

Subject card

Subject name and code	Differential equations, PG_00155417						
Field of study	Mathematics						
Date of commencement of studies	October 2025		Academic year of realisation of subject		2027/2028		
Education level	Bachelor's 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	3		Language of instruction		Polish		
Semester of study	5		ECTS credits		5.0		
Learning profile	academic		Assessment form		exam		
Conducting unit	Institute of Mathematics -> Faculty of Mathematics, Physics and Informatics -> Rector						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. Tomasz Człapiński				
	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	The student learns the basics of the theory of ordinary differential equations.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[MATL3_U03] is able to correctly use the acquired concepts of linear algebra and geometry, is able - at a simple and medium level of difficulty - to apply the known theorems and methods in these fields and is able to interpret the obtained results	The student is able to apply linear algebra methods to solve linear differential equations or systems, with constant coefficients.	[SU3] text preparation/written work
	[MATL3_W08] knows and understands the structure of mathematical theories, is able to use mathematical formalism to build and analyze simple mathematical models in other fields of science	The student knows the applications of differential equations in other fields of science.	[SW4] test/exam - oral or written
	[MATL3_U06] is able to correctly use the acquired concepts of differential equations, is able - at a simple and medium level of difficulty - to apply the known theorems and methods in this field and is able to interpret the obtained results	The student is able to use appropriate methods to determine solutions of selected types of differential equations.	[SU3] text preparation/written work
	[MATL3_W09] knows and understands the role and importance of proof in mathematics, as well as the concept of the importance of assumptions	The student knows the definitions of basic types of differential equations and proofs of theorems concerning the determination of their solutions or the study of their properties.	[SW4] test/exam - oral or written
	[MATL3_W06] knows and understands the basic concepts, methods and theorems of differential equations as well as basic examples illustrating specific concepts in this field and allowing to refute erroneous hypotheses or unauthorized reasoning	The student knows the definitions of basic types of differential equations and theorems concerning ways of solving them or determining the existence of their solutions.	[SW4] test/exam - oral or written
	[MATL3_K01] is ready to accept the limitations of his/her own knowledge and understands the need for further education	The student knows the limitations of his/her own knowledge and understands the need for further education.	[SK8] observation of student's independent or team work
	[MATL3_K06] is ready to formulate opinions on basic mathematical issues	The student is able to formulate opinions on basic mathematical issues.	[SK1] oral statement/conversation/discussion [SK8] observation of student's independent or team work
	[MATL3_W07] knows and understands selected concepts, methods and theorems of topology, as well as basic examples illustrating specific concepts in this field and enabling the refutation of erroneous hypotheses or unauthorized reasoning	The student knows how to use exemplary topology theorems in proving theorems concerning differential equations,	[SW4] test/exam - oral or written
	[MATL3_U07] is able to correctly use the acquired concepts of topology, is able - at a simple and medium level of difficulty - to apply the known theorems and methods of this field and is able to interpret the obtained results	The student is able to find solutions of selected types of differential equations.	[SU3] text preparation/written work
	[MATL3_U09] is able to plan how to solve a specific problem and prepare a correct record of this solution, providing strict and precise justification for the correctness of his reasoning	The student is able to correctly write down solutions of selected types of differential equations.	[SU3] text preparation/written work
	[MATL3_K09] is ready to critically evaluate arguments, find gaps in reasoning and constructively criticize other people's reasoning	The student is ready to critically evaluate arguments, find gaps in reasoning and constructively criticize the reasoning of others.	[SK1] oral statement/conversation/discussion
	[MATL3_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 precise questions that serve to deepen one's own understanding of a given topic or to find missing elements of reasoning.	[SK1] oral statement/conversation/discussion

	Course outcome	Subject outcome	Method of verification
	[MATL3_U02] is able to correctly use the known concepts of mathematical analysis, is able - at a simple and medium level of difficulty - to apply the known theorems and methods of this field and is able to interpret the obtained results	The student is able to calculate integrals appearing when solving selected types of differential equations.	[SU3] text preparation/written work
	[MATL3_K04] is ready to understand and appreciate the importance of intellectual honesty in one's own and other people's actions; is willing to act ethically	The student is ready to understand and appreciate the importance of intellectual honesty in their own and other people's actions; ethical conduct.	[SK8] observation of student's independent or team work
	[MATL3_U08] is able to formulate definitions and theorems in an understandable way, both orally and in writing, and present correct mathematical reasoning regarding the acquired issues	The student is able to prove selected theorems concerning solving selected differential equations or investigating their properties.	[SU4] test/exam - oral or written
Subject contents	1. Linear differential equations, equations with separable variables, other elementarily integrable equations. 2. Existence and uniqueness of the solution of the initial value problem. 3. Arzela-Ascoli theorem and Peano's theorem on the existence of solutions. 4. Theory of linear systems, systems with constant coefficients. 5. N-th order linear equations, equations with constant coefficients. 6. Boundary value problems for second-order linear equations. 7. Basic concepts and theorems on the stability of linear systems. 8. Euler's method for initial value problems.		
Prerequisites and co-requisites	Mathematical Analysis 1,2,3 Linear Algebra		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	exam	51.0%	50.0%
	observation of the student's attitude	51.0%	0.0%
	test	51.0%	45.0%
	activity	51.0%	5.0%
Recommended reading	Basic literature	1. J. Muszyński, A. D. Myszkis, Równania różniczkowe zwyczajne,PWN. 2. J. Ombach, Wykłady z równań różniczkowych, Wydawnictwo UJ. 3. Z. Kamont, Równania różniczkowe zwyczajne, Wydawnictwo UG. 4. A. Pelczar, J. Szarski, Wstęp do teorii równań różniczkowych, PWN	
	Supplementary literature	none	
	eResources addresses		
Example issues/ example questions/ tasks being completed	not included		
Work placement	Not applicable		

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