

Subject card

Subject name and code	Division and Chromatic Theorems in Combinatorics, PG_00177243						
Field of study	Mathematical Modeling and Data Analysis						
Date of commencement of studies	October 2024		Academic year of realisation of subject			2024/2025	
Education level	Master's studies		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	2		ECTS credits			5.0	
Learning profile	academic		Assessment form			credit	
Conducting unit							
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. Andrzej Nowik				
	Teachers		dr hab. Andrzej Nowik				
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	0.0	0.0	0.0	0.0	30.0	30
	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	30		5.0		90.0	125
Subject objectives	The aim is to equip students with the necessary skills to successfully write their master's thesis.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[MMiADMU2_U02] can express mathematical content in speech and in writing, in mathematical texts of various nature	The student is able to express mathematical content orally and in writing in mathematical texts.	[SU2] presentation/project/paper/report
	[MMiADMU2_U09] can prepare in-depth oral presentations in Polish and at least in one foreign language in a selected field of mathematics	The student is able to prepare a report and deliver a presentation on a given topic.	[SU2] presentation/project/paper/report
	[MMiADMU2_U07] is able to define his interests and develop them; in particular, is able to establish contact with specialists in their field, e.g. understand their lectures intended for young mathematicians	The student is able to identify their interests in mathematical discussions.	[SU1] oral statement/conversation/discussion
	[MMiADMU2_W07] knows and understands the basic legal and ethical conditions related to research and teaching	The student acquires knowledge about copyright and intellectual property.	[SW2] presentation/project/paper/report
	[MMiADMU2_K04] is ready to understand and appreciate the importance of intellectual honesty in the actions of himself and others; is ready to act ethically	The student understands and appreciates the importance of intellectual honesty.	[SK8] observation of student's independent or team work
	[MMiADMU2_K01] is ready to recognize the limitations of his own knowledge and is ready to continue his education	The student is aware of the limitations of their own knowledge and demonstrates readiness for further learning.	[SK8] observation of student's independent or team work
	[MMiADMU2_U08] is able to in-depth preparation of texts in Polish and at least one foreign language, in a selected field of mathematics	The student is able to prepare a report and deliver its presentation on a given topic.	[SU2] presentation/project/paper/report
	[MMiADMU2_U05] is able to make proofs and analyzes in a given field, in which, if necessary, he also uses tools from other areas of mathematics	The student is able to apply the methods of division theorems in reasoning and conducting proofs.	[SU2] presentation/project/paper/report
	[MMiADMU2_K06] is ready to form an opinion on basic mathematical issues	The student is able to formulate opinions on mathematical issues.	[SK1] oral statement/conversation/discussion
	[MMiADMU2_K05] is ready to independently search for information in literature, also in foreign languages	The student is able to independently search for information in professional literature.	[SK2] presentation/project/paper/report
	[MMiADMU2_U04] can, at an advanced level and including modern mathematics, apply and present in speech and in writing the methods of at least one selected branch of mathematics	The student is able to apply and present the methods of divisive theorems at an advanced level.	[SU2] presentation/project/paper/report
	[MMiADMU2_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 being researched and knows the links between the issues of this field and other branches of mathematics	The student has an advanced theoretical knowledge of results and reasoning in divisibility theorems.	[SW2] presentation/project/paper/report
	[MMiADMU2_U03] can understand mathematical texts from selected areas of mathematics	The student acquires the ability to understand mathematical texts involving advanced-level division theorems.	[SU2] presentation/project/paper/report
	[MMiADMU2_K02] is ready to precisely formulate questions to deepen his own understanding of a given topic or to find missing elements of reasoning	The student is able to formulate precise questions aimed at deepening the understanding of a given topic.	[SK1] oral statement/conversation/discussion
Subject contents	Ramsey's theorem, Van der Waerden's theorem, Schur's theorem, Folkman's theorem, Gallai's theorem, the HalesJewett theorem, Hindman's theorem, geometric partition theorems (such as the GrahamRothschild theorem). Theorems from graph theory such as extremal theorems (e.g., Turán's theorem), chromatic problems (e.g., Vizing's theorem , an overview of various graph coloring methods). Classical combinatorial games such as NIM-type games (in their various versions).		

Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Monitoring student progress	100.0%	0.0%
	referee	51.0%	100.0%
Recommended reading	Basic literature	R.L.Graham, B.L.Rothschild, J.H.Spencer, Ramsey Theory, Second edition, seria Wiley-Interscience Series In Discrete Mathematics and Optimization.	
	Supplementary literature	G.Chartrand, P. Zhang, Chromatig Graph Theory, series Discrete Mathematics and Its Applications.	
	eResources addresses		
Example issues/ example questions/ tasks being completed	N/A		
Work placement	Not applicable		

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