



Subject card

Subject name and code	Partial differential equations , PG_00025512						
Field of study	Mathematics						
Date of commencement of studies	October 2022		Academic year of realisation of subject		2024/2025		
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	3		Language of instruction		Polish		
Semester of study	6		ECTS credits		5.0		
Learning profile	general academic profile		Assessment form		assessment		
Conducting unit	Department of Differential Equations and Mathematical Applications -> Faculty of Applied Physics and Mathematics						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. Sergey Kryzhevich				
	Teachers		dr hab. Sergey Kryzhevich mgr inż. Urszula Goławska				
Lesson types and methods of instruction	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		5.0		60.0	125
Subject objectives	Acquiring basic knowledge of the theory of partial differential equations and their applications.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	K6_U09		Student uses ordinary equations to solve partial differential equations		[SU4] Assessment of ability to use methods and tools [SU3] Assessment of ability to use knowledge gained from the subject		
	K6_U06		Student knows how to use theorems and methods of calculus of functions of one and several variables		[SU4] Assessment of ability to use methods and tools		
	K6_W03		Student understands the construction of mathematical theories, mathematical formalism can be used to construct and analyze simple mathematical models in other sciences		[SW2] Assessment of knowledge contained in presentation		
	K6_U07		Student uses selected algorithms for solving differential equations.		[SU4] Assessment of ability to use methods and tools		
	K6_W01		The student has knowledge of the theory of partial differential equations.		[SW1] Assessment of factual knowledge		

Subject contents	LECTURE		
	1. Brief history of Partial Differential Equations. 2. First integrals' method of solving non-linear systems of ODEs. 3. Basic definitions and examples of problems that lead to PDEs. 4. PDEs of the first order. Method of characteristics. 5. Classification and canonical forms of second order equations in two independent variables. 6. Hyperbolic equations. Free and forced vibrations of an infinite string. The Fourier method for free vibrations of the finite string. The Sturm-Liouville boundary value problem. 7. Parabolic equations on the example of the thermal conductivity equation. Construction of solutions using the Fourier method of separation of variables. 8. Elliptic equations: harmonic functions and their properties; Laplace's equation. The Dirichlet boundary problem. 9. The Cauchy problem in the class of analytical functions		
	EXERCISES		
	During exercises (thematically correlated with the lecture), students solve calculation problems and selected theoretical issues.		
Prerequisites and co-requisites	The knowledge of Mathematical Analysis and Ordinary Differential Equations		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	tests	50.0%	100.0%
Recommended reading	Basic literature	1. L.C. Evans Równania różniczkowe cząstkowe, PWN 2002. 2. Z. Kamont Równania różniczkowe cząstkowe pierwszego rzędu, GTN 2003. 3. H. Marcinkowska Wstęp do teorii równań różniczkowych cząstkowych, PWN 1972. 4. P. Strzelecki Krótkie wprowadzenie do równań różniczkowych cząstkowych, Wydawnictwo Uniwersytetu Warszawskiego, 2006. 5. W. Żakowski, W. Leksiński Matematyka", tom IV, PWN 1984.	
	Supplementary literature	1. D. Bobrowski, J. Mikołajski, J. Morchało, Równania różniczkowe cząstkowe w zastosowaniach, Wydawnictwo Politechniki Poznańskiej, Poznań, 1995. 2. J. Niedoba, W. Niedoba Równania różniczkowe zwyczajne i cząstkowe, AGH Uczelniane Wydawnictwa Naukowo-Dydaktyczne, 2001. 3. M.M. Smirnow, Zadania z równań różniczkowych cząstkowych, PWN, Warszawa, 1970.	
	eResources addresses	Adresy na platformie eNauczanie:	
	Example issues/ example questions/ tasks being completed	The definition of a harmonic function Solve PDEs by separation of variables Formulate the initial problem for infinite string	
Work placement	Not applicable		

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