



Subject card

Subject name and code	Numerical methods, PG_00057018						
Field of study	Mechatronics						
Date of commencement of studies	February 2024	Academic year of realisation of subject			2023/2024		
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	dr hab. inż. Marek Galewski dr inż. Michał Mazur					
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 knowledge about selected numerical methods (methods of solving various computational problems using computers) to students						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K7_U09] is able to evaluate feasibility of advanced methods and tools (including programistic and for computer aided design and manufacturing) for solving complex, practical engineering task, characteristic for mechatronics, and to choose and apply proper method and tools	Student can choose appropriate numerical algorithm to solve a given problem	[SU1] Assessment of task fulfilment [SU4] Assessment of ability to use methods and tools
	[K7_W05] has detailed, supported by the theory knowledge in terms of control theory, identification methods, concurrent and real time programing, signal and image processing and Artificial Intelligence	Student describes a selected numerical algorithm	[SW3] Assessment of knowledge contained in written work and projects
	[K7_W01] has extended knowledge in terms of selected areas of mathematics, including discrete and applied mathematics, optimisation methods, mathematical and numerical methods essential for: 1) modelling and analysis of nonstationary mechatronics, continuous and discrete time systems as well as physical phenomena; 2) description and analysis of mechatronic systems that include programmable devices 3) description and analysis of signal processing algorithms 4) synthesis of non-stationary mechatronic systems	Student understands mathematical dependencies lying behind selected numerical algorithms	[SW1] Assessment of factual knowledge
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</p> <p>Interpolation and aproximation</p> <p>Optimization</p>		
Prerequisites and co-requisites	Basic programming skills, recommended: Matlab, C, C++, Java		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Project	51.0%	25.0%
	Written exam	51.0%	75.0%
Recommended reading	Basic literature	<p>Z. Fortuna, B. Macukow, J. Wąsowski: Metody numeryczne, WNT, 2017</p> <p>R.L. Burden, J.D. Faires, A.M. Burden: Numerical Analysis- dowolne wydanie</p> <p>B. Pańczyk, E. Łukasik, J. Sikora, T. Guziak: Metody numeryczne w przykładach, Politechnika Lubelska 2012</p>	

	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	Adresy na platformie eNauzanie: Metody Numeryczne, W/P, MTR, II st., sem. 01, letni 2023/24 (PG_00057018) - Moodle ID: 34736 https://enauzanie.pg.edu.pl/moodle/course/view.php?id=34736
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>--</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	