

CMUP – NEW MEMBERS MEETING

29 October 2026

Room: FC1 0.31

Hour	Speaker	Title and abstract
14:30—15:00	Tânia Paulista (FCUP, CMUP) 	Graphs defined on semigroups Over the years, there have been studied several graphs whose vertices are elements of a group and whose edges are defined according to some property of the group. There is often a close relationship between the combinatorial structure of these graphs and the algebraic structure of the group used to construct them, which makes them a popular line of research among group theorists. Moreover, this relationship makes these graphs powerful tools to prove group-theoretical results — for instance, one of these graphs was involved in the discovery of some of the sporadic finite simple groups. These graphs defined from groups include, among others, the commuting graph, the power graph and the enhanced power graph. In the commuting graph distinct vertices are adjacent if and only if the corresponding elements of the group commute. In the power graph distinct vertices are adjacent if and only if one of them is a power of the other. In the enhanced power graph distinct vertices are adjacent if and only if they are both powers of the same element of the group. In this talk we will consider the extension of these graphs to general semigroups. First, we will discuss known results for graphs defined on semigroups; and then we will see how results obtained for graphs defined on groups inspire analogous questions for general semigroups.
15:00—15:30	Ahmed Elshafei (FCUP, CMUP) 	From Halphen Vector Fields to Architectural Geometry Integrable systems have deep connections with differential geometry through the theory of special surfaces and their transformations. In this talk, I will present recent applications of these ideas to architectural geometry, with particular emphasis on the Darboux–Halphen system and its role in the construction of free-form gridshells. I will also discuss how the modern theory of Halphen vector fields and projective structures reveals new links between classical differential geometry and contemporary geometric design, illustrating how advances in pure mathematics can lead to innovative applications in architecture.
15:30—16:00	Coffee-Break	
16:00—16:30	Elena Pascucci (FCUP, CMUP) 	Some Topics in the Theory of Polynomial Identities A polynomial identity of an algebra A is a polynomial in non-commuting variables that vanishes under all evaluations in A. Algebras satisfying at least one nontrivial polynomial identity are called PI-algebras. In this talk, I will give an informal introduction to the theory of polynomial identities, discussing some of its basic questions, examples, and structural ideas. We will also see how the subject naturally interacts with other areas of mathematics, such as representation theory and invariant theory. In the final part of the talk, I will discuss some recent developments concerning algebras equipped with an additional trace operation, and the corresponding theory of polynomial identities with trace.
16:30—17:00	Alexander Blomenhofer (FCUP, CMUP) 	X-ranks and generic identifiability In 1995, Alexander and Hirschowitz determined how many linear forms are needed to represent a generic d-form in n variables as a sum of their d-th powers. More generally, people study the question of X-rank: Given an irreducible algebraic variety X living in an affine space, how many points from X do we need to represent the general element in that space as a sum of elements from X? We discuss the notions of generic X-rank and identifiability for an algebraic variety X and we present selected results. If time permits, we will briefly touch on applications.