

表 GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Introduction to numerical methods, PG_00037298									
Field of study	Technical Physics									
Date of commencement of studies	October 2022		Academic year of realisation of subject			2023/2024				
Education level	first-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	2		Language of instruction			Polish				
Semester of study	4		ECTS credits			4.0				
Learning profile	general academic profile		Assessmer	nent form			assessment			
Conducting unit	Department of Theoretical Physics and Quantum Information -> Faculty of Applied Physics and Mathematics									
Name and surname of lecturer (lecturers)	Subject supervisor		prof. dr hab. Józef Sienkiewicz							
	Teachers		prof. dr hab. Julien Guthmuller							
			prof. dr hab. 、	. dr hab. Józef Sienkiewicz						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project		Seminar	SUM		
	Number of study hours	30.0	0.0	30.0	0.0		0.0	60		
	E-learning hours inclu	uded: 0.0								
Learning activity and number of study hours	Learning activity	Participation in classes includ plan		Participation in consultation hours		Self-study SUM		SUM		
	Number of study hours	60		4.0		36.0		100		
Subject objectives	To teach students how to use basic numerical methods.									
Learning outcomes	Course outcome		Subject outcome			Method of verification				
	K6_W05		Possesses the basic knowledge how to make usage of chosen specific to computer science in physics and technology.			[SW1] Assessment of factual knowledge				
	K6_U03		Possesses skills of writing applications with needed numerical method using the chosen programming language and adequate bundled software.			[SU1] Assessment of task fulfilment				
	K6_W03		Possesses the orderly knowledge of the basic numerical methods which enables to model physical chosen phenomena and some technical processes.			[SW1] Assessment of factual knowledge				

2. (2, h.) Methods of finding the roots of functions amoung other subjects: the bisection method, the Newton-Raptison method and hybrid methods. 3. (2, h.) Interpolation methods, amoung other subjects: the Lagrange interpolation and the Hermite interpolation. 4. (2, h.) Interpolation-continued, functions 5. (2, h.) Methods of solving systems of linear equations includes: the method of Gaussian elimination also in solving fridagonal systems, the Cost method. 6. (2, h.) Approximation of draivalves include: difference formulas of the first and second order of derivatives, the Richardson extrapolation. 7. (2, h.) The least squares method. 9. (2, h.) Numerical integration including primitive and composite integration formulas. The Romberg integration. 10. (2, h.) Numerical integration including primitive and composite integration formulas. The Romberg integration. 11. (2, h.) Examples of integration including proper integrals, multidimensional numerical integration, the Monte-Carlo method. 12. (2, h.) The Discrete Fourier Transform (DFT) and The Fast Fourier Transform (FFT) 14. (2, h.) Solving the ordinary differential equations (part 1): the Euler, Runge-Kutta and Runge-Kutta-Fehiberg methods. 15. A final test. Prerequisites and oriteria 16. A final test. Practical exercise 17. (2, h.) The Discrete Fourier Transform (DFT) and The Fast Fourier Transform (FFT) 14. (2, h.) Solving the ordinary differential equations	Subject contents	1. (2 h.) Brief guide to good programming habits. Testing and debugging. Elentary computer graphics. Drawing curves given by formulas. Fractals. Fractional dimension. Examples include the snowflake (the von							
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