

	Adam Mickiewicz University in Poznań	
	Doctoral School of Exact Sciences AMU	
	The Topology of 3- and 4-dimensional Manifolds	
	prof. dr hab. Krzysztof M. Pawałowski	
	Scientific lectures, workshops	
Field of science	Mathematics	
Teaching method	Lectures	
Language	English/Polish	
Numbers of hours	20	
Aims of the course	The aim of the course is to describe topological manifolds of dimensions 3 and 4, with focus on the classification problems and constructions of specific manifolds.	
Course contents	Manifolds, Morse functions, and cobordism of manifolds. Homology, cohomology, and the Poincare Duality Theorem. Vector bundles and characteristic classes. Handle decomposition of manifolds and the Whitney trick. Handle cancellation and the h -cobordism Theorem. Heegaard splittings of 3-manifolds and the Dehn surgery. The homotopy classification of 3-dimensional lens spaces. The classification of simply connected 4-manifolds. Stable classification of 4-manifolds. Kirby calculus on 4-manifolds.	
Prerequisites and co-requisites	Basic analysis (calculus), group theory, abstract algebra, and point-set topology.	
Learning outcomes		
On completion of the course PhD candidates will be able to:		Assessment mode
<ul style="list-style-type: none"> • understand basic notions and theorems of the course • describe general ideas used in proofs of main theorems • explain the role of Heegaard splittings of 3-manifolds and the role of intersection forms of 4-manifolds 		E_W01 E_W02 E_U01 E_U02 E_U05
Literature	R. Gompf, A. Stipsicz, <i>4-manifolds and Kirby calculus</i> , American Math. Society, 1999. N. Saveliev, <i>Lectures on the topology of 3-manifolds</i> , Walter de Gruyter, 2011. J. Schultens, <i>Introduction to 3-manifolds</i> , American Math. Society, 2014. A. Scorpan, <i>The wild world of 4-manifolds</i> , American Math. Society, 2005.	
Additional information		