



## Subject card

Subject name and code	Applied Mathematics, PG_00049642						
Field of study	Space and Satellite Technologies, Space and Satellite Technologies						
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		
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		3.0		
Learning profile	general academic profile		Assessment form		exam		
Conducting unit	Mathematics Center -> Vice-Rector for Education						
Name and surname of lecturer (lecturers)	Subject supervisor		dr Magdalena Musielak				
	Teachers		dr Magdalena Musielak				
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	15.0	0.0	0.0	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		10.0		35.0	75
Subject objectives	Student uses methods of mathematical analysis, differential and integral equations, numerical methods and computational software to solve problems appearing in the area of space and satellite technologies.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	K7_U06		Student is able to use their mathematical knowledge in combination with computational software to solve problems from the area of space and satellite technologies.		[SU4] Assessment of ability to use methods and tools		
	[K7_K01] is aware of the constant necessity of improving and broadening their knowledge; can inspire and organise the teaching and learning process.		Student understands the need of lifelong learning. Student is able to inspire others and organize their learning process.		[SK5] Assessment of ability to solve problems that arise in practice		
	[K7_W01] has extended knowledge of selected areas of mathematics making it possible to solve computational problems and develop research results of technical tasks.		Student defines the holomorphic function, evaluates line integrals of complex functions, is able to solve and analyze ordinary differential equations with the use of computational software, evaluates and applies Laplace, Fourier and other transforms, knows the basic types of integral equations, understands the concept of linear and nonlinear transformation as well as inverse problems, is able to solve and analyze them with the use of computational software.		[SW1] Assessment of factual knowledge		

Subject contents	1) Complex analysis; complex functions of a real and complex variable; analytic functions; derivatives and line integrals of complex function  2) Ordinary differential equations: numerical methods of solution in Matlab  3) Transforms: Laplace, Z, Fourier, Hilbert; applications; evaluation with the use of Matlab  4) Intro to integral equations  5) Linear and nonlinear transformations of multidimensional space. Inverse problems: solving and analyzing with the use of Matlab  6) Probability and statistics in engineering applications		
Prerequisites and co-requisites	Knowledge of mathematical analysis and linear algebra on undergraduate level		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Short tests	0.0%	20.0%
	Homework assignments	0.0%	20.0%
	Final exam	50.0%	60.0%
Recommended reading	Basic literature	J.Długosz, <i>Funkcje zespolone</i> , GiS  Żakowski, W., Leksiński, W., <i>Podręczniki Akademickie - Matematyka. Część IV</i> , Wydawnictwo Naukowe PWN  Hochstadt, H., <i>Integral Equations</i> , A Wiley-Interscience Publications  M.Bednarczyk, A.Dąbrowicz-Tlałka, <i>Elementy rachunku prawdopodobieństwa w zadaniach; dla studentów uczelni technicznych</i> , Wyd.PG	
	Supplementary literature	M.Gewert, Z.Skoczylas, <i>Równania różniczkowe zwyczajne</i> , GiS  W.Sradomski, <i>Matlab. Praktyczny podręcznik modelowania</i> , Helion  Krasnow, M. L., Kisielew, A. I., Makarenko, G. I., <i>Zadania z równań całkowych</i> , Wydawnictwo Naukowe PWN	
	eResources addresses	Adresy na platformie eNauczanie:	
	Example issues/ example questions/ tasks being completed	<ul style="list-style-type: none"><li>Solve the given differential equation using Laplace transform</li><li>Use Z transform to solve the given difference equation</li><li>Evaluate the line integrals over complex functions</li><li>Analyze the frequency of the input signal when its Fourier transform is given.</li></ul>	
Work placement	Not applicable		