

Subject card

Subject name and code	Mathematical Analysis II, PG_00189371						
Field of study	Mathematical Modeling and Data Analysis						
Date of commencement of studies	October 2026		Academic year of realisation of subject		2026/2027		
Education level	Bachelor's 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	1		Language of instruction		Polish		
Semester of study	2		ECTS credits		11.0		
Learning profile	academic		Assessment form		exam		
Conducting unit							
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. Barbara Wolnik				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	60.0	60.0	0.0	0.0	0.0	120
	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	120		6.0		149.0	275
Subject objectives	The aim of the course is to familiarize students with the concepts, theorems and methods of integral calculus of functions of one variable and the theory of functional sequences and series.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[MMiADL3_W06] 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 theorems of mathematical analysis in terms of the material covered during the course.		[SW4] test/exam - oral or written		
	[MMiADL3_U02] is able to correctly use the concepts of mathematical analysis and differential equations, is able to apply the theorems and methods of these fields and is able to interpret the obtained results		The student correctly uses the concepts and the methods of mathematical analysis learned during the course, can use concepts from the curriculum to solve tasks, and draw correct conclusions from the obtained results in a mathematical context		[SU4] test/exam - oral or written		
	[MMiADL3_W02] knows and understands selected concepts, methods and theorems of mathematical analysis and differential equations as well as basic examples both illustrating specific concepts in this field and allowing to refute false hypotheses or invalid reasoning as well as basic examples both illustrating specific concepts from these fields and allowing to refute false hypotheses or invalid reasoning		The student understands the concepts, methods and theorems of mathematical analysis in terms of the material covered during the course, and is able to use examples and counterexamples to illustrate these concepts and verify the correctness of mathematical reasoning.		[SW4] test/exam - oral or written		

Subject contents	1. Indefinite integral (the concept of an antiderivative) and basic methods of its calculation. Definite integral of a continuous function. Construction of the Riemann integral and its basic properties. Improper integrals. Integral estimates, integral mean value theorems. Basic theorems of integral calculus. 2. Functional sequences and series. Pointwise convergence and uniform convergence of functional sequences and series. Cauchy's condition for uniform convergence. Theorem on the continuity of the limit (sum) of a uniformly convergent sequence (series). Weierstrass's criterion. Power series, their radius and interval of convergence. Definition of elementary functions using power series. Integration of functional sequences and series. Fourier series. Basic properties of Fourier series.		
Prerequisites and co-requisites	Passed Mathematical Analysis I course		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	exam	51.0%	50.0%
	tests	51.0%	50.0%
Recommended reading	Basic literature	K. Kuratowski "Rachunek różniczkowy i całkowy", PWN Warszawa 1973. K. Jankowska, T. Jankowski "Zbiór zadań z matematyki" Wydawnictwo Politechniki Gdańskiej 2003 K. Jankowska, T. Jankowski "Zadania z matematyki wyższej" Wydawnictwo Politechniki Gdańskiej 2011 J. Banaś, S. Wędrychowicz, Zbiór zadań z analizy matematycznej, Wydawnictwo Naukowo-Techniczne, Warszawa 2001.	
	Supplementary literature	W. Krywicki, L. Włodarski, Analiza matematyczna w zadaniach, część I i II, PWN Warszawa 1986. G.M. Fichtenholz, Rachunek różniczkowy i całkowy, tom I, II i III. PWN Warszawa 1978.	
	eResources addresses		
Example issues/ example questions/ tasks being completed	Discuss the formula for integration by substitution: formulate and prove the appropriate theorem and solve the given example. Give the definition of a proper rational function. Formulate the theorem on the decomposition of a proper rational function into simple fractions. Explain (using examples) the methods of calculating coefficients. Formulate the definition of a Riemann-integrable function on the interval [a,b]. Explain the concept using illustrative examples. Formulate the Cauchy-Maclaurin theorem (on the relationship between the convergence of an improper integral and the convergence of the appropriate series). Discuss its proof, indicating the significance of the individual assumptions. Give any of the necessary and sufficient conditions for uniform convergence of a functional sequence that you have learned. Discuss the issue using selected examples. Discuss the properties of power series that you have learned (concerning sum, uniform convergence, equality of two series, integration and differentiation term by term). Derive the formula called binomial series.		
Work placement	Not applicable		

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