

# University of Sussex

## Department of Mathematics

### Research Strategy

## Better Research for a Better World

*Disclaimer: This is a Departmental Research Strategy. It should be considered together with other Departments, Research Centres and Research Groups strategies as well as the School Research Strategy. As strategies need to live, this document will be continuously updated in the coming years.*



## Research vision

***Our vision is that the mathematics of today will inform and help the innovations of the future. We believe that we cannot foresee what innovations future generations will need. Therefore, mathematicians should be enabled to explore a wide range of new methods and techniques based on their curiosity.***

# Background and Organisation

The **Department of Mathematics** currently has **five research groups** (Analysis and Partial Differential Equations, Numerical Analysis and Scientific Computing, Mathematical Physics, Mathematics Applied to Biology and Probability and Statistics) but it is also working towards the establishment of a **new interdisciplinary research centre: *The Dr Perry James (Jim) Browne Research Centre on Mathematics and its Applications***.

There are however no sharp boundaries between the Mathematics research groups and centre with frequent collaborations between members of different groups and with many working at the interfaces of these sub-disciplines.

The **Groups** are made up by individual independent researchers and there is a **Chair of the Research Committee** who chairs periodic meetings related to the administration of research.

The **Coordinator of Research Group** in the Department of Mathematics at the University of Sussex is a **service role** to the Research Group and to the Department.

The Coordinator of Research Group in the Department of Mathematics is appointed by the Head of Department after consultation with the Research Groups.

**The Coordinator of Research Group respects the independence of all the researchers belonging to the group and acts according to the best practices of coordination.** In particular, the Coordinator of Research Group carefully avoids creating unnecessary tensions among the members of the Research Group and between the Research Group and the Department. On the contrary, the Coordinator of Research Groups seeks to develop the Research Group based on the **principles of academic freedom and harmonious collaboration** among the Members of the Research Group and among the Research Group and the Department.

The Coordinator of the Research Group organises a meeting of the Research Group when necessary or when required by the Head of Department to discuss

- The preparation of joint research proposals
- The organisation of seminars
- The organisation of workshops and conferences
- Facilitation of networking
- Organisation or reorganisation of teaching in a specific field
- Any other business concerning the Research Group

The agenda of this meeting is prepared by the Coordinator of the Research Group and discussed with the members of the Research Group and the Head of Department and shared with the whole Department.

The Coordinator of the Research Group is responsible for minuting if this is necessary (e.g. upon request of a member of the Research Group) and shares the minutes with the Department.

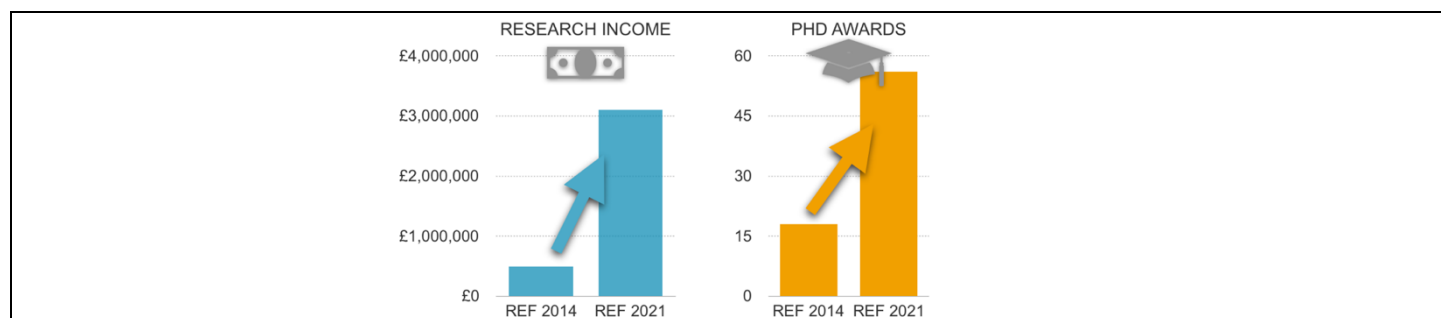


Figure 1: Performance of the Department of Mathematics over the REF period 2014-2021: Left: Research income, right: PhD awards

# Research goals

Our goals are:

- Diversifying our funding pool with the goal of increasing research funding by 50% compared to our results for 2014-2020.
- Attracting and retaining the best researchers.
- Further enhancing our facilities, environment and support to provide a climate that gives ample time for thinking, in order to be able to solve problems and prove deep mathematical theorems.
- Establishing the new *Perry James (Jim) Research Centre on Mathematics and its Applications*.
- Reaching to the local industry and authority via collaborations and consulting.

	Description	Evaluation
<b>A</b>	Diversifying our funding pool with the goal of increasing research funding by 50% compared to our results for 2014-2020.	Based on research income as reported on the research dashboard.
<b>B</b>	Attracting and retaining the best researchers	Based on the success in retaining researchers and attracting them.
<b>C</b>	Further enhancing our facilities, environment and support to provide a climate that gives ample time for thinking, in order to be able to solve problems and prove deep mathematical theorems.	Based on the quality of outputs as internally and externally evaluated.
<b>D</b>	Establishing the new Perry James (Jim) Research Centre on Mathematics and its Applications	Based on the success in establishing the centre.
<b>E</b>	Reaching to the local industry and authority via collaborations and consulting	Based on the number and quality of collaborations and consulting activities.

# Strategic Plan

Our strategic plan is inspired by our vision, is consistent with the University and School strategic plans and consists of three pillars to achieve our main goals:

- (i) concrete actions already in place and made possible by the legacy gift;
- (ii) a series of actions to be implemented in the near future to increase grant capture, attract and retain the best researchers and boost the PhD program in Mathematics at Sussex, and
- (iii) specific research objectives set by the research groups.

## Pillar 1

### First Action

*Statement of principle: Giving mathematicians in the Department of Mathematics of the University of Sussex the freedom of research needed to achieve important and useful mathematical results (Goals: c, b, and a).*

Action: Every year, mathematicians on a permanent teaching and research or permanent research contract and who are not large (> £100,000) grant holders and satisfy a criterion of activity in research (such as: at least one paper published in a peer-reviewed journal in the last 12 months) will receive a grant of £1,000 for their research activities.

These colleagues should commit themselves in acknowledging the James (Jim) Perry Browne Research Centre in their future publications.

Note: The grant should (and will) be cumulative (unspent money will not disappear contrary to what may happen in usual devolved accounts).

### Second action

*Statement of principle: Fostering collaboration of mathematicians at Sussex with national and international mathematicians (Goals: a and b);*

Action: Every year the Centre will organise two high-profile seminars per academic year, inviting prominent mathematicians (e.g. winners of Abel prize or Fields medallists or just people who got important results); the invited mathematicians will deliver a James (Jim) Perry Browne Plenary Lecture of one hour during their stay at Sussex.

Note: The funds of the first action can of course be used to support small collaborative efforts.

Note: The yearly budget for this activity is £4,000.

### Third action

*Statement of principle: Fostering interdisciplinary collaborations with applied scientists both within the University of Sussex and elsewhere (Goals: a and e).*

Action: With up to £2,500 per year, the Centre will help mathematicians on a permanent teaching and research or permanent research contract in looking for partners for interdisciplinary projects where the mathematical component is predominant or important. This could take the form of help in organising sandpits or hackathons or unconferences or other suitable tools to foster and promote collaboration between mathematicians and applied scientists, outreach activities and collaboration with local industries, local authorities and local schools (with one focus in attracting students into research-oriented undergraduate studies).

## Pillar 2

*Series of further specific actions:*

- i. The department will submit new proposals for Doctoral Training Centres (Goal c).
- ii. Joint PhD studentships with other schools will be investigated (Goal a).
- iii. Individuals or subgroups will aim at submitting EPSRC grant proposal (>£200,000) every three years at least (Goal a).
- iv. The selection of self-funded PhD students will be revisited and streamlined to help department members engaging with it efficiently (Goal a). Changes will include designing a set of speculative projects, systematically posting interviews comments.
- v. Search for suitable candidates and frequent submission of Marie Skłodowska Curie, ERC, Royal Society, Leverhulme and EPSRC research-fellow grants (Goal b).
- vi. Development of international partnerships such as dual degrees with Chinese and other international Universities (Goal a).
- vii. Improve on local, national and international outreach, organising regularly outreach talks showcasing our research (Goals b,e).
- viii. Enhance the visibility of the Research Center (Goal d).

# Pillar 3

## Analysis and PDE

To be added

### Mathematics Applied to Biology and Numerical Analysis and Scientific Computing

1. Support emerging research with the NHS and City Councils with special focus on Data Science for Healthcare and Smart Cities/Net Zero emissions (as for NASC).

Initiate research collaborations with Industry where Data Analytics are paramount.

2. Engage in attracting research funding, especially based on interdisciplinary applications involving BSMS/Industry from sources such as MRC, BBSRC, EPSRC, Wellcome Trust and Innovate UK (as for NASC).

3. Support the creation of an MSc programme and a Doctoral Training Centre in Healthcare Technologies in partnership with the Brighton and Sussex Medical School (including Data Science).

4. Contribute to the Department's KEF and REF, with special focus on improving the Department's Impact profile

5. MAB and NASC to propose and develop an application to UKRI, Wellcome Trust or other suitable funders, to establish a DTC in "Healthcare Technologies".

6. MAB and NASC to speak to UKRI, Wellcome Trust etc. and locally to BSMS/Psychology/Life Sciences/EngInf in view of creating a training base for PhD students from different backgrounds/joint supervision across Schools.

## Mathematical Physics

To be added

### Probability and Statistics

1. Increase the number of applications for postdoctoral fellows and individual grants.

2. Continue and enhance inter-group or inter-departmental collaborations.

3. Re-establish a Probability seminar (not hybrid).

4. Individual applications for PhD studentships when it is possible or financially viable for the school.

5. Explore potential avenues of impact should the opportunity appear.

6. Apply for prestigious research fellowships (such as Oberwolfach research in pairs).

7. Continue with our remarkable publication level both qualitatively and quantitatively.

# Next Steps

- From 15 December 2021 to 15 January 2022, comments will be collected to complete the live draft - DONE
- 2 February 2022, the Departmental meeting adopts the document up to pillar 2 and, after that, a second call is issued to complete pillar 3