

Subject card

Subject name and code	Practical application of forcing, PG_00174488						
Field of study	Mathematics						
Date of commencement of studies	October 2024		Academic year of realisation of subject		2025/2026		
Education level	Master's studies		Subject group		Optional subject group		
Mode of study	full-time studies		Mode of delivery		at the university		
Year of study	2		Language of instruction		Polish		
Semester of study	3		ECTS credits		6.0		
Learning profile	academic		Assessment form		exam		
Conducting unit							
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. Rafał Filipów				
	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		10.0		80.0	150
Subject objectives	The aim of the course is to familiarize students with the applications of forcing theory.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[MATMU2_W02] knows and understands well the role and importance of the construction of mathematical reasoning	Verifies basic properties and proves simple facts about forcing theory.	[SW4] test/exam - oral or written
	[MATMU2_W01] knows and understands in-depth the theory of selected areas of mathematics	Verifies basic properties and proves simple facts about forcing theory.	[SW4] test/exam - oral or written
	[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 has in-depth theoretical knowledge of results and arguments in a chosen field of mathematics.	[SW4] test/exam - oral or written
	[MATMU2_U01] can construct mathematical reasoning: prove theorems and refute hypotheses through construction and selection of counterexamples	Verifies basic properties and proves simple facts about forcing theory.	[SU4] test/exam - oral or written
	[MATMU2_U03] can understand mathematical texts of various types from selected fields of mathematics	Understands mathematical texts of a various nature from selected areas of mathematics.	[SU8] observation of student's independent or team work
	[MATMU2_K01] is willing to acknowledge the limitations of his or her own knowledge and is willing to pursue further education	Is willing to acknowledge the limitations of his or her own knowledge and is willing to pursue further education.	[SK8] observation of student's independent or team work
	[MATMU2_K02] is ready to precisely formulate questions to deepen his/her understanding of a given topic or find missing elements of reasoning	Can formulate precise questions that serve to deepen one's understanding of a topic or identify missing elements of reasoning.	[SK8] observation of student's independent or team work
	[MATMU2_K05] is ready to independently search for information in literature, also in foreign languages	Independently searches for information in the literature.	[SK8] observation of student's independent or team work
	[MATMU2_K04] is ready to understand and appreciate the importance of intellectual honesty in one's own and other people's actions; ethical conduct	Understands and appreciates the importance of intellectual honesty in one's own actions and those of others; acts ethically.	[SK8] observation of student's independent or team work
	[MATMU2_U06] is able to apply methods and examples from a selected field of mathematics in related fields	Verifies basic properties and proves simple facts about forcing theory.	[SU4] test/exam - oral or written
	[MATMU2_U05] can perform proofs in a selected field and, if necessary, also use tools from other areas of mathematics	Verifies basic properties and proves simple facts about forcing theory.	[SU4] test/exam - oral or written
	[MATMU2_K06] is ready to formulate opinions on basic mathematical issues	Is able to formulate opinions on basic mathematical issues.	[SK8] observation of student's independent or team work
	[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	Verifies basic properties and proves simple facts about forcing theory.	[SU4] test/exam - oral or written
	[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	Is able to define his/her interests and develop them.	[SU8] observation of student's independent or team work
Subject contents	1. Axioms of ZFC Set Theory 2. Partially Ordered Sets 3. Fundamental Theorems of Forcing Theory 4. Examples of Forcings 5. Applications of Forcing Theory to Infinite Combinatorics		
Prerequisites and co-requisites			

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	observation of the student's attitude	51.0%	0.0%
	egzam	51.0%	50.0%
	tests	51.0%	50.0%
Recommended reading	Basic literature	1. T. Bartoszyński and H. Judah, Set theory. On the structure of the real line 2. A. Blass, Combinatorial Cardinal Characteristics of the Continuum	
	Supplementary literature	1. K. Kunen, Set Theory 2. T. Jech, Set Theory	
	eResources addresses		
Example issues/ example questions/ tasks being completed	1. Write a definition of a generic extension 2. Prove the independence of the continuum hypothesis 3. Write a definition of an unbounded number b and a dominant number d 4. Prove the consistency of the inequality b less than		
Work placement	Not applicable		

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