University of Gdańsk

Subject card

Subject name and code	Mathematical Logic, PG_00174482						
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 basic concepts of mathematical logic.						

Learning outcomes

Course outcome	Subject outcome	Method of verification
[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 mathematical logic.	[SU4] test/exam - oral or written
[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 own understanding of a given topic or to find missing elements of reasoning.	[SK8] observation of student's independent or team work
[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 mathematical logic.	[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_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_K05] is ready to independently search for information in literature, also in foreign languages	Independently searches for information in 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 and other people's actions; acts ethically.	[SK8] observation of student's independent or team work
[MATMU2_W02] knows and understands well the role and importance of the construction of mathematical reasoning	Verifies basic properties and proves simple facts about mathematical logic.	[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 mathematical logic.	[SW4] 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 mathematical logic.	[SU4] test/exam - oral or written
[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 mathematical logic.	[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
[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

Subject contents

1. Relational Systems
2. Boolean Algebras
3. Terms and Formulas
4. Theories and Models
5. Theorems and Proofs
6. Theorems of First-Order Logic
7. Completeness of First-Order Logic
8. Definability
9. Peano Arithmetic
10. Skolem-Lowenheim Theorem
11. Ultraproducts

<table>
<tr><td>Prerequisites and co-requisites</td><td></td></tr>
<tr><td>Assessment methods and criteria</td><td>
<table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>tests</td><td>51.0%</td><td>50.0%</td></tr>
<tr><td>observation of the student's attitude</td><td>51.0%</td><td>0.0%</td></tr>
<tr><td>egzam</td><td>51.0%</td><td>50.0%</td></tr>
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<tr><td>Recommended reading</td><td>
<table>
<tr><td>Basic literature</td><td>1. A. Adamowicz, P. Zbierski, Logic of Mathematics - A Modern Course of Classical Logic
2. W. Marek, J. Onyszkiewicz, Elements of logic and foundations of mathematics in problems</td></tr>
<tr><td>Supplementary literature</td><td>1. H.E. Enderton, A mathematical introduction to logic
2. Shoenfield, Mathematical logic</td></tr>
<tr><td>eResources addresses</td><td></td></tr>
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<tr><td>Example issues/ example questions/ tasks being completed</td><td>1. Write a definition of a term and a formula
2. Prove that every theorem has a proof
3. Write a definition of a model with a given signature
4. Prove that sentences that have a proof in a given theory are true in the model of that theory</td></tr>
<tr><td>Work placement</td><td>Not applicable</td></tr>
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