



## Subject card

Subject name and code	Application of Mathematics in Technology, PG_00049767						
Field of study	Power Engineering, Power Engineering						
Date of commencement of studies	October 2023	Academic year of realisation of subject			2024/2025		
Education level	first-cycle studies	Subject group			Obligatory subject group in the field of study		
Mode of study	Full-time studies	Mode of delivery			at the university		
Year of study	2	Language of instruction			English		
Semester of study	3	ECTS credits			3.0		
Learning profile	general academic profile	Assessment form			assessment		
Conducting unit	Faculty of Ocean Engineering and Ship Technology						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Klaudia Wrzask				
	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		41.0	75
Subject objectives	ability of mathematical methods application in engineering						
Learning outcomes	Course outcome		Subject outcome			Method of verification	
	[K6_W01] has basic knowledge of mathematics necessary to describe the phenomena related to the processes of energy conversion and transfer; uses information technology to solve mathematical problems		explains and applies signal approximation, defines and formulates Fourier's series, is able to solve vectorial differential equations, defines and applies Lapunov's stability analysis methods, explains notions of random process theory, explains fundamentals of artificial networks application, explains fundamentals of fuzzy sets theory, explains genetic algorithms application			[SW1] Assessment of factual knowledge	
	[K6_U02] is able to apply the learned mathematical methods to the analysis and design of elements, systems and energy systems		adapts known methods in solving technical problems			[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	
Subject contents	signal modelling, Fourier series, Fourier transformation, Fourier analysis, principal notions and application of state space theory, solution of vectorial differential equations, principal notions and application of stochastic processes theory, fuzzy sets theory and its application, fundamentals of artificial neural networks, genetic algorithms						
Prerequisites and co-requisites	knowledge of mathematics fundamentals						
Assessment methods and criteria	Subject passing criteria		Passing threshold		Percentage of the final grade		
	lecture		68.0%		50.0%		
	exercises		60.0%		50.0%		
Recommended reading	Basic literature		[1] Cooper G.R., Mc Gillem C.D.: Probabilistic Methods of Signal and Systems Analysis. New York-Oxford University Press, 1999, [2] Jordan D.W., Smith P.: Mathematical Techniques. Oxford University Press, 1998, [3] Lathi B.P.: Signal Processing and Linear Systems. Berkeley Cambridge Press, 1998,				

	Supplementary literature	[1] Fausett L.: Fundamentals of Neural Networks. Prentice Hall, 1994, [2] Hassoun M. H.: Fundamentals of Artificial Neural Networks. MIT Press, 1995, [6] Cox E.: The Fuzzy Systems Handbook. Academic Press, London 1994
	eResources addresses	Adresy na platformie eNauczanie:
Example issues/ example questions/ tasks being completed	Purpose of signal modelling using Fourier series, reason of applying both trigonometrical and exponential Fourier series, state space role in mathematical modelling of engineering processes, impulse response role in particular solution of vectorial differential equations, random process analysis using statistical characteristics, fuzzy logic and fuzzy set notion, engineering process analysis using fuzzy set method, analysis of engineering process dynamics using artificial neural network method, genetic algorithm application in design and control optimisation	
Work placement	Not applicable	