

。 GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Numerical methods, PG_00064784								
Field of study	Mechatronics								
Date of commencement of studies	February 2026		Academic year of realisation of subject			2025/2026			
Education level	second-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	1		ECTS credits			2.0			
Learning profile	general academic profile		Assessment form			assessment			
Conducting unit	Division of Mechatronics -> Institute of Mechanics and Machine Design -> Faculty of Mechanical Engineering and Ship Technology -> Wydziały Politechniki Gdańskiej						al		
Name and surname	Subject supervisor	Subject supervisor dr hab. inż. Marek Galew							
of lecturer (lecturers)	Teachers	1							
Lesson types and methods	Lesson type	Lecture	Tutorial	Laboratory	Project	t	Seminar	SUM	
of instruction	Number of study hours	15.0	0.0	0.0	15.0		0.0	30	
	E-learning hours included: 0.0								
Learning activity and number of study hours	Learning activity	activity Participation ir classes includ plan		a didactic Participation in ed in study consultation hours		Self-study SUM			
	Number of study hours	30		4.0		16.0		50	
Subject objectives	Providing students with knowledge of selected numerical methods (i.e., computer methods for solving various computational problems), particularly for solving systems of linear, nonlinear, and differential equations, interpolation, approximation, and optimization.								
Learning outcomes	Course outcome		Subject outcome			Method of verification			
	[K7_U01] utilizes acquired analytical, simulation, and experimental methods, as well as mathematical models for analysis and evaluation of stationary and non-stationary mechatronic systems/processes with continuous and discrete operation		The student selects an appropriate numerical algorithm for solving the given task.			[SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools [SU1] Assessment of task fulfilment			
	[K7_W04] demonstrates knowledge encompassing selected issues in the field of detailed knowledge, particularly in the scope of methods, techniques, tools, and algorithms specific to Mechatronics		The student describes the operation of a selected numerical algorithm and points out its disadvantages, advantages, limitations, and scope of application.			[SW1] Assessment of factual knowledge			
	[K7_W02] demonstrates structured and theory supported knowledge encompassing key issues in the field of Mechatronics, enabling modeling and analysis of stationary and non-stationary mechatronic systems, devices, and processes with continuous and discrete operation		The student describes and explains the mathematical dependencies that form the basis of selected numerical algorithms.			[SW1] Assessment of factual knowledge			

Subject contents	ontents Numerical methods - basic terms						
	Stability and computational errors						
	Solving of linear and non-linear set of equations						
	Eigenvalues and eigenvectors	s and eigenvectors					
	Numerical integration and derivation						
	Ordinary differential equation solving (ODE)						
	Interpolation and aproximation						
	Optimization						
	Issues related to the practical implementation of algorithms (optional)						
Prerequisites and co-requisites	Basic programming skills, recommended: Matlab, C, C++, Java						
Assessment methods	Subject passing criteria	Passing threshold	Percentage of the final grade				
and criteria	Project	51.0%	25.0%				
	Written exam	51.0%	75.0%				
Recommended reading	Basic literature	Z. Fortuna, B. Macukow, J. Wąsows	ski: Metody numeryczne, WNT, 2017				
	R.L. Burden, J.D. Faires, A.M. Burden: Numerical Analysis wydanie						
		B. Pańczyk, E. Łukasik, J. Sikora, T. Guziak: Metody numeryczne w przykładach, Politechnika Lubelska 2012					
	Supplementary literature	W. H. Press, S. A. Teukolsky, W. T. Vetterling, B. P. Flannery, M. Metcalf, Numerical Recipes in C: The Art of Scientific Computing, Second Edition, Cambridge University Press					
	eResources addresses						
Example issues/	Describe selected numerical algorithm						
example questions/							
tasks being completed							
	Describe the impact of numerical representation of numbers on computational errors.						
	What are the advantages and disadvantages of different groups of methods for solving differential equations?						
	A list of examplary question will be provided to the students at leas 2 weeks before the exam.						
Work placement	Not applicable						

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