



Subject card

Subject name and code	Numerical Methods, PG_00053193						
Field of study	Electrical Engineering						
Date of commencement of studies	October 2020		Academic year of realisation of subject		2020/2021		
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	Part-time studies		Mode of delivery		e-learning		
Year of study	1		Language of instruction		Polish		
Semester of study	2		ECTS credits		3.0		
Learning profile	general academic profile		Assessment form		assessment		
Conducting unit	Faculty of Electrical and Control Engineering						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. inż. Mirosław Wołoszyn				
	Teachers		dr hab. inż. Mirosław Wołoszyn				
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	10.0	0.0	10.0	0.0	0.0	20
	E-learning hours included: 20.0						
	Adresy na platformie eNauczanie:						
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	20		5.0		50.0	75
Subject objectives	Learning the basic numerical methods in the practice of engineering calculations. Getting acquainted with libraries of numerical methods.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	K6_U05		can write a computer program using numerical methods and analyze the results of calculations		[SU4] Assessment of ability to use methods and tools		
	K6_W01		knows the numerical methods necessary in the work of an engineer		[SW3] Assessment of knowledge contained in written work and projects		
Subject contents	Representation of a real number in a digital machine and its influence on the accuracy of calculations, numerical stability of an algorithm. Matrix algebra. Systems of linear equations: Gaussian elimination method, Jordan method, LU decomposition, inverse matrix, iterative methods. Nonlinear algebraic equations: finding zeros of functions of one variable, bisection method, secant method, Newton's method, systems of nonlinear equations - simple iteration method, Newton's method. Interpolation: Lagrange polynomials, Numerical computation of derivative of one variable function, backward, central and front difference quotient. Approximation: mean square. Numerical integration of functions of one variable: Newton-Cotes quadratures, Romberg's method, Gauss-Legendre quadratures, singular integrals, integrals in an unlimited interval. Euler's method.						
Prerequisites and co-requisites							
Assessment methods and criteria	Subject passing criteria		Passing threshold		Percentage of the final grade		
	lecture assignments		60.0%		12.0%		
	tests and work on the laboratory		60.0%		88.0%		

Recommended reading	Basic literature	<p>Z. Fortuna, B. Macukow, J. Wąsowski: Metody numeryczne, WNT Warszawa 1982</p> <p>J. i M. Jankowscy: Przegląd metod i algorytmów numerycznych. cz. 1, WNT Warszawa 1981.</p> <p>M. Dryja, J. i M. Jankowscy: Przegląd metod i algorytmów numerycznych. cz. 2, WNT Warszawa 1982.</p> <p>A. Krupowicz: Metody numeryczne zagadnień początkowych równań różniczkowych zwyczajnych. PWN Warszawa 1986.</p> <p>C. Pozrikidis: Numerical Computation in Science and Engineering, Oxford University Press 1998.</p>
	Supplementary literature	Ramin S. Esfandiari: Numerical Methods for Engineers and Scientists Using MATLAB. CRC Press
	eResources addresses	
Example issues/ example questions/ tasks being completed	Solution of a system of equations using the Gauss, LU, GS method. Interpolation of functions by the Lagrange method. Approximation of the $\sin(x)$ function using mean square approximation. Calculation of the integral using the Simpson method. Solution of a nonlinear equation using the Newton's method. Solution of a differential equation using the Euler method.	
Work placement	Not applicable	