



DEPARTAMENTO
DE ANÁLISIS
MATEMÁTICO Y
MATEMÁTICA
APLICADA



SEMINARIO DE ANÁLISIS MATEMÁTICO Y MATEMÁTICA APLICADA

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Prelectura de tesis doctoral: Análisis funcional en estructuras asimétricas

This thesis deals with the study of different types of structures of asymmetric nature, related to metric, algebraic and differential structures, as well as combinations of them, with metric asymmetries playing a central role. Some examples of these structures include asymmetric normed spaces, where a real linear space E is endowed with a function p satisfying all but one of the conditions required to be a norm, which allows for the values of $p(v)$ and $p(-v)$ to differ for some points v in E . This notion can be generalized further by relaxing the algebraic structure of the linear space, by replacing the additive group with a monoid (which may lack additive inverses), and restricting scalar multiplication to non negative scalars. This gives rise to the notion of normed cones. Another interesting example are Finsler manifolds, which share the differential structure of finite-dimensional smooth manifolds, but each tangent space in the tangent bundle of the manifold is endowed with an asymmetric norm, as opposed to the inner product norms used in Riemannian manifolds. These examples can be studied in the framework of quasi-metric spaces, which are a generalization of metric spaces in which the distance function satisfies all the conditions required to be a metric except one: the distance function does not need to be symmetric. Dropping the assumption of symmetry from the definition of a metric offers a greater degree of flexibility regarding situations that can be modeled using this concept, at the expense of losing some of the tools and results known for metric spaces. Our study of these asymmetric structures is carried out using tools and notions inspired by classical functional analysis. In particular, the idea of employing some structure on a space of real-valued functions $F(X)$ over a set X to determine some property on the set X itself is present in most of the results of this work.

**Organizado por el Departamento de Análisis Matemático y Matemática Aplicada y el
Instituto de Matemática Interdisciplinar (IMI)**

**Fecha: Martes 20 de junio de 2023
a las 16:00 horas**

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