

Subject card

Subject name and code	Selected Applications of Differential Equations, PG_00172469						
Field of study	Mathematical Modeling and Data Analysis						
Date of commencement of studies	October 2024		Academic year of realisation of subject		2025/2026		
Education level	Bachelor's studies		Subject group		Optional subject group		
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		6.0		
Learning profile	academic		Assessment form		exam		
Conducting unit							
Name and surname of lecturer (lecturers)	Subject supervisor		dr Danuta Jaruszewska-Walczak				
	Teachers		dr Danuta Jaruszewska-Walczak				
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	30.0	0.0	0.0	0.0	60
	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	60		10.0		80.0	150
Subject objectives	The student learns the basics of the theory of differential equations and their applications.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[MMiADL3_U08] is able to plan a way to solve a given problem and make a correct record of this solution, providing accurate and precise justifications for the correctness of their reasoning		The student is able to prepare a solution to a specific differential problem along with a precise justification of the correctness of the reasoning.		[SU4] test/exam - oral or written		
	[MMiADL3_U07] can comprehensively, in speech and in writing, formulate definitions and theorems and present correct mathematical reasoning regarding the issues learned		The student is able to provide understanding of definitions and theorems as well as correct reasoning related to the issues learned in the theory of differential equations.		[SU1] oral statement/conversation/discussion [SU4] test/exam - oral or written		
	[MMiADL3_K02] is ready to precisely formulate questions to deepen his/her own understanding of a given topic or to find missing elements of reasoning		The student is ready to formulate questions aimed at deepening the understanding of a given topic.		[SK1] oral statement/conversation/discussion [SK8] observation of student's independent or team work		
	[MMiADL3_W08] knows and understands well the role and importance of proof in mathematics, as well as the concept of the significance of assumptions		The student knows and understands proofs of theorems and understands the role of constructing reasoning related to the topics learned for ordinary and partial differential equations and their applications.		[SW4] test/exam - oral or written		

Subject contents	Examples of problems leading to differential equations. Geometric interpretation. Linear differential equations, equations with separated variables.		
	Systems of first-order equations. Existence and uniqueness of the solution of the initial value problem.		
	Theory of linear systems, fundamental matrix. Systems with constant coefficients. Putzer's algorithm.		
	Higher-order linear equations, fundamental system of solutions. Equations with constant coefficients.		
	Differential methods for approximate solving of differential equations.		
	Examples of differential problems for partial equations. Characteristics of first-order partial equations. Classification of second-order linear partial equations and their properties.		
Prerequisites and co-requisites	Mathematical analysis, linear algebra.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	exam	51.0%	50.0%
	observation of student behavior	100.0%	0.0%
	test	51.0%	50.0%
Recommended reading	Basic literature	M. Braun, Differential Equations and Their Applications, Springer. Z. Kamont, Równania różniczkowe zwyczajne, Wydawnictwo UG. J. Muszyński, A. D. Myszkis, Równania różniczkowe zwyczajne, PWN. J. Ombach, Wykłady z równań różniczkowych, Wydawnictwo UJ. A. Pelczar, J. Szarski, Wstęp do teorii równań różniczkowych, PWN	
	Supplementary literature	Not required	
	eResources addresses		
Example issues/ example questions/ tasks being completed	Not required		
Work placement	Not applicable		

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