

Subject card

Subject name and code	Introduction to measure theory, PG_00155409						
Field of study	Mathematics						
Date of commencement of studies	October 2024		Academic year of realisation of subject		2025/2026		
Education level	Bachelor's studies		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	4		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 measure and integral theory.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[MATL3_U05] is able to correctly use the known concepts of probability and statistics, is able - at a simple and medium level of difficulty - to apply the known theorems and methods in these fields and is able to interpret the obtained results	Verifies basic properties and proves simple facts about measures and integrals and measurable mappings.	[SU4] test/exam - oral or written
	[MATL3_W08] knows and understands the structure of mathematical theories, is able to use mathematical formalism to build and analyze simple mathematical models in other fields of science	Knows and understands the basic concepts, theorems and methods of measure and integral theory.	[SW4] test/exam - oral or written
	[MATL3_K04] is ready to understand and appreciate the importance of intellectual honesty in one's own and other people's actions; is willing to act ethically	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
	[MATL3_U09] is able to plan how to solve a specific problem and prepare a correct record of this solution, providing strict and precise justification for the correctness of his reasoning	Verifies basic properties and proves simple facts about measures and integrals and measurable mappings.	[SU4] test/exam - oral or written
	[MATL3_W02] knows and understands the basic concepts, methods and theorems of mathematical analysis as well as basic examples illustrating specific concepts in this field and enabling the refutation erroneous hypotheses or unauthorized reasoning	Knows and understands the basic concepts, theorems and methods of measure and integral theory.	[SW4] test/exam - oral or written
	[MATL3_U08] is able to formulate definitions and theorems in an understandable way, both orally and in writing, and present correct mathematical reasoning regarding the acquired issues	Verifies basic properties and proves simple facts about measures and integrals and measurable mappings.	[SU4] test/exam - oral or written
	[MATL3_W09] knows and understands the role and importance of proof in mathematics, as well as the concept of the importance of assumptions	Knows and understands the basic concepts, theorems and methods of measure and integral theory.	[SW4] test/exam - oral or written
	[MATL3_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
	[MATL3_K01] is ready to accept the limitations of his/her own knowledge and understands the need for further education	Knows the limitations of his/her own knowledge and understands the need for further education.	[SK8] observation of student's independent or team work
	[MATL3_K09] is ready to critically evaluate arguments, find gaps in reasoning and constructively criticize other people's reasoning	Is able to critically evaluate arguments and find gaps in his/her own and other people's reasoning.	[SK8] observation of student's independent or team work
	[MATL3_W05] knows and understands the basic concepts, methods and theorems of probability and statistics, as well as basic examples illustrating specific concepts in these fields and enabling the refutation erroneous hypotheses or unauthorized reasoning	Knows and understands the basic concepts, theorems and methods of measure and integral theory.	[SW4] test/exam - oral or written
	[MATL3_U02] is able to correctly use the known concepts of mathematical analysis, is able - at a simple and medium level of difficulty - to apply the known theorems and methods of this field and is able to interpret the obtained results	Verifies basic properties and proves simple facts about measures and integrals and measurable mappings.	[SU4] test/exam - oral or written

	Course outcome	Subject outcome	Method of verification
	[MATL3_W09] knows and understands the role and importance of proof in mathematics, as well as the concept of the importance of assumptions	Knows and understands the basic concepts, theorems and methods of measure and integral theory.	[SW4] test/exam - oral or written
	[MATL3_K02] is ready to precisely formulate questions to deepen his/her own understanding of a given topic or to 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
Subject contents	1. Measure space 2. Measure generated by outer measure 3. Lebesgue measure 4. Measurable functions 5. Lebesgue integral		
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. D. Cohn Measure Theory	
	Supplementary literature	1. P. Halmos, Measure theory, Springer 1974	
	eResources addresses		
Example issues/ example questions/ tasks being completed	1. Write the definition of the σ -algebra of sets and the definition of a measure on a σ -algebra. 2. Prove that every measure is sigma-subadditive 3. Write the definitions of the Lebesgue integral of a non-negative direct function, a non-negative function, and any function. 4. Prove Lebesgue's theorem on the integration of a bounded sequence		
Work placement	Not applicable		

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