

Subject card

Subject name and code	Mathematical Analysis II, PG_00188810						
Field of study	Analiza matematyczna II						
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		
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. inż. Jacek Gulowski				
	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		5.0		150.0	275
Subject objectives	The aim of the subject Mathematical Analysis II is to familiarize students with the concepts, theorems and methods of differential and integral calculus of functions of one variable.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[MATL3_U02] is able to correctly use the concepts of mathematical analysis and measure theory, is able to apply the theorems and methods of these fields and is able to interpret the obtained results		The student is able to apply the methods of solving tasks learned, correctly uses the concepts learned, is able to interpret the obtained results and solve practical tasks related to the mathematical analysis.		[SU3] opracowanie tekstowe/ praca pisemna		
	[MATL3_U08] can formulate definitions and theorems in an understandable manner, both orally and in writing, and present correct mathematical reasoning on the learned topics		The student is able to apply the methods of solving tasks learned, correctly uses the concepts learned, is able to interpret the obtained results and solve practical tasks related to the subject matter.		[SU3] opracowanie tekstowe/ praca pisemna		
	[MATL3_W02] knows and understands at an advanced level selected concepts, methods and theorems of mathematical analysis and measure theory, as well as basic examples both illustrating specific concepts in this field and allowing to refute false hypotheses or invalid reasoning		The student knows and understands examples illustrating the above-mentioned concepts of mathematical analysis.		[SW4] test/egzamin - ustny lub pisemny		
	[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 and understands the basic theorems and proofs of theorems concerning the above-mentioned concepts of mathematical analysis of functions of one variable defined on subsets of the real line		[SW4] test/egzamin - ustny lub pisemny		

Subject contents	1. Derivative of a function of one variable. Derivative, its geometric meaning. Derivatives of elementary functions. Derivative of a sum, product, quotient and superposition of functions, derivative of an inverse function. Rolle, Lagrange and Cauchy theorems. Higher order derivatives, functions of class C^n. Taylor's formula. Necessary and sufficient conditions for the existence of a local extremum. Applications of differential calculus to curve sketching (sketching graph of the function). De l'Hopital's rule. 2. Riemann integral of a function of one variable. Construction of the Riemann integral and its basic properties. Integrability of a continuous function. Integral estimates, integral mean value theorems. Indefinite integral (the concept of an antiderivative). Fundamental theorem of integral calculus. Integration by parts and by substitution. 3. 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. Weierstrass's theorem on the approximation of continuous functions by polynomials. 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. 4. Euclidean metric in R^d spaces, convergence of sequences in R^d. Continuity and differentiability of R^d-valued functions of one variable (vector functions). Tangent to a curve. Properties of norm and scalar product. Open and closed sets, compact sets in Euclidean spaces. Limits and continuity of vector-valued functions of several variables.		
Prerequisites and co-requisites	Convergence of number sequences and series. Continuity of real functions of one real variable. Pointwise and uniform convergence of function sequences and series.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	tests	51.0%	50.0%
	student's attitude evaluation	51.0%	0.0%
	final exam	51.0%	50.0%
Recommended reading	Basic literature	1. W. Rudin, <i>Podstawy analizy matematycznej</i>, Państwowe Wydawnictwo Naukowe, Warszawa 1982. 2. K. Kuratowski, <i>Rachunek różniczkowy i całkowy</i>, PWN Warszawa 1973. 3. A. Birkholc: <i>Analiza matematyczna. Funkcje wielu zmiennych</i>. PWN W-wa, 1995. 4. J. Banaś, S. Wędrychowicz, <i>Zbiór zadań z analizy matematycznej</i>, Wydawnictwo Naukowo-Techniczne, Warszawa 2001. 5. W. Kaczor, M. Nowak, <i>Zadania z analizy matematycznej</i>, t2, PWN 2012. 6. W. Kaczor, M. Nowak, <i>Zadania z analizy matematycznej</i>, t3, PWN 2012.	
	Supplementary literature	- G.M. Fichtenholz, <i>Rachunek różniczkowy i całkowy</i>, tom I, II i III. Państwowe Wydawnictwo Naukowe, Warszawa 1978. W. Kryszicki, L. Włodarski, <i>Analiza matematyczna w zadaniach</i>, część I i II, Państwowe Wydawnictwo Naukowe, Warszawa 1986. - Ryszard Rudnicki, <i>Wykłady z analizy matematycznej</i>, PWN, Warszawa 2012	
	eResources addresses		
Example issues/ example questions/ tasks being completed	N/A		
Work placement	Not applicable		

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