



Subject card

Subject name and code	Probabilistic and statistical methods, PG_00064266						
Field of study	Transport						
Date of commencement of studies	October 2025		Academic year of realisation of subject		2026/2027		
Education level	first-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	2		Language of instruction		Polish		
Semester of study	3		ECTS credits		3.0		
Learning profile	general academic profile		Assessment form		assessment		
Conducting unit	Department of Transportation Engineering -> Faculty of Civil and Environmental Engineering -> Faculties of Gdańsk University of Technology						
Name and surname of lecturer (lecturers)	Subject supervisor		dr Anita Milewska				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	30.0	0.0	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		3.0		27.0	75
Subject objectives	Learning basic description methods for univariate and multivariate random variables and an introduction to mathematical statistics, as well as supplementing knowledge about number series and power series.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K6_U08] able to carry out simple engineering tasks related to the construction and operation of a selected element of the transport system, select the right methods and tools		The student has knowledge of probabilistic methods and has introductory knowledge of mathematical statistics and is able to use it in engineering tasks in transport.		[SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools [SU2] Assessment of ability to analyse information		
	[K6_W01] has knowledge of mathematical analysis, algebra, calculus of probability and operational research required for describing and solving transport problems		The student has knowledge of probability and mathematical analysis (including number series and power series) necessary to describe and solve transport problems.		[SW1] Assessment of factual knowledge		
Subject contents	Course content – lecture						
	Number series - sequence of partial sums, sum of a series, geometric series, Dirichlet series, criteria for convergence/divergence of series (comparative, d'Alembert, Cauchy, integral), alternating series and Leibniz criterion, absolute and conditional convergence of series, criteria for absolute convergence/divergence of series (d'Alembert, Cauchy). Power series - interval of convergence, radius of convergence, integration and differentiation of power series, Taylor and Maclaurin series. Probabilistics - random event, probabilizable event, class of Borel sets, probability, probability space, random variable and its cumulative distribution function, types of random variables (discrete, continuous), multivariate random variables, marginal distributions, joint density function, independent random variables, parameters of random variables, basic distributions of random variables (two-point, Bernoulli, Poisson, uniform, exponential, normal, Gaussian, Weibull), Chebyshev's inequality, Moivre-Laplace theorem. Introduction to mathematical statistics, basic statistics and their values calculated from sample.						
	Course content – exercises						
Prerequisites and co-requisites	Using the information presented in the lecture. Moreover, confidence interval, confidence level, creating confidence intervals using the normal distribution.						
	Probability (high school level), mathematical analysis, algebra.						

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Conjunction of conditions: pass the colloquium covering the scope of topics from lectures and tutorials, and get a positive grade of the current work on the tutorials.	55.0%	100.0%
Recommended reading	Basic literature	Milewska A., Metody probabilistyczne i statystyka matematyczna w inżynierii lądowej i transportowej, Wyd. PG 2025 Żakowski W., Kołodziej W., Matematyka, cz. II, WNT (several editions) Krysicki W., Bartos J., Dyczka W., Królikowska K., Wasilewski M., Rachunek prawdopodobieństwa i statystyka matematyczna w zadaniach, część I, PWN (several editions)	
	Supplementary literature	Krysicki W., Włodarski L., Analiza matematyczna w zadaniach, cz. I, II, PWN (several editions)	
	eResources addresses		
Example issues/ example questions/ tasks being completed	Write the definition of the distribution function of a random variable and its properties. Calculate the variance of an exponential random variable.		
Practical activities within the subject	Not applicable		

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