



Subject card

Subject name and code	Numerical Methods, PG_00038088						
Field of study	Automation, Robotics and Control Systems						
Date of commencement of studies	October 2026	Academic year of realisation of subject				2026/2027	
Education level	first-cycle studies	Subject group					
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	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						
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 basic knowledge in the field of mathematics including algebra, geometry, mathematical analysis, probabilistics, numerical methods - necessary to describe and analyze automation and robotics systems						
[K6_U05] can use analytical and simulation methods to solve tasks in the field of automation and robotics and use various techniques to carry out engineering tasks related to automation and robotics devices and systems							
Subject contents	<p>Course content – lecture Computer arithmetic and round-off error, floating-point representation. Numerical matrix algebra: systems of linear algebraic equations, Gauss elimination, Gauss - Jordan elimination, LU decomposition, computation of the inverse matrix, iterative methods. Nonlinear algebraic equations: one equation: bisection, regula-falsi method, secant method, Newtons method, system of equations: fixed-point iterations, Newtons method. Function interpolation: Lagrange polynomials. Numerical differentiation of a function of one variable, backward, centered, and forward differences. Approximation of functions: least-squares n polynomials. Numerical integration of one-dimensional integrals: Newton-Cotes rules, Romberg integration, Gauss-Legendre quadrature, singular integrands, integrals over infinite domains. Initial-value problems for ordinary differential equations: polynomial approximation, Euler method.</p> <p>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.</p>						
Prerequisites and co-requisites							
Assessment methods and criteria	Subject passing criteria		Passing threshold		Percentage of the final grade		
	tasks from lectures		60.0%		12.0%		
	tests and work on exercises		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	The solution of equations by Gauss, LU, GS. Lagrange interpolation function method. Approximation of the function $\sin(x)$ using the mean square approximation. Calculation of integrals by Simpson. The solution of nonlinear equations using Newton's method. The solution of differential equations using Euler's method.	
Practical activities within the subject	Not applicable	

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