



Subject card

Subject name and code	Numerical methods, PG_00064784						
Field of study	Mechatronics						
Date of commencement of studies	February 2025	Academic year of realisation of subject			2024/2025		
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	Department of Mechanics and Mechatronics -> Faculty of Mechanical Engineering and Ship Technology						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. inż. Marek Galewski				
	Teachers						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	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	Participation in didactic classes included in study plan		Participation in 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_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		
	[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		

Subject contents	<p>Numerical methods - basic terms</p> <p>Stability and computational errors</p> <p>Solving of linear and non-linear set of equations</p> <p>Eigenvalues and eigenvectors</p> <p>Numerical integration and derivation</p> <p>Ordinary differential equation solving (ODE)</p> <p>Interpolation and approximation</p> <p>Optimization</p> <p>Issues related to the practical implementation of algorithms (optional)</p>											
Prerequisites and co-requisites	Basic programming skills, recommended: Matlab, C, C++, Java											
Assessment methods and criteria	<table border="1" data-bbox="448 860 1487 965"> <thead> <tr> <th data-bbox="448 860 794 898">Subject passing criteria</th> <th data-bbox="794 860 1141 898">Passing threshold</th> <th data-bbox="1141 860 1487 898">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="448 898 794 936">Written exam</td> <td data-bbox="794 898 1141 936">51.0%</td> <td data-bbox="1141 898 1487 936">75.0%</td> </tr> <tr> <td data-bbox="448 936 794 965">Project</td> <td data-bbox="794 936 1141 965">51.0%</td> <td data-bbox="1141 936 1487 965">25.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	Written exam	51.0%	75.0%	Project	51.0%	25.0%
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Example issues/ example questions/ tasks being completed	<p>Describe selected numerical algorithm</p> <p>Describe the impact of numerical representation of numbers on computational errors.</p> <p>What are the advantages and disadvantages of different groups of methods for solving differential equations?</p> <p>--</p> <p>A list of exemplary question will be provided to the students at leas 2 weeks before the exam.</p>											
Work placement	Not applicable											

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