

Subject card

Subject name and code	Topology II, PG_00206848						
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 Subject group related to scientific research in the field of study		
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		exam		
Conducting unit	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	Improving the skills related to proving statements. Mastering the material. Preparation for the course Algebraic topology and possible writing of a master's thesis in topology.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[MATMU2_U01] is able to construct mathematical reasoning: prove theorems, formulate, test and refute hypotheses by constructing and selecting counterexamples, choosing, if necessary, methods and tools from various areas of mathematics	can construct mathematical reasoning in the field of topology, conduct proofs during the exam	[SU2] presentation/project/paper/report [SU4] test/exam - oral or written
	[MATMU2_W03] knows and understands to a deep degree 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 between issues in this field and other areas of mathematics	knows and understands - various methods of defining and constructing general topological spaces, various topological properties and theorems relating to them; the concept of homotopy and the construction of the fundamental group and their basic properties; can use these tools to explore certain spaces - a way to expand the scope of topology to include elements of general topology and homotopy theory	[SW4] test/exam - oral or written [SW2] presentation/project/paper/report
	[MATMU2_W02] knows and understands in depth the role and importance of the construction of mathematical reasoning	knows and understands: - various methods of defining and constructing general topological spaces, various topological properties and theorems relating to them; the concept of homotopy and the construction of the fundamental group and their basic properties; can use these tools to explore certain spaces - new constructions of topological spaces and constructions of the basic group and their importance in the study of spaces	[SW4] test/exam - oral or written [SW2] presentation/project/paper/report
	[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	knows and understands how to extend the scope of topology to include elements of general topology and homotopy theory	[SW2] presentation/project/paper/report
Subject contents	1. Basic topological concepts (topological space, basis, subbasis, closed sets, maps, homeomorphisms and topological invariants, separation axioms, Urysohn's lemma, Tietze-Urysohn theorem) 2. Operations on spaces (subspace, disjoint sum, Cartesian product, quotient space) 3. Compactness (local compactness, compact extensions, Tikhonov's theorem, paracompactness) 4. Metrizable spaces 5. Connectedness (connected and locally connected spaces, connected components) 6. Homotopy, fundamental group. 7. Covering spaces, theorems on lifting maps.		
Prerequisites and co-requisites	Knowledge of basic concepts and theorems in metric topology.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Presentation of solutions to problems during exercises	51.0%	40.0%
	Exam	51.0%	60.0%

Recommended reading	Basic literature	1. R. Duda Wprowadzenie do topologii, część I , PWN Warszawa, 1986 2. R. Engelking, Topologia ogólna, PWN Warszawa, 1989 3. M.J.Greenberg, Wykłady z topologii algebraicznej, PWN Warszawa 1980 4. E. Dudek, Zbiór zadań do wykładu fakultatywnego "Topologia II", praca mgr UG, skrypt kserograficzny.
	Supplementary literature	not applicable
	eResources addresses	
Example issues/ example questions/ tasks being completed	not applicable	
Work placement	Not applicable	

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