

Mathematical biology

Mathematical Biology research in Birmingham is strongly integrated with experimental research, medicine and healthcare.

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

Dr Rosemary Dyson

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Lecturer in Applied Mathematics

Mathematical modelling; biomechanics; thin liquid films; fibre-reinforced fluids.

[Profile \(/staff/profiles/maths/dyson-rosemary.aspx\)](/staff/profiles/maths/dyson-rosemary.aspx)

Dr David Smith

Lecturer in Applied Mathematics & Birmingham Science City Fellow

Microscale biological fluid dynamics, especially in fertility, health and disease, examples including sperm motility, cilia driven flow, mucus layers in lungs and digestive tract, and the fluid mechanics of biopolymers. Computational methods for modelling very viscous flows, especially boundary integral methods. Applications of mathematics and computational analysis in medicine and biology, including 'steroidobolomics', digestion, the immune system and biodiversity..

[Profile \(/staff/profiles/maths/smith-david.aspx\)](/staff/profiles/maths/smith-david.aspx)

Dr Sara Jabbari

Birmingham Fellow and MRC Biomedical Informatics Fellow

Mathematical modelling, particularly applied to biological systems, e.g. gene regulation networks; the use of asymptotic methods to analyse and simplify mathematical models.

[Profile \(/staff/profiles/maths/jabbari-sara.aspx\)](/staff/profiles/maths/jabbari-sara.aspx)

Local active research collaborations include:

- University of Birmingham Systems Science for Health initiative
- University of Birmingham Centre for Systems Biology
- Centre for Human Reproductive Science at Birmingham Women's Hospital
- Endocrinology, Reproductive Biology, Immunology and Cancer Sciences in the College of Medicine
- Plastic surgery, University Hospital Birmingham
- University of Birmingham Institute of Microbiology and Infection

Collaborations further afield include:

- Centre for Plant Integrative Biology, Nottingham
- Centre for Mathematical Biology, Oxford
- School of Chemistry, Warwick
- School of Computer Science, Groningen, Netherlands
- Centre for Biomolecular Sciences, Nottingham

The main focus of mathematical biology research in Birmingham is multiscale modelling of a variety of biological and medical systems, areas of interest including, but not limited to:

- Mechanical effects in plant growth
- Fluid dynamics of sperm motility, and symmetry breaking in embryonic development
- The role of mucus films in airway defence, the reproductive and digestive systems
- Models of cancer and inflammation
- The role of mechanical anisotropy in tissue formation
- Bacterial gene regulation and its role in disease
- Antibiotic resistance and novel drug development