

Subject card

Subject name and code	Algebraic Topology, PG_00210357						
Field of study	Mathematics						
Date of commencement of studies	October 2026		Academic year of realisation of subject		2026/2027		
Education level	Master's studies		Subject group		Obligatory subject group in the field of study Optional 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	Division of Geometry -> Institute of Mathematics -> Faculty of Mathematics, Physics and Informatics -> Rector						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. Maciej Mroczkowski				
	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		3.0		62.0	125
Subject objectives	Learning advanced mathematical constructions in the field of algebraic topology, acquiring the ability to apply algebraic methods in topology.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[MATMU2_U08] can use English at level B2+ of the Common European Framework of Reference for Languages, to a degree that allows for independent completion of education and communication with a diverse group of recipients, using specialist terminology		The student understands algebraic topology lectures delivered in English. During exercises, the student is able to present solutions in English. In the algebraic topology exam, the student speaks or writes in English.		[SU1] oral statement/conversation/discussion [SU4] test/exam - oral or written [SU8] observation of student's independent or team work		
	[MATMU2_W01] knows and understands in depth the theory of selected areas of mathematics or related fields, the complex relationships between them and their development trends		The student understands the connections between algebra and topology using algebraic constructions for topological objects.		[SW4] test/exam - oral or written [SW2] presentation/project/paper/report		
	[MATMU2_U05] is able to apply new or adapt existing methods and tools from a selected field of mathematics and information and communication technologies in related fields		The student is able to apply his/her knowledge of algebra and metric topology to solve problems in algebraic topology.		[SU2] presentation/project/paper/report [SU4] test/exam - oral or written [SU8] observation of student's independent or team work		

Subject contents	1. Higher homotopy groups. 2. CW-complexes. 3. Homology functors, singular homologies. 4. Homotopy invariance theorems. 5. The relationship between the fundamental group and the first singular homology group. 6. Relative homologies, exact homology sequences. 7. The section theorem, applications to spheres.		
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%
	tests	51.0%	50.0%
	exam	51.0%	50.0%
Recommended reading	Basic literature	1. M. J. Greenberg, <i>Wykłady z topologii algebraicznej</i>, PWN Warszawa 1980 2. R. Duda, <i>Wprowadzenie do topologii II</i>, PWN Warszawa 1986 3. E. H. Spanier, <i>Topologia algebraiczna</i>, PWN Warszawa 1972 4. A. Hatcher, <i>Algebraic topology</i>, Cambridge Univ.Press http://www.math.cornell.edu/~hatcher	
	Supplementary literature	not included	
	eResources addresses		
Example issues/ example questions/ tasks being completed	not included		
Work placement	Not applicable		

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