

## 。 GDAŃSK UNIVERSITY OF TECHNOLOGY

## Subject card

Subject name and code	Numerical methods, PG_00061666								
Field of study	Hydrogen Technologies and Electromobility								
Date of commencement of studies	October 2024		Academic year of realisation of subject			2024/2025			
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	Full-time studies		Mode of delivery			at the university			
Year of study	1		Language of instruction			Polish			
Semester of study	2		ECTS credits			3.0			
Learning profile	general academic profile		Assessment form			assessment			
Conducting unit	Katedra Elektrotechniki -> Faculty of Electrical and Control Engineering								
Name and surname	Subject supervisor		dr hab. inż. Mirosław Wołoszyn						
of lecturer (lecturers)	Teachers	dr hab. inż. Mirosław Wołoszyn							
			dr inż. Dmytro Kondratenko						
			dr inž. Wiktoria Stahl						
Lesson types and methods	Lesson type	Lecture	Tutorial	Laboratory	Projec	t	Seminar	SUM	
of instruction	Number of study hours	15.0	30.0	0.0	0.0		0.0	45	
	E-learning hours included: 0.0								
Learning activity and number of study hours	Learning activity Participation in classes include		didactic Participation in consultation hours		Self-study SUM				
	Number of study hours	45		4.0		26.0		75	
Subject objectives	The purpose of the course is for the student to master the numerical methods used in engineering calculations.								
Learning outcomes	Course outcome		Subject outcome			Method of verification			
	[K6_U02] can work individually and in a team, can communicate using various techniques in a professional environment, as well as document and analyze the results of their work, can estimate the time needed to perform the entrusted task		Student use computer tools for numerical calculationss			[SU4] Assessment of ability to use methods and tools			
	[K6_W05] has structured knowledge of measuring electrical and non-electrical quantities, documenting their results and calculating measurement uncertainty		Student uses numerical methods in engineering work			[SW1] Assessment of factual knowledge			
[K6_K01] is a continuous e improvement profession of knows the po education		the need for and self- ield of the trician and es of further	Student learns new algorithms used in numerical methods			[SK2] Assessment of progress of work			
Subject contents	Representation of a real number in a digital machine and its effect on the accuracy of calculations, numerical stability of the algorithm.Matrix algebra. Systems of linear equations: Gauss elimination method, Jordan method, LU decomposition, inverse matrix calculation, iterative methods. Nonlinear algebraic equations: finding zeros of functions of one variable, bysection method, secant method, Newton's method, systems of nonlinear equations - simple iteration method, Newton's method. Interpolation: Lagrange polynomials. Numerical calculation of the derivative of a function of one variable, backward, central and forward differential quotients. Approximation: mean squared. Numerical integration of functions of one variable: Newton-Cotes quadrature, Romberg method, Gauss-Legendre quadrature, singular integrals, integrals on an unbounded interval. Methods of solving initial problems for ordinary differential equations: Euler's method.								

Prerequisites and co-requisites						
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade			
	lecture assignments	60.0%	12.0%			
	tests and exercise work	60.0%	88.0%			
Recommended reading	Basic literature	C. Pozrikidis: Numerical Computation in Science and Engineering, Oxford University Press 1998.				
	Supplementary literature	James F. Epperson: An introduction to numerical methods and analysis. Wiley, 2013				
	eResources addresses	Adresy na platformie eNauczanie: METODY NUMERYCZNE [TWiE][2024/25] - Moodle ID: 43407 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=43407 METODY NUMERYCZNE [Ćwiczenia][WS][I][2024/25] - Moodle ID: 44251 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=44251 METODY NUMERYCZNE [Ćwiczenia][DK][I][2024/25] - Moodle ID: 44252 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=44252				
Example issues/ example questions/ tasks being completed	Solving a system of equations by the Gauss, LU, GS method. Interpolation of functions by the Lagrange method. Approximation of the function sin(x) using mean-square approximation. Calculation of an integral using Simpson's method. Solution of a non-linear equation using Newton's method. Solving a differential equation using Euler's method.					
Work placement	Not applicable					

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