GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Application of Mathematics in Technology, PG_00049767		
Field of study	Power Engineering		
Date of commencement of studies	October 2024	Academic year of realisation of subject	2025/2026
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

aibility of mathematical methods application in engineering

Learning outcomes

Course outcome	Subject outcome	Method of verification
[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	[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
[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

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
	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 artifitial neural network method, genetic algorithm application in design and control optimisation	
Work placement	Not applicable	