Subject card

Subject name and code	Application of Mathematics in Technology, PG_00049767						
Field of study	Power Engineering, Power Engineering, Power Engineering, Power Engineering, Power Engineering						
Date of commencement of studies	October 2020		Academic year of realisation of subject		2021/2022		
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	Department of Control and Power Engineering -> Faculty of Ocean Engineering and Ship Technology						
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Klaudia Wrzask					
	Teachers	dr inż. Klaudia Wrzask					

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						
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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	aibility of mathematical methods application in engineering		

Learning outcomes	Course outcome	Subject outcome	Method of verification
	K6_W01	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	adapts known methods in solving technical problems	[SU2] Assessment of ability to analyse information [SU4] Assessment of ability to use methods and tools [SU3] Assessment of ability to use knowledge gained from the subject

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
	exercises	60.0%	50.0%
	lecture	68.0%	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
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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 artifitial neural network method, genetic algorithm application in design and control optimisation	
Work placement	Not applicable	