GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Basics of Probability Methods, PG_00058914		
Field of study	Informatics		
Date of commencement of studies	October 2022	Academic year of realisation of subject	2023/2024
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	Part-time studies	Mode of delivery	at the university
Year of study	2	Language of instruction	Polish
Semester of study	4	ECTS credits	4.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Teleinformation Networks -> Faculty of Electronics, Telecommunications and Informatics		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Marcin Narloch	
	Teachers	dr inż. Marcin Narloch	

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	10.0	60.0	100

Subject objectives

Knowledge of basic methods of one-and multidimensional random variable analysis.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_W01] Knows and understands, to an advanced extent, mathematics necessary to formulate and solve simple issues related to the field of study	The student describes the basic types of random processes and knows methods for calculating the basic parameters characterizing discrete and continuous random variables.	[SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects
[K6_U01] can apply mathematical knowledge to formulate and solve complex and non-typical problems related to the field of study and perform tasks, in an innovative way, in not entirely predictable conditions, by:n- appropriate selection of sources and information obtained from them, assessment, critical analysis and synthesis of this information,n- selection and application of appropriate methods and toolsn	Calculates parameters and characteristics of one-and multidimensional random variables.	[SU1] Assessment of task fulfilment [SU4] Assessment of ability to use methods and tools
[K6_U43] can analyse date and formulate, apply and assess appropriate formal models and algorithms for solving problems in the field of information systems and applications	Student identifies, classifies and describes the basic types of random processes, analyzes their properties, calculates parameters and characteristics of random processes.	[SU2] Assessment of ability to analyse information [SU4] Assessment of ability to use methods and tools

Subject contents	1. Definition of random event, algebra of events. 2. Combinatorics. Definitions of the probability. 3. Conditional probabilities, independent events. 4. Law of total probability, Bayes theorem. 5. Definitions of continuous and discrete random variables, definition and properties of cumulative distribution function. 6. Definition and properties of probability density function. 7. Multidimensional random variables (MRV): distribution function, marginal distributions. 8. Conditional distributions . 9.Mean value and variance of RV: definition, properties. Higher order statistical moments of RV. 10. Moments of multidimensional RV, mixed moments, correlation coefficient, covariance coefficient, covariance matrix. 11. Examples of areas implementation of discrete RV distributions; two-point, binomial , Poisson, geometric. 12. Examples of areas implementation of continuous RV distributions: exponential, Rayleigh, Gauss. Gauss distribution of multidimensional RV. 13. Functions of RV and their probability distribution. 14. Definitions of limits of RV sequences, first and second Tchebyschev inequalities, Markov large number theorem, limit theorem. 15. Entropy of discrete RV.
Prerequisites and co-requisites	No requirements
Assessment methods and criteria	

Subject passing criteria	Passing threshold	Percentage of the final grade
Midterm colloquium	50.0%	90.0%
activity	0.0%	10.0%

Recommended reading	Basic literature	Sobczak W., Konorski J., Kozłowska J.: Probabilistyka stosowana, wyd. PG, 2004r.
	Supplementary literature	A. Papoulis.: Probability, Random Variables and Stochastic Process, McGraw-Hill, 1991
	eResources addresses	Adresy na platformie eNauczanie:
Example issues/ example questions/ tasks being completed	Example problem: Random variable probability density function is given by the formula p(x)=Cexp(-2x) for x>0. Calculate the constant C, cumulative dystributon function, the mean value and variance of random variable X. Example question: Write and prof Tchebyschev inequalities.	
Work placement	Not applicable	