek Koronacki, Jan Mielniczuk, "Statystyka dla studentów kierunków technicznych i przyrodniczych." • Andrzej Bielicki, Wiesław Makać, "Metody wnioskowania statystycznego." • Wiesław Makać, Danuta Urbanek-Krzysztofiak, "Metody opisu statystycznego." • Jay L. Devore, "Probability and Statistics for Engineering and theSciences. 8th edition." • Norman Lloyd Johnson, "Statistics and experimental design in engineering and the physical sciences."
	Supplementary literature	• Zdzisław Kaczmarek, "Metody statystyczne w hydrologii imeteorologii." • Stanisław Węglarczyk, "Statystyka w inżynierii środowiska." • Ven Te Chow, David R. Maidment, Larry W. Mays, "Applied hydrology" • John C. Davis "Statistics and Data Analysis in Geology. Third Edition."
	eResources addresses	

Example issues/ example questions/ tasks being completed	
Practical activites within the subject	Not applicable

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