

Subject card

Subject name and code	Analytic functions I, PG_00155365						
Field of study	Funkcje analityczne I						
Date of commencement of studies	October 2025		Academic year of realisation of subject		2025/2026		
Education level	Master's studies		Subject group		Optional subject group Specialty subject group		
Mode of study	full-time studies		Mode of delivery		at the university		
Year of study	1		Language of instruction		Polish		
Semester of study	1		ECTS credits		6.0		
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 Szymon Myga				
	Teachers		dr Szymon Myga dr Adrian Karpowicz				
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		10.0		80.0	150
Subject objectives	Introduction of basic concepts regarding the complex plane and the analysis of complex functions of one variable. Proving the most important theorems regarding analytical functions. Applications.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[MATMU2_K06] is ready to formulate opinions on basic mathematical issues	The student is ready to formulate opinions on basic mathematical issues from the program content.	[SK5] realizacja zadania problemowego
	[MATMU2_U07] is able to define his/her interests and develop them; in particular, is able to establish contact with specialists in his/her field, e.g. understand their lectures intended for young mathematicians	The student is able to independently solve problems and tasks based on the theory presented during the lecture.	[SU4] test/egzamin - ustny lub pisemny [SU5] realizacja zadania problemowego
	[MATMU2_K01] is willing to acknowledge the limitations of his or her own knowledge and is willing to pursue further education	The student is ready to recognize the limitations of his/her knowledge of program content and take action to further deepen it.	[SK8] obserwacja samodzielnej lub zespołowej pracy studenta
	[MATMU2_W03] knows and understands in-depth a selected field of theoretical or applied mathematics and is able to understand the formulations of issues in this field that are still at the research stage and knows the connections of issues in this field with other areas of mathematics	The student knows and understands basic definitions, theorems and the scope of program content.	[SW4] test/egzamin - ustny lub pisemny [SW5] realizacja zadania problemowego
	[MATMU2_U01] can construct mathematical reasoning: prove theorems and refute hypotheses through construction and selection of counterexamples	The student is able to prove the most important theorems regarding the theory of analytic functions; knows examples showing the importance of the assumptions contained in these statements.	[SU4] test/egzamin - ustny lub pisemny
	[MATMU2_U06] is able to apply methods and examples from a selected field of mathematics in related fields	Using the theory learned during the lecture, the student is able to examine the properties of analytical functions and series, integrals and points associated with these functions.	[SU5] realizacja zadania problemowego
	[MATMU2_K02] is ready to precisely formulate questions to deepen his/her understanding of a given topic or find missing elements of reasoning	The student is ready to precisely formulate questions to deepen his or her understanding of a given topic or find missing elements of reasoning.	[SK8] obserwacja samodzielnej lub zespołowej pracy studenta
	[MATMU2_U04] is able, at an advanced level and including modern mathematics, to apply and present, orally and in writing, methods of at least one selected branch of mathematics	The student is able to independently solve problems and tasks based on the theory presented during the lecture.	[SU4] test/egzamin - ustny lub pisemny [SU5] realizacja zadania problemowego
	[MATMU2_K05] is ready to independently search for information in literature, also in foreign languages	The student is ready to independently search for information in the literature, also in foreign languages.	[SK8] obserwacja samodzielnej lub zespołowej pracy studenta
	[MATMU2_K04] is ready to understand and appreciate the importance of intellectual honesty in one's own and other people's actions; ethical conduct	The student is ready to understand and appreciate the importance of intellectual honesty in his own and other people's actions; ethical conduct.	[SK4] test/egzamin - ustny lub pisemny [SK8] obserwacja samodzielnej lub zespołowej pracy studenta
	[MATMU2_W01] knows and understands in-depth the theory of selected areas of mathematics	The student knows definitions and theorems within the scope of the program content.	[SW4] test/egzamin - ustny lub pisemny [SW5] realizacja zadania problemowego
	[MATMU2_W02] knows and understands well the role and importance of the construction of mathematical reasoning	The student understands the importance of the assumptions of the formulated statements.	[SW4] test/egzamin - ustny lub pisemny
	[MATMU2_U05] can perform proofs in a selected field and, if necessary, also use tools from other areas of mathematics	The student is able to prove the most important theorems regarding the theory of analytic functions; knows examples showing the importance of the assumptions contained in these statements.	[SU4] test/egzamin - ustny lub pisemny
	[MATMU2_U03] can understand mathematical texts of various types from selected fields of mathematics	Using the theory learned during the lecture, the student is able to examine the properties of analytical functions and series, integrals and points associated with these functions.	[SU5] realizacja zadania problemowego [SU8] obserwacja samodzielnej lub zespołowej pracy studenta

Subject contents	• Reminder of the basic algebraic and topological properties of the set of complex numbers. • Power series and their convergence. • Complex functions of a real variable, exponential functions, trigonometric functions, Euler's formula. • Complex logarithm and power of a complex number. • Differentiable functions, derivatives and their basic properties. • Holomorphic function. Cauchy-Riemann equations, sufficient and necessary conditions for differentiability. • Linear integral of a complex function, basic properties. • Cauchy's theorem and theorem about the existence of a primary function. • Cauchy's integral formula. • Holomorphic function as a power series, Morera's theorem. • Zeros of the holomorphic function. • The principle of maximum. • Liouville's theorem. Laurent series, expansion of the holomorphic function into the Laurent series. • Isolated singular points. • Residuum of functions, residual theorem and its application to computing improper integrals of real functions. • Function sequences of holomorphic functions.		
Prerequisites and co-requisites	none		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Observation of the student's attitude	51.0%	0.0%
	Testes	51.0%	45.0%
	Exam	51.0%	55.0%
Recommended reading	Basic literature	1. F. Leja, Teoria funkcji analitycznych, PWN 2. J. Długosz, Funkcje zespolone. Teoria, przykłady, zadania	
	Supplementary literature	• W. Rudin, Analiza rzeczywista i zespolona • J. Krzyż, Zbiór zadań z funkcji analitycznych • J. Chądzyński, Wstęp do analizy zespolonej w zadaniach	
	eResources addresses		
Example issues/ example questions/ tasks being completed	none		
Work placement	Not applicable		

Document generated electronically. Does not require a seal or signature.