

Analysis

The underlying focus of mathematical analysis is the study of functions. An enormous number of the mathematical models that have been developed over the years to study the economic, physical, natural and social sciences describe the behaviour of real-world systems using functions to represent the objects being modelled, and the ways in which these objects evolve and interact is represented by equations involving functions, such as ordinary and partial differential equations. Some of these (especially nonlinear equations) are too complex to be solved using current technology, and we do not know, for instance, whether initially smooth solutions to the equations of fluid flow can develop turbulent behaviour. The members of the analysis group study equations involving functions, and in some cases, study the properties of functions and ways in which they can be represented, in order to improve our capacity to tackle the equations.

The research interests of the members of the group are given below.

Professor Jonathan Bennett

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Professor

Jonathan's interests lie in multivariable Euclidean harmonic analysis and its interactions with problems in geometric analysis and combinatorics. Recently he has been investigating the scope of heat-flow methods and induction-on-scales arguments in the analysis of geometric inequalities arising in the restriction theory for the Fourier transform.

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Dr Chris Good

Reader

Recently Chris has been working on:

- The structure of ω -limit sets of tent maps and shifts of finite type using a mixture of analytic and symbolic techniques.
- The relationship between shadowing and expansivity of maps on compact metric spaces.
- The role of periodic points in chaos.
- Abstract dynamical systems modelled by compact Hausdorff spaces, separable metric spaces, the space of rational numbers and continua.
- Characterizations of ordinals.

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Dr Olga Maleva

Senior Lecturer

Olga has published research papers in leading mathematical journals and has been awarded research grants by the European Commission and the Royal Society. Her current research is supported by a grant from the Engineering and Physical Sciences Research Council. At the moment, she is supervising a postdoctoral advisee and a doctoral student.

Olga has been invited speaker to a number of international research conferences and has given numerous research seminars in the UK and abroad.

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Dr José Alfredo Cañizo

Lecturer

José works on existence theory and asymptotic behavior of kinetic equations, especially for coagulation and fragmentation models.

He is also interested on the theory of nonlocal partial differential equations, which often appear in models of collective behavior.

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Dr Susana Gutierrez

Lecturer

Susana has published a number of research papers in leading international journals. She delivers invited talks at conferences, workshops and seminars at both local and international level.

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Dr Alessio Martini

Lecturer

Alessio's main area of research is harmonic analysis on Lie groups and their homogeneous spaces. This area is characterised by a strong interplay between techniques of functional analysis and Euclidean harmonic analysis and results from algebra and representation theory. Alessio has worked on uncertainty inequalities and on spectral

theory for commuting systems of differential operators. Recently he has been focusing on the problem of obtaining sharp spectral multiplier theorems for non-elliptic hypoelliptic operators, such as sublaplacians, which arise naturally in non-commutative contexts.

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Dr Maria Carmen Reguera

Birmingham Fellow

Maria works on harmonic analysis and especially on the theory of weighted inequalities for singular integral operators. She is also interested in related questions in operator theory for Bergman spaces and geometric analysis.

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