GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Numerical methods, PG_00057018		
Field of study	Mechatronics		
Date of commencement of studies	February 2023	Academic year of realisation of subject	2022/2023
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 inż. Michał Mazur dr hab. inż. Marek Galewski	

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_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
	[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_U09] is able to evaluate feasibility of advanced methods and tools (including programmistic and for computer aided design and manuacturing) for solving complex, practical engineering task, characteristic for mechatronics, and to choose and apply proper method and tools	Student can choose appropiate numerical algorith to solve a given problem	[SU4] Assessment of ability to use methods and tools [SU1] Assessment of task fulfilment

Subject contents

Numerical methods - basic terms

Stability and computational errors

Solving of linear and non-linear set of equations

Eigenvalues and eigenvectors

Numerical integration and derivation

Ordinary differential equation solving

Interpolation and aproximation

Optimization

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
Written exam	51.0%	75.0%
Project	51.0%	25.0%

Recommended reading

Basic literature

Z. Fortuna, B. Macukow, J. Wąsowski: Metody numeryczne, WNT, 2017

R.L. Burden, J.D. Faires, A.M. Burden: Numerical Analysis- dowolne 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	Adresy na platformie eNauczanie: Metody Numeryczne, WP, MTR, II st., sem. 01, letni 2022/23 (PG_00057018) - Moodle ID: 26511 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=26511
Example issues/ example questions/ tasks being completed	Describe selected numerical algorithm Describe the impact of numerical representation of numbers on computational errors. -- A list of examplary question will be provided to the students at leas 2 weeks before the exam.	
Work placement	Not applicable	