



Subject card

Subject name and code	Statistics, PG_00042499						
Field of study	Environmental Engineering						
Date of commencement of studies	October 2022	Academic year of realisation of subject			2022/2023		
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			4.0		
Learning profile	general academic profile	Assessment form			assessment		
Conducting unit	Department of Hydraulic Engineering -> Faculty of Civil and Environmental Engineering						
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	0.0	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	4.0		70.0		104
Subject objectives	The main objective of the course is to present the terms and concepts used in statistics and demonstrate the utility of statistical procedures research in the field of technical and natural sciences with the special focus in hydrology, water distribution and water quality analysis.						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	[K7_W12] has knowledge of contemporary and useful principles on data acquisition, filtration, processing and analysis	Student has knowledge of basic statistical tools used for data analysis and statistical modeling.			[SW3] Assessment of knowledge contained in written work and projects		
	[K7_W01] has broadened and deepened knowledge of selected mathematics sections, including statistics components and optimization methods, and mathematical and numerical methods necessary for: 1) modeling and analysis of water supply systems and their physical phenomena; 2) description and analysis of flood protection systems; 3) functional analysis, optimization and reliability of sanitary engineering systems; 4) description of phenomena related to the flow of water in the environment, in pipes and open channels, filtration, migration of pollutants	Student has the ability to design and perform statistical experiment in the field of environmental engineering			[SW3] Assessment of knowledge contained in written work and projects		
	[K7_U11] can formulate reports preparing for the research work; can identify the direction of further education and complete the process of self-education"	Student has knowledge of data exploration, visualization and statistical data analysis			[SU4] Assessment of ability to use methods and tools [SU2] Assessment of ability to analyse information [SU1] Assessment of task fulfilment		
	[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	Student has knowledge of important literature positions in the field of data analysis and statistics.			[SU2] Assessment of ability to analyse information		

Subject contents	Calculus of probability. Random events. Empirical distributions. Random variable, basic one-dimensional distributions. Regressions of 1 and 2 degree. Applications in environmental engineering. Statistical population and random samples. Confidence intervals. Estimation of distributions parameters. Sampling of flow discharge values. t-Student and Chi square distributions. Methods of estimating maximum probable precipitation. Parametric and non-parametric tests. Statistical methods of forecasting in hydrology and meteorology. Experimental design.		
Prerequisites and co-requisites	Mathematics, Hydrology, Water treatment		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Final test	60.0%	100.0%
Recommended reading	Basic literature	<ol style="list-style-type: none"> 1. Koronacki J., Mielniczuk J. (2006), Statistics for students of engineering and environmental sciences. Wydawnictwa Naukowo-Techniczne. Warszawa. (in polish) 2. Pawłowski Z. (1976), Statistics. Państwowe Wydawnictwo naukowe. Warszawa. (in polish) 3. Taylor J.R. (2011), An Introduction to Error Analysis: The Study of Uncertainties in Physical Measurements. Wydawnictwo Naukowe PWN Warszawa. (in polish) 4. Kaczmarek Z.: Statistical methods in hydrology and meteorology. Warszawa WKiŁ. 1970 (in polish) 5. Węglarczyk, S., Statistics in environmental engineering. PK. Kraków 2010 (in polish) 6. Węglarczyk, S., Statistical methods. PK. Kraków 1993 (in polish) 	
	Supplementary literature	<ol style="list-style-type: none"> 1. Gmurman W.J. (1976), Tasks of probability and statistics. Wydawnictwa Naukowo-Techniczne. Warszawa. (in polish) 2. Hastie T., Tibshirani R., Friedman J. (2009), The Elements of Statistical Learning. Data Mining, Inference, and Prediction. Second Edition. Springer (in english) 3. Zaleski J. (2004) Stochastic models and computer simulation. Application to water distribution systems. Wydawnictwo Naukowe PWN. Warszawa. (in polish) 4. Plucińska A., Pluciński E. (2000), <i>Probability theory</i>. Wydawnictwa Naukowo-Techniczne. Warszawa. (in polish) 	
	eResources addresses		
Example issues/ example questions/ tasks being completed			
Work placement	Not applicable		