

Subject card

Subject name and code	Introduction to Mathematics, PG_00189369						
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	1		ECTS credits		4.0		
Learning profile	academic		Assessment form		credit		
Conducting unit	Division of Set Theory -> Institute of Mathematics -> Faculty of Mathematics, Physics and Informatics -> Rector						
Name and surname of lecturer (lecturers)	Subject supervisor		dr Iwona Krzyżanowska				
	Teachers		dr Iwona Krzyżanowska				
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	0.0	60.0	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		3.0		37.0	100
Subject objectives	The aim is to teach the use of propositional and quantification calculus in reasoning, in particular in proving theorems, performing operations on sets and functions; interpreting issues known from other areas of mathematics in the language of set theory, understanding issues related to different types of infinity and orders in sets. These skills are needed to study most areas of mathematics. Additionally, the course aims to develop students' skills in abstract understanding of problems and general mathematical culture.To familiarize students with the basic concepts and tools of elementary mathematics.						

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	understands the significance of mathematical proof in theory building and can identify which assumptions are crucial for the correctness of theorems that are the subject of the course	[SW4] test/exam - oral or written
	[MMiADL3_U05] is able to plan a way to solve a complex problem and prepare a correct record of this solution, providing strict and precise justification for the correctness of his/her reasoning	is able to plan and carry out the solution of a mathematical problem in the field of program content, in the context of new, previously undiscussed examples, documenting each stage of reasoning clearly and logically	[SU4] test/exam - oral or written
	[MMiADL3_W01] knows and understands elected concepts, methods and theorems of mathematical logic, set theory and topology	knows the elements of logic and set theory, in particular the theorems and definitions that are the subject of the course, as well as examples illustrating these issues	[SW4] test/exam - oral or written
	[MMiADL3_U01] is able to correctly use the concepts of mathematical logic, set theory and topology	is able to apply the theorems and proof methods learned during the course, use the ideas and techniques appearing in examples given during the course, solve exercises, use examples illustrating the issues learned during the course and use them to identify false hypotheses and incorrect reasoning	[SU4] test/exam - oral or written
Subject contents	Properties of elementary functions (linear and quadratic functions, absolute value, polynomials, rational functions and their domain, power function (rational exponent), trigonometric and cyclometric functions, exponential and logarithmic functions). Determining properties of functions from their graphs. Solving equations and inequalities from the graph of a function. Elements of mathematical logic. Propositional calculus. Logically equivalent propositional forms and tautologies. Propositional functions of several variables and the laws of quantifier calculus. Methods of proving theorems. Set algebra. The laws of set calculus. Venn diagrams. Cartesian product of sets. Generalized unions and products of sets. Indexed families of sets. Functions. Properties of functions. Injections, surjections and bijections. Composition of functions. Inverse function. Images and preimages of sets with respect to a function. Equivalence relations. The principle of abstraction. Partially ordered sets. Distinguished elements, including maximal and minimal elements. Cardinalities of sets. Comparing cardinalities of sets. Equinumerous sets, countable sets, examples of uncountable sets, a power set. Cantor and Cantor-Bernstein theorems. Sets of cardinality continuum. Proof of the uncountability of the set of real numbers. Providing the subject-specific terminology in English.		
Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	observation of student's attitude	51.0%	0.0%
	written tests	51.0%	100.0%

Recommended reading	Basic literature	W. Guzicki, P. Zakrzewski, Wykłady ze wstępu do matematyki. Wprowadzenie do teorii mnogości, WN PWN, Warszawa 2005. W. Guzicki, P. Zakrzewski, Wstęp do matematyki. Zbiór zadań, WN PWN, Warszawa 2005. J. Topp, Wstęp do matematyki, Wydawnictwo Uniwersytetu Gdańskiego, 2015. W. Marek, J. Onyszkiewicz, Elementy logiki i teorii mnogości w zadaniach, WN PWN, Warszawa 2005. Hammack R., Book of Proof, Third edition, 2018 Bryński M., Dróbka N., Szymański K., Matematyka dla zerowego roku studiów, Wydawnictwo WNT, 2012; Leksiński W., Macukow B., Żakowski W., Matematyka dla maturzystów, Wydawnictwo WNT; Kowalczyk R., Niedziałomski K., Obczyński C., Matematyka dla studentów i kandydatów na wyższe uczelnie. Repetytorium, Warszawa, 2022.
	Supplementary literature	K. Kuratowski, Wstęp do teorii mnogości i topologii, WN PWN, Warszawa 2004. A. Wojciechowska, Elementy logiki i teorii mnogości, WN PWN, Warszawa 1979. Uryga J., Nowa matura. Matematyka. Rozwiązywanie zadań, Wydawnictwo Szkolne PWN, 2010; Karolak T., Repetytorium z matematyki, Skrypt, 2004; Kurlyandchik L., Matematyka elementarna w zadaniach Tom I i II, Aksjomat Toruń, 2005.
	eResources addresses	
Example issues/ example questions/ tasks being completed		
Work placement	Not applicable	

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