GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Partial differential equations , PG_00025512		
Field of study	Mathematics		
Date of commencement of studies	October 2026	Academic year of realisation of subject	2028/2029
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 -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr Agnieszka Bartłomiejczyk	
	Teachers		

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	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_W01	The student has knowledge of the theory of partial differential equations.	[SW1] Assessment of factual knowledge
K6_U09	Student uses ordinary equations to solve partial differential equations	[SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools
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

<table>
<tr><td>Subject contents</td><td>Course content – 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. Eliptic equations: harmonic functions and their properties; Laplace`s equation. The Dirichlet boundary problem.
9. The Cauchy problem in the class of analytical functions</td></tr>
<tr><td>Prerequisites and co-requisites</td><td>The knowledge of Mathematical Analysis and Ordinary Differential Equations</td></tr>
<tr><td>Assessment methods and criteria</td><td><table><tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr><tr><td>tests</td><td>50.0%</td><td>100.0%</td></tr></table></td></tr>
<tr><td>Recommended reading</td><td><table><tr><td>Basic literature</td><td>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.</td></tr><tr><td>Supplementary literature</td><td>1. D. Bobrowski, J. Mikołajski, J. Morchało, Równania różniczkowe cząstkowe w zastosowaniach, Wydawnictwo Politechniki Poznańskiej, Poznań, 1995.
2. J. Niedoba, W. Niedoba Równania rózniczkowe zwyczajne i cząstkowe, AGH Uczelniane Wydawnictwa Naukowo-Dydaktyczne, 2001.
3. M.M. Smirnow, Zadania z równań różniczkowych cząstkowych, PWN, Warszawa, 1970.</td></tr><tr><td>eResources addresses</td><td></td></tr></table></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td>The definition of a harmonic function
Solve PDEs by separation of variables
Formulate the initial problem for infinite string</td></tr>
<tr><td>Practical activites within the subject</td><td>Not applicable</td></tr>
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