

Subject card

Subject name and code	Elementary connections between algebra, geometry and topology, PG_00170079						
Field of study	Mathematics						
Date of commencement of studies	October 2025		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	1		Language of instruction			Polish English, optionally	
Semester of study	2		ECTS credits			5.0	
Learning profile	academic		Assessment form			credit	
Conducting unit	Institute of Mathematics -> Faculty of Mathematics, Physics and Informatics -> Rector						
Name and surname of lecturer (lecturers)	Subject supervisor		dr Rafał Lutowski				
	Teachers						
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 goal is preparing students to write master thesis.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[MATMU2_K01] is willing to acknowledge the limitations of his or her own knowledge and is willing to pursue further education	The student knows the limitations of his own knowledge and shows readiness for 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	The student can accurately formulate questions to deepen understanding of a given topic.	[SK1] oral statement/conversation/discussion
	[MATMU2_U09] can prepare oral presentations in-depth in Polish and at least one foreign language, in a selected field of mathematics	The student can prepare a paper and make a presentation on a given topic.	[SU2] presentation/project/paper/report
	[MATMU2_W07] knows and understands the basic legal and ethical conditions related to scientific and teaching activities	The student acquires knowledge of copyright and intellectual property.	[SW1] oral statement/conversation/discussion
	[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	The student can apply and present methods of the selected branch of mathematics at an advanced level	[SU2] presentation/project/paper/report
	[MATMU2_U03] can understand mathematical texts of various types from selected fields of mathematics	The student acquires the ability to understand mathematical texts in the selected field of mathematics at an advanced level.	[SU2] presentation/project/paper/report
	[MATMU2_K05] is ready to independently search for information in literature, also in foreign languages	The student can independently search for information in the professional literature.	[SK2] presentation/project/paper/report
	[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 an in-depth theoretical knowledge of performance and argumentation in the selected field of mathematics.	[SW2] presentation/project/paper/report
	[MATMU2_U05] can perform proofs in a selected field and, if necessary, also use tools from other areas of mathematics	The student can apply the methods of the selected field of mathematics in argumentation and proof.	[SU2] presentation/project/paper/report
	[MATMU2_U08] is able to prepare in-depth written works in Polish and at least one foreign language in a selected field of mathematics	The student can prepare a presentation on a given topic in written form.	[SU2] presentation/project/paper/report
	[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	Students can define their interests in mathematical discussions.	[SU1] oral statement/conversation/discussion
	[MATMU2_U02] can express mathematical content in speech and writing, in mathematical texts of various nature	Students can express mathematical content orally and in writing in mathematical texts.	[SU2] presentation/project/paper/report
	[MATMU2_K04] is ready to understand and appreciate the importance of intellectual honesty in one's own and other people's actions; ethical conduct	The student understands and appreciates the importance of intellectual honesty.	[SK8] observation of student's independent or team work
	[MATMU2_K06] is ready to formulate opinions on basic mathematical issues	Students can form opinions on mathematical issues	[SK1] oral statement/conversation/discussion
Subject contents	1. Formulating geometric and topological problems in the language of algebra and vice versa. 2. Becoming familiar with such relationships as, for example: crystallographic groups - Euclidean geometry, hyperbolic groups - hyperbolic geometry, finite groups - spherical geometry. 3. Algebraic invariants, such as determinants or quadratic forms. 4. Representation theory. 5. Provide nomenclature for the issues under consideration 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%
	activity during classes	51.0%	0.0%
	presentation	51.0%	100.0%
Recommended reading	Basic literature	• A. Białynicki-Birula: Zarys algebry, PWN, 1987 • H. Weyl: Symetria, Prószyński i spółka, 1997 (lub PWN 1960) • M. Davis: The geometry and topology of Coxeter groups, Princeton University Press - 2008	
	Supplementary literature	Determined individually with students	
	eResources addresses		
Example issues/ example questions/ tasks being completed	n/a		
Work placement	Not applicable		

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