GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Application of Mathematics in Technology 2, PG_00042057					
Field of study	Power Engineering, Power Engineering					
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	
Mode of study	Full-time studies		Mode of delivery		at the university	
Year of study	2		Language of instruction		English	
Semester of study	4		ECTS credits		3.0	
Learning profile	general academic profile		Assessment form		assessment	
Conducting unit	Katedra Elektrotechniki i Inżynierii Wysokich Napięć -> Faculty of Electrical and Control Engineering					
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. inż. Jacek Horiszny			
	Teachers		dr hab. inż. Jacek Horiszny			

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	5.0	40.0	75

Subject objectives	Introduction to numerical methods and their application in solving problems in electrical 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	Student uses numerical methods to: solve equations and systems of linear and non-linear equations describing electric circuits, interpolation and approximation of functions of one variable in order to develop measurement data, calculating definite integrals for solving problems in an electromagnetic field, solving differential equations describing a transient state in an electric circuit.	[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	Student is able to apply the known numerical methods with the use of modern computational tools	[SU4] Assessment of ability to use methods and tools

Subject contents	Numerical methods in electrical engineering: solving linear DC circuits - Gauss method, Gauss-Jordan method, Jacobi method; solving nonlinear DC circuits - secant method, Newton's method; approximation of measurement data - Lagrange's formula, Newton's formula, the least squares method; solving problems in electrodynamics - integration using the trapezoidal method, Simpson's method; solving electric circuits in a transient state - Adams-Bashforth methods of 1st and 2nd order

Prerequisites and co-requisites	Basic knowledge of electrical engineering and electronics.

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Tests during the semester	55.0%	67.0%
	Tasks solved in the class	55.0%	33.0%

Recommended reading	Basic literature	Fortuna Z., Macukow B., Wąsowski J.: Metody numeryczne
		Szatkowski A., Cichosz J.: Metody numeryczne
		Shoup T. E.: Applied numerical methods for the microcomputer
	Supplementary literature	
		T. Cholewicki: Elektrotechnika teoretyczna. Tom 1 i 2
		M. Krakowski: Elektrotechnika teoretyczna. Tom 1 i 2
	eResources addresses	Adresy na platformie eNauczanie: Application of Mathematics in Technology 2 [2023/24] - Moodle ID: 36897 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=36897
Example issues/ example questions/ tasks being completed	1. Solve the given linear DC circuit by Gaussian method	
	2. Solve the given non-linear DC circuit by the Newton method	
	3. Perform the approximation of the measurement data using the least squares method	
	4. Solve a given first-order differential equation using the Euler method.	
	5. Solve a given second-order differential equation using the Euler method.	
Work placement	Not applicable	