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 2026	Academic year of realisation of subject	2026/2027
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	Department of Electrical Engineering -> Faculty of Electrical and Control Engineering -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Mirosław Wołoszyn	
	Teachers	dr inż. Maria Chomka dr hab. inż. Mirosław Wołoszyn	

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
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 didactic classes included in study plan	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_W01] has knowledge of mathematics – including linear algebra, mathematical analysis, numerical methods – necessary to describe physical and chemical phenomena, as well as the analysis of electrical circuits and automation and robotics systems	The student uses numerical methods in engineering work.	[SW1] Assessment of factual knowledge
[K6_K01] is aware of the need for continuous education and self-improvement and knows the possibilities of further education	The student uses computer tools for numerical calculations.	[SK2] Assessment of progress of work

Subject contents

Course content – lecture
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.
Course content – exercises
The student solves problems using numerical methods. They solve systems of linear equations, nonlinear equations, use interpolation and approximation, calculate integrals, and solve ordinary differential equations.

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		
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.		
Practical activites within the subject	Not applicable		

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