

Institution: University of Sussex

Unit of Assessment: 10 Mathematical Sciences

1. Unit context and structure, research and impact strategy

Overview:

The Unit of Assessment (UoA10) is the Department of Mathematics at the University of Sussex which operates within the School of Mathematical and Physical Sciences (MPS), alongside the Department of Physics and Astronomy. The Department of Mathematics currently has 21.0 FTE permanent faculty with research and teaching duties, 1.9 FTE research only, 34 PhD students and 426 students, comprising 350 undergraduates and 76 postgraduates.

Faculty belong to four research groups (one new since REF2014): Analysis and Partial Differential Equations (APDE), 8.0 FTE; Mathematics Applied to Biology (MAB), 4.0 FTE; Numerical Analysis and Scientific Computing (NASC), 4.0 FTE; and the newly-established Probability and Statistics (PS) 5.0 FTE, with many working at the interfaces of these disciplines and on Mathematical Physics. There are however no sharp boundaries between the research groups with frequent collaborations between members of different groups.

Key developments from REF2014 to REF2021 are:

- Research awards up 6-fold to £3.3m plus a donation of £1.1m to foster research excellence
- 64 PhDs awarded compared to 18 for REF2014
- Establishment of new Probability and Statistics research group

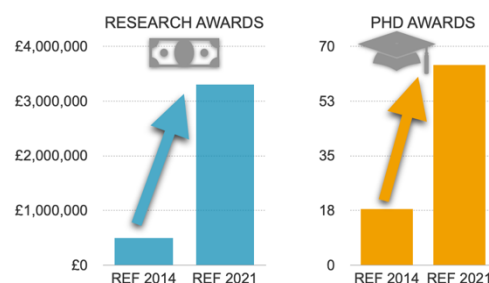


Fig1 Research awards and PhD awards.

Implementation and achievement of strategic objectives 2014-2021:

In line with UoA10's REF 2014 strategy of **identifying and growing in strategic areas**, the research group Probability and Statistics was established in 2016. Two early-career researchers, **Wang** and **Dahlqvist**, a Reader, **Vysotskiy**, as well as a Royal Society URF, **Simm**, joined existing faculty members **Scalas** and **Georgiou**. The creation of the PS group was motivated by the UKRI-EPSRC strategy of strengthening the area of Statistics and Applied Probability.

Another goal set in REF 2014 was **to diversify the portfolio of funders and exploit opportunities for large grants**. This resulted in a significant increase in research awards compared to the previous period (Fig1), with UoA10 securing research funding from new sources. Of the £3.3m, 28% came from the EU H2020 programme, 26% from the Leverhulme Trust, 21% from the Royal Society, 20% from the EPSRC and the remaining 5% from a series of funders including the London Mathematical Society, the National Research Council of Italy (CNR), the Alan Turing Institute as well as corporate funders (including Ambiental, American Express and AVIVA). A combination of strategic leadership and energetic early-career faculty with support provided by UoA10 led to a successful application to the EU's Horizon 2020 research and innovation programme, for a four-year (2015-2019) innovative training network (**ModCompShock**) with an international budget of €3,914,276.31, extended to the end of 2020, coordinated by a member of UoA10 (**Makridakis**).

Implementation of the UoA10's plan of **proactively creating and enhancing partnerships with external groups in other Schools in the University and beyond** has resulted in activities including: (i) the participation in two EU-funded innovation training networks - **ModCompShock** and **InCeM** - with partners in more than 10 European countries, involving research in shock-

waves in non-linear hyperbolic and convection dominated PDEs and in the mathematical modelling of epithelial cell motility, respectively; (ii) one of our faculty, Makridakis, has been appointed as **Director of the [Institute of Applied and Computational Mathematics](#)** at the Foundation for Research & Technology-Hellas in Crete, Greece, (iii) a successful joint application with the Department of Engineering to UK Research and Innovation, (iv) a partnership with Ambiental (an Environmental Assessment and Risk Analytics company) via two Case Conversion PhD studentships, (v) joint applications for research bids with a diverse set of partners including the Brighton and Sussex Medical School. UoA10 has also secured two industry-funded PhD studentships, one partly funded (AVIVA) and one fully funded (Moogsoft), (vi) UoA10 holds joint seminars with the Business School (the seminar series on Finance and Stochastics (FAST)) and with the Department of Physics and Astronomy (the seminar series on Mathematical Physics).

UoA10 is **committed to producing exceptionally high-quality research**. To this end UoA10 members at Sussex have: (i) published almost 400 peer-reviewed papers in international journals (ii) organised 24 conferences and workshops at the University of Sussex attended by world-leading mathematicians (including a recent Fields medallist) with more than 700 participants. Moreover, members of UoA10 actively organised international and national conferences, workshops and research programmes, are often invited speakers at conferences and workshops and serve the mathematical community as editors of international peer-reviewed journals and evaluators of research proposals. The increase in research funding led to a significant increase in the number of PhD students (Fig1). This helped in creating a vibrant and active research community, with PhD students contributing to more than 150 outputs either in collaboration or as single authors. Over the REF period (2013-2020), the SciVal field-weighted citation impact (the ratio of the total citations actually received by the outputs, and the total citations that would be expected, based on the average of the subject field over a period of up to 4 years) within the ASJC category “Mathematics” of UoA10 is 1.50 compared to 1.39 for the University of Sussex overall, and 1.39 for the UK overall.

During the REF period, UoA10 has built up a structured programme of activities to provide outreach and public engagement events of the highest quality throughout the county of Sussex. Starting from 9 events in 2013-14, we have been consistently delivering over 35 events each year thereafter, with an annual reach of over 2,000 school students and 1,000 members of the public. To achieve this dramatic increase, UoA10 partnered with key stakeholders such as the LMS, the Mathshub, Brighton & Hove City Council, and local schools. While the Covid-19 pandemic led to a reduction in the overall amount of outreach and public engagement delivered in 2020, an online “Sussex Universe” seminar has been organised presented by researchers in UoA10. The commitment of the department is demonstrated by the investment into an outreach officer, academic outreach lead as well as dedicated administrative and technical support. Mathematics outreach has a portfolio of 20 separate activities offered to schools, ranging from Keystage 2 to 5. The majority of these activities directly link with both the school syllabus and the research carried out at Sussex.

Since March 2020, the ongoing pandemic has temporarily disrupted several activities, including seminar series, mainly due to a significant increase in on-line teaching load. However, UoA10 has remained resilient and has maintained a steady number of research publications and grant applications, and its members have actively participated in national and international seminars and workshops, such as the LMS Invited Lecture Series 2020. UoA10 has also contributed to the scientific debate around the pandemic with the release of several preprints on mathematical epidemiology later accepted for publication.

Vision and strategy:

*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. To implement our vision and to foster **excellence in our research**, we set specific goals for the next REF:*

- (i) **diversifying our funding pool with the goal of increasing research funding by 50% compared to our results for 2014-2020;**
- (ii) **attracting and retaining the best researchers;**
- (iii) **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.**

We will keep existing collaborations and promote new ones with external partners, to further enhance the impact of our research on the mathematical sciences and on applied sciences. We shall engage with the society at large, the public, policy makers and industry.

Implementation of strategy:

UoA10 plans to build on our current strengths with particular emphasis on mathematical analysis, numerical analysis, stochastic processes and mathematical modelling in biology, the natural sciences, the social sciences and humanities. Interdisciplinarity has been part of our work for many years with collaborations with physicists, chemists, biologists and economists. We plan to extend our interdisciplinary collaborations to disciplines we do not yet cover, including arts and humanities, e.g. working with Sussex Humanities Lab.

Our UoA will target the extra funding for mathematics made available by the UK government, and will explore alternative funding routes including private foundations also outside the UK as well as using crowdfunding platforms for small projects. Thanks to the legacy gift of Dr James (Jim) Perry Browne, our researchers will receive an additional £1000 every year as seed funding for their activities. UoA10 will further use the legacy gift to establish a fund of £2500 per year, supporting interdisciplinary projects with a predominant mathematical component by organising meetings to promote collaboration between mathematicians and applied scientists.

Our Unit shall keep the open and fair recruitment procedures outlined in Section 2 using our world-wide research network to attract and select the best applicants. Moreover, we shall use the Royal Society, Leverhulme and UKRI fellowship schemes to recruit and retain talented early-career researchers.

UoA10 will act to reduce teaching loads from the 2020 peak to more reasonable levels and to provide funding for fully-funded PhD students. We will build in a sustainable way with a long-term aim of attaining a faculty-base of about 30 research-active staff.

Over the coming REF cycle the outreach team will continue to support our Research Groups in their public engagement and will provide a balanced and unbiased view of our activities. We plan to enhance our partnership with Knowledge Transfer Network Industrial Mathematics (see Impact for details) to organise further Study Groups with Industry as a service to the applied and industrial mathematics community and to initiate new collaborations with corporate partners, local and national authorities, Parliament (through the Parliamentary Office of Science & Technology), and the Civil Service.

Strategy monitoring:

Our strategy is developed and refined both top-down and bottom-up. Since REF2014, individual Personal Research Plans are issued annually relating to UoA10, MPS and University strategies. At all levels these strategies are clearly documented and visible and are reviewed annually. Furthermore, UoA10's activity and strategy are reviewed annually by an external research advisory (ERA) board. Our strategy is consistent with the strategic plan of the University of Sussex (Sussex 2025): **to obtain excellence through support and development of its researchers emphasising quality and not quantity; to provide support mechanisms to help its researchers to develop through their whole career and to build on its pioneering heritage of interdisciplinarity.**

Research integrity:

The University of Sussex is committed to promoting and upholding the highest academic and ethical standards in all its activities and formally endorses the UK Concordat to Support Research Integrity. The University developed robust research governance and ethics policies and procedures recognising the importance of addressing ethical matters, while supporting the achievement of its research objectives. These procedures and policies underpin all research at the University and are publicly available on the University website along with a detailed [Code of](#)

Practice. The University has a register of interests to avoid conflicts of interest, whether real or perceived, and detailed policies on the management of research data and information security. The cross-school Science and Technology Research Ethics Committee provides guidance and advice as needed and reports to University's Research Governance Office with all matters arising. The School has an [internal website](#) containing links to all the procedures and forms (e.g. a self-assessment checklist for ethical reviews) relating to such matters. UoA10 has a Research Integrity and Misconduct Officer dealing with allegations of research misconduct.

Most importantly, research integrity and ethical standards are upheld by the culture that is embedded in UoA10. All new staff are mentored and guided in the value of open, transparent and collaborative research. In our UoA, everyone is treated fairly and with respect and our flat hierarchy encourages internal questioning. Our research is shared openly and debated robustly in seminars as well as in informal and formal meetings. Our PGRs organise their own seminar series and scrutinise the work of their peers.

Open Science:

UoA10 has moved towards open science and, in many instances, where relevant, code and data used in papers are transparently released in the public domain, including in the supporting information of published papers and/or public repositories such as GitHub. Members of UoA10 have been involved in Open Science initiatives such as co-signing the paper/manifesto *Open Science Saves Lives: Lessons from the COVID-19 Pandemic*.

Impact:

Based on our vision, the leading principles of our impact strategy are that knowledge exchange activities can inspire new Mathematics and, in turn, Mathematics can significantly contribute to the economy, society and culture. This is at the core of the Bond review, [The Era of Mathematics](#), published in 2018. UoA10 has therefore invested to foster knowledge exchange and impact and will continue to do so in the future. A number of mechanisms were introduced to support knowledge exchange:

- Through events such as (i) away-days dedicated to impact (with topics such as funding, sustainability and support for impact), (ii) annual Sussex Impact Days (and Impact Awards) and (iii) conversations with experts from within and outside of the University, UoA10 has embedded impact into research.
- To broaden the potential of impact arising from research, UoA10 uses the support of an Innovation Partnership Fellow (IPF) funded by MPS. The role of the IPF revolves around: (i) meeting researchers and familiarising with their research areas, (ii) identifying where the potential is for new impact cases and knowledge exchange, (iii) maintaining and growing a list of corporate contacts, (iv) matching academics and corporate partners, and (v) supporting and nurturing relationships.
- UoA10 has used University funds, such as the Research Impact Fund (RIF), Research Development Fund (RDF) and the Higher Education Innovation Fund (HEIF), to support visits by departmental faculty to companies abroad. Research from two of the impact cases used these funds; the Case Study by Blyuss on *Combating crop losses and improving global food supplies through mathematical models and gene silencing* received funds from the RDF and a Case Study by Madzvamuse, still ongoing with a likely submission in the next REF, got funds from the HEIF.
- In 2018, UoA10 secured match-funding from the RIF for the first Knowledge Transfer Network (KTN) Study Group on Energy Systems. The Study Group consisted of a three-day meeting, held at the University of Sussex, with industrial problems posed by Williams Advanced Engineering and the National Grid, with focus on energy storage and distribution. In April 2020, KTN, UoA10 together with the Department of Mathematics in Bath co-organised a Virtual Study Group Pilot with Zenotech (whose interests lie in the application of radial basis functions in computational fluid dynamics) and Scott Bader (whose interests lie in modelling the stability of multiphase resins).
- UoA10 was awarded two Case Conversion PhD studentships to support and grow the collaboration with Ambiental (a flood-risk modelling/assessment company supporting

planners and insurers hosted by the Sussex Innovation Centre) which led to Lakkis's case study on *Computational models in flood-risk assessment*.

- We invested for the future: the recent recruitment of Wang allows UoA10 to develop impactful research with Amec Foster Wheeler (now with the Wood Group) on neutron diffusion in nuclear reactors.
- UoA10's MAB group has responded to the challenging COVID-19 outbreak by not only providing media commentary, but also impactful national and international modelling which shaped policy nationally and internationally. This led to a third impact case submission.

2. People

UoA10 is diverse with faculty from at least 17 different countries (China, Cyprus, Denmark, France, Germany, Greece, Iran, Italy, Lebanon, Slovakia, Romania, Russia, Spain, UK, Ukraine, USA, Zimbabwe). It received an Athena SWAN Bronze award in 2016 (see below), representing significant progress since REF 2014, and *will strive to keep and increase this diversity while fostering equality* using the following procedures.

Recruitment of researchers:

UoA10's recruitment policy is the selection, support and retention of high-quality researchers (see *Section 1: Vision and Strategy*) complementing expertise in at least one of the four research groups, and with an interdisciplinary outlook. In terms of both seniority and areas of expertise, the Department now has a balanced profile (6 Professors, 6 Readers, 5 Senior Lecturers and 4 Lecturers).

Equality and Diversity training is mandatory for everybody, whereas Unconscious Bias and Recruitment and Selection training is mandatory for staff involved in recruitment. The importance of researchers' personal and career development, and lifelong learning, is clearly recognised and promoted at all stages of their career. This statement of principle is substantiated below.

Staff development strategy:

The University is fully committed to implementing the Concordat to Support the Career Development of Researchers and to provide a productive and supportive working environment for researchers. Since 2013, Sussex has held the award of the *HR excellence in research* by the European Commission. The award recognises the measures the University is taking to improve working conditions and career development opportunities for research staff by implementing the principles of the Concordat and the European Charter for Researchers. Progress toward these aims is implemented by the Sussex Concordat Implementation Plan. At the Department level the HoD is responsible for compliance, reporting to the Research Staff Working Group which oversees university-level implementation. UoA10's staff development strategy includes probation, training, appraisal, and mentoring. Training is implemented through training workshops and courses that are run through the University's Organisational Development team. Training is available on applying for grants, supervising graduate students, managing research groups, researcher development, professional and management development, unconscious bias, and equality and diversity.

UoA10 actively seeks to maximise the time available for research. The optimisation of the taught programmes has given faculty the opportunity to concentrate their teaching in one of the University's two teaching terms, thus creating significant continuous periods for dedicated research. The typical teaching load is two modules per year. UoA10 members with high-workload administrative duties typically receive a rebate of one module per year.

The Head of School (HoS), the Head of Department (HoD) or a delegated trained, senior and research-active member of the Department annually appraises faculty and research fellows. Trained appraisers also act as mentors and provide career advice during the year.

Promotion cases are submitted annually to the HoS, and then considered by MPS and later by the University promotion committee. Career breaks, e.g. because of periods of maternity, parental or adoption leave, which may have influenced outputs and/or career progression are recorded and duly considered. In this way, research quality prevails over quantity. MPS promotion workshops supplementing university-wide workshops are periodically organised focusing on career challenges for STEM researchers. *Evidence of healthy staff development is shown by the fact that all but one of the lecturers and senior lecturers that were submitted to REF2014 have since been promoted. In a recent promotion round four faculty members were promoted, three to Professorships and one to a Senior Lectureship.*

New academics are recruited after a transparent selection process including an open call whose wording is tailored to avoid gender bias. The selection procedure is compliant with the San Francisco Declaration on Research Assessment (DORA) that sees Sussex as one of the two early UK signatories. New academics are usually appointed on a probationary basis (typically three years), and, in the first year of their appointment, they have reduced teaching and administrative loads kept well below half that of established academics. In practice, in their first year in UoA10, new academics are usually not required to teach more than one module and receive no administrative duties. In addition, new faculty are endowed with a start-up grant for research visits, conference organisation and equipment, and they can hire one School-funded PhD student.

An early-career mentoring programme is available via the University's Research Office, with seminars on Effective Mentoring Skills for Mentors presented by the Organisational Development team.

Grant applications are supported as follows. First, the School Research Development Officer informs on upcoming calls and deadlines. Regular workshops are held to present specific grants. Second, the School Research Development Officer advises on the budget and full costing for the application. Third, an internal peer review round for the application is organised before submission. Peer reviewers are critical friends chosen by the applicant. They can even send comments while the application is being written. If an application is unsuccessful, the proposal is further discussed and alternative funding sources and future improvements are identified. This discussion is strictly focused on providing constructive feedback.

The HoD has access to a discretionary account to cover some research costs, e.g. conference travel for members of UoA10. Each individual also has a so-called Devolved Budget, initially consisting of a fixed endowment of £1000 per year per research-active person. A variable part is awarded in proportion to income contribution from research grants. This is spent on blue-sky research initiatives. UoA10 recently received a legacy gift worth one-million pounds that is used to top-up individual funding for research-active colleagues not holding substantial research grants.

UoA10 has a transparent workload model that is regularly revised. Faculty can apply for six-month sabbatical leave every nine semesters. During leave, faculty concentrate on research and on career development opportunities. A total of 6 sabbatical semesters were taken by faculty over the period covered by REF2021. Where possible, members of staff who are holders of research grants are given either partial or full relief from teaching depending on the nature of the grant.

Some of the consequences of these staff development practices are the outcomes described in Section 1: increases in research funding, in the quality and quantity of outputs and in resources allocated to PhD students.

Research students:

The University of Sussex has a set of approved [Principles to Govern Doctoral Studies](#), which provide the university-level strategic framework for doctoral education. UoA10 is using these university-level principles to guide its post-graduate provision. *In short, Sussex aims to train and*

develop diverse, pioneering and courageous doctoral researchers who will have a lasting impact, within and outside academia.

Recruitment strategy and procedures for research students:

Research studentships have been a pillar supporting the *research strategy* of UoA10 as they enable the recruitment of high-potential young researchers. Fully-funded research projects for PhD students are rigorously selected by an internal committee made up of members of UoA10. The recruitment of research students comes via advertisements on national and international webpages, presentations at workshops and conferences, and career conferences. Thanks to the international profile of our faculty, an excellent international network is available, through which a significant number of research students have been recruited. Internal recruitment paths come from the University's Junior Research Associate (JRA) scheme, and research placement or [MMath research projects](#). The JRA scheme is a pioneering university level project aimed at developing future research leaders. It includes a bursary and encourages talented undergraduate students to consider a future career in research.

To ensure the best PhD candidates are recruited, a robust selection procedure is in place, where applicants are interviewed by a gender-balanced panel of two or three UoA10 members, all of whom have undertaken unconscious bias training.

The *Doctoral Training Partnerships and MPS project selection procedure* is a two-stage process. In the first stage, proposals for studentships are invited among the faculty. The selection criteria are: academic merit, fit to EPSRC strategic areas, and our research strategy. At the end of a thorough selection process a shortlist of projects are identified. In the second stage, a panel ranks the projects. This list is then submitted to the university-wide selection committee that decides which DTP studentships to award.

Our PhD students have been financed by research grants (currently Leverhulme and Marie Skłodowska-Curie training network), EPSRC DTP studentships and University funds. The department has been a training site for three EU H2020 Marie Skłodowska-Curie Initial Training Networks (STRIKE, InCeM, ModCompShock), two (InCeM, ModCompShock) as a partner and one (ModCompShock) as the coordinator. Of the £3.3m awarded to UoA10 for PhD students, 59% came from either the EU or from department match-funding, 23% from the EPSRC, 11% from Sussex, 5% from the Leverhulme Trust. The remaining 2% includes funding from companies.

Monitoring and support of research students:

Each research student has two supervisors, a main supervisor and a second supervisor, responsible for providing support during the student's studies and advising on career opportunities. Main supervisors typically follow an open-door policy, but are required to hold weekly meetings with their research students. Supervisors are required to attend professional development on a regular basis including an online programme, *Supervising Doctoral Studies*, for new and experienced supervisors, designed by [Epigeum](#) (a provider of online courses) consisting of nine Sussex-specific self-study workshops.

Career development for research students is a priority in UoA10 and there are University and MPS administrators with responsibility for PG careers. Students are strongly encouraged to undertake formal employability and transferable-skills training through participation in focused events organised by the University and externally. The University's Doctoral School provides support and advice to all PGR students, and offers Researcher Development Workshops mapping onto the Vitae Researcher Development Framework. Workshop topics include: communication, publication, personal effectiveness, project management, wellbeing and IT training. In addition, a twice yearly *Starting to Teach* module taking the form of six workshops is provided and English-language training is offered for international students. The Doctoral School also provides funding for researcher-led initiatives and careers advice. MPS has a dedicated Director of Doctoral Studies, advising PGRs on all matters related to their studies and on

financial support at the School level. The Director of Doctoral Studies chairs a committee, which includes the Head of the two Departments and the Head of School, where all issues related to PGRs are discussed.

The Annual Review of research students is at the end of each academic year. The review, which is conducted by either one or two reviewers who are UoA10 members, is based on questionnaires that are completed by the student and the supervisors and a report written by the student on their research to date. It includes career advice and a discussion of the courses that are taken to enhance and broaden the student's mathematical knowledge and acquire transferrable skills. In their first year, students have an additional formal first year appraisal with their supervisor. Its goal is to monitor progress, and to flag-up problems of academic or personal nature as early as possible. In later years, additional interim interviews are scheduled if closer monitoring of the student's progress is deemed necessary.

MPS organises induction sessions for first-year PhD students, and re-induction sessions for subsequent years. Information is covered on all aspects of the academic year, e.g. contact details of relevant staff, and a range of support programmes offered by the University, including specific Athena SWAN-related material, as well as material relating to consent and to sexual violence.

The students benefit from reading groups and from attending weekly departmental seminars where they learn from international experts on a wide range of topics in mathematics. At University level, a dedicated Sussex Research Hive serves all doctoral researchers, it offers a designated space for self-study, rooms for collaborative meetings, and organises workshops on all academic matters.

UoA10 and the University successfully use the *Researcher Development Framework* to plan personal and career development for research students and researchers. This ensures the fulfilment of all requirements of the Concordat to Support the Career Development of Researchers, the QAA code of practice for research programmes and the Roberts recommendations for postgraduate researchers and research staff.

UoA10 requires PhD students to undertake a minimum of 100 hours of broadening mathematical training and aims for a typical amount of 120 hours. Taught courses include in-house ones and courses offered by the MAGIC doctoral training network. They are not restricted to the students' specific area of research, but should allow them to broaden their understanding of other areas of mathematics and their knowledge across all fields. All taught-course activities are recorded and assessed. At the beginning of their studies PGRs discuss and decide together with their supervisors on a realistic and effective training plan (for both pastoral and academic aspects). The plan must be approved by the Director of Doctoral Studies. Special focus is paid to how this training plan addresses specific requirements. This training plan and its completion are regularly monitored by the supervisors through the Annual Review process, and is updated where necessary.

On the initiative of UoA10's research students, a School PGR Student Committee has been established, chaired by a PGR student representative. It has its own budget for the development of collaborative opportunities amongst doctoral researchers. Research students organise a seminar series, with talks given by current PhD students, where they present their results to other students and faculty. They participate in local, national and international level postgraduate training events, such as Summer Schools, and can access travel funds when needed. UoA10 offers up to £1650 (MPS-funded) per PGR, per year for travel expenses. MPS organises a one-day, MPS-funded, PGR student-run, postgraduate research conference for all the PGRs and PDRAs in the School. It includes a poster competition, with a prize given for the best poster, and all printing costs are covered by the School.

The results of our doctoral school – a direct consequence of the procedures outlined above - are as follows. Since August 2013, 64 PhD students have graduated - a dramatic increase from 18 in the previous REF period. The average percentage of students submitting their dissertation in time between 14/15 and 18/19 was 96.6% with a 100% completion rate in 14/15, 16/17 and 17/18. Moreover, PhD students have published 150+ outputs either as single author or in collaboration. Out of 33 students for whom we have reliable next-destination data, 61% are active in the higher education/public research sector with roles ranging from postdoc to head of department and 39% work in corporate settings for companies as diverse as Alibaba, Deloitte, Syngenta, and UBS.

Equality and diversity:

For its dedication to improving workplace standards, as well as in hiring and promoting women to senior positions in STEM departments, the School of MPS received the Athena SWAN Charter Bronze Award in 2017. Earlier in the REF period, UoA10 received the same award on its own. In addition to mandatory training on equality and diversity, all MPS members are required to attend training on unconscious bias. Line managers also undergo compulsory appraisal training.

MPS has flexible working dispositions, both formally and informally. All employees are regularly reminded of such arrangements. Application forms for flexible working are available on the University HR family-friendly web pages. MPS also operates flexible informal procedures. For instance, any staff member can choose to work from home at any time if they have no responsibilities requiring them to be on campus.

In order to apply for flexible teaching hours, a simple process is in place for those with caring duties. All staff members receive email alerts reminding them, if they wish, to apply for flexible arrangements before timetabling commences. Meetings and seminars take place between 10am-4pm and emails requiring action are normally sent to mailing lists between 9am-5pm.

Before and after periods of maternity/paternity/adoption leave, the HoS meets workers to discuss possible problems and issues and to draft a plan for the leave period. Workers are informed about the maternity/paternity/adoption leave policies during induction. These policies are explained on the MPS website and apply to PhD students as well. The site provides managers with a comprehensive checklist on measures to be taken before, during and after any such leave.

It is MPS policy that when on leave, all workers are contacted through regular email messages and invited to all social events. Closer to the conclusion of leave, employees are asked if any additional measures will be needed upon their return, and along with their line manager they create a back-to-work schedule to ensure a successful return. At the meeting with the HoS on the first day of their return from leave, any complaints or demands for special arrangements are addressed and the returning worker is introduced to all new colleagues and informed of any changes in working practices. Researchers returning from long-term caring leave have a workload reduction of 60% in the first term so that they can focus on their research.

Paternity leave is encouraged through transitional arrangements after return that reflect those for maternity leave. The HoD has discretionary funds to support spouses/carers travelling with employees. In promotion applications, emphasis is on quality and not on quantity in general and, more so, for staff with caring responsibilities or in similar circumstances.

Requests for part-time contracts can be made and UoA10 will always let staff return to full-time if requested. There are no zero-hour contracts within UoA10 and, with the exception of 2 PDRAs, there are only permanent contracts within UoA10 for personnel with research duties. In the annual appraisal, particular care is given to the career development of both part-time staff and fixed-term PDRAs.

A dedicated Common Room and kitchens with coffee machines and microwaves are available, where employees meet regularly and discuss over a cup of tea/coffee. A bookable meeting space is also available as a lunchroom and can be used for resting or breastfeeding.

MPS has two Equality, Diversity and Wellbeing Champions, whose role is to ensure that staff are clear on institutional policies. They are the first point of contact for informal discussions and/or advice. In 2016, MPS organised an awayday dedicated to Equality and Diversity, which included Unconscious Bias, and Bullying and Harassment training to improve staff awareness around these. Flexible working arrangements – and the individual choice for all teaching to be scheduled within one semester or spread over two – foster better work-life balance.

Within MPS a range of wellbeing activities are organised for faculty by the School's Wellbeing Champion, e.g. cake events with optional charity contributions, 'commit to GET fit' runs/walks, and arts and craft sessions. In addition, social activities such as annual walks on the South Downs and BBQs are organised for faculty and their families.

The REF submission equality and diversity reports below further corroborate the paramount importance attributed to EDI by UoA10. The output selection panel included 5 colleagues (2 women). They met five times and selected papers submitted by authors and based on the evaluation of the ERAs. The age bias is explained by the age of UoA10 researchers.

Table 1 Submit to REF Only (UoA10)

% Headcount	Gender		Disability		Ethnicity			FT/PT		Fixed Term/Permanent		Age Range			Submitted Headcount
	Female	Male	No Stated Disability	Stated Disability	non BME	BME	Not Known/Refused	Full Time	Part Time	Permanent	Fixed Term	< 30	30-50	Over 50	
	21.7%	78.3%	100%		69.6%	26.1%	4.3%	95.7%	4.3%	95.7%	4.3%		87%	13%	23

Table 2 All Staff on Academic Grades (UoA10)

% Headcount	Gender		Disability		Ethnicity			FT/PT		Fixed Term/Permanent		Age Range			Submitted Headcount
	Female	Male	No Stated Disability	Stated Disability	non BME	BME	Not Known/Refused	Full Time	Part Time	Permanent	Fixed Term	< 30	30-50	Over 50	
	18.2%	81.8%	97%	3%	69.7%	24.2%	6.1%	72.7%	27.3%	84.8%	15.2%	6.1%	69.7%	24.2%	33

3. Income, infrastructure and facilities**Support for funding applications:**

Research funding applications are coordinated within MPS by an academic Director of Research and Knowledge Exchange. The University allocates a Research Development Officer providing administrative support for grant applications. All funding applications are subject to formal internal peer review; unsuccessful grants undergo a post-outcome review to improve future submissions. These procedures led to significant improvements in success rates as summarised in Section 1.

Start-up support:

All new faculty receive a start-up package of up to £15,000 for three years for Professors and up to £5,000 for three years for Lecturers/Senior Lecturers. All new appointments during the REF period also received a fully-funded 3.5-year PhD studentship.

Incentive and seed funding:

Staff receive a percentage of overheads income from grants as incentive funding for use in supporting their research. As a minimum, each research-active faculty member receives £1000 per year to support new and ongoing research activities. This has recently been further enhanced as a result of a legacy gift fund.

Research Income:

Research awards have grown by a factor of six compared to the last REF period to £3,279,659. Highlights include a Royal Society University Research Fellowship (**Simm**), three Leverhulme Trust research project grants (**Madzvamuse, Düring, Dashti/Kiss**) and two EU H2020 Marie Skłodowska-Curie Innovative Training Network grants (**Madzvamuse, Makridakis**). Three early career researchers have been awarded EPSRC Starting Grants (**Cagnetti, Georgiou, Koch**). UoA10 researchers have also received smaller grants for research, travel and organisation of conferences from national and international institutions, such as the Royal Society, the Alan Turing Institute, the London Mathematical Society, the Japan Society for the Promotion of Science and the Italian Consiglio Nazionale delle Ricerche.

UoA10 will build on these successes by further developing interdisciplinary and international collaborations that will lead to access to an even wider range of funding bodies, enabled by recent strategic recruitments (detailed in Section 1).

Professional services staff:

Professional services staff to support UoA10 research activities correspond to 7.37 FTE: 1.0 FTE for a research development officer (grade 7) to support grant preparation (pre-award), 1.0 FTE for a research finance officer (grade 7) to support grants (post awards), 1.0 FTE for a research accounts officer (grade 6) and 2.87 FTE for clerical staff (grades 3-5), 1.0 FTE for business development (grade 8) and 0.5 FTE Project Management (grade 7).

Estate and Infrastructure:

UoA10 is located in a single building, facilitating personal meetings and discussions. Research students have personal desks in shared offices of three to five people, and every student is provided with a desktop and/or laptop computer. Academics work in single occupancy offices, while postdoctoral researchers have shared offices. The corridors were refurbished in 2016 and are fitted with energy efficient LED lighting and blackboards for informal discussion. Staff desktop and/or laptop computers have been regularly updated, typically every four to five years.

UoA10 has a dedicated seminar room, with state-of-the-art audio-visual equipment and blackboards, where it runs three of its weekly seminar series.

The library of the university is open 24 hours a day during term time and has an extensive collection of mathematical monographs and provides access to a wide range of relevant

mathematical journals. UoA10 has access to an annual budget to buy new books. Over £45,000 was spent in this regard during the REF period.

Research infrastructure:

High performance computing:

The University of Sussex provides a centrally-managed High Performance Computing environment into which research teams are encouraged to add computer nodes and storage dedicated to their needs. This comprises a University wide service of 1152 computing cores and a parallel file system providing 1PB of local 'scratch' storage. A further 2600 cores, 4 GPU 'nodes' and 250TB of scratch storage have been funded by research groups and schools. In addition to the short-term scratch storage used for computation, the University's Research File system has a total capacity of about 1.8 Petabytes, which is backed-up.

IT Services (ITS) at Sussex are developing a Strategy 'Ahead of the Digital Curve'. With guidance from researchers and research leaders across the Schools, a multi-million pound Roadmap for investment in IT to support the University's research mission is being created, focussing on supporting outcomes in an increasingly data-intensive research environment.

Other infrastructure:

As a further example, in 2018, a NASC faculty (Jensen) has benefited from in-kind access to Google's machine-learning HPC hardware, specifically 105 TPUs for 30 days, where each TPU has 180 teraflops of processing power. Standard pricing is \$6.50 per TPU and hour, this amounted to an in-kind contribution of \$491,400.

4. Collaboration and contribution to the research base, economy and society

International reach:

Members of UoA10 have a wide variety of external and interdisciplinary collaborations both at the national and international level: 100% have published internationally co-authored publications during the REF period, and 100% have presented their results in an overseas seminar or conference. These collaborations are supported by several national and international funding agencies as detailed in Section 3.

Visitor programme:

The department runs a visitor programme and four seminar series (one jointly with the Business School and one with the Department of Physics and Astronomy) with weekly talks during term time. During the REF period more than 300 seminar talks were delivered by national and international speakers. In particular, UoA10 hosted a number of internationally renowned mathematicians who shared their recent mathematical research in workshop and seminar talks; examples are, in alphabetical order: Allaire, Ball, Bertozzi, Bingham, Braides, Brigo, Burger, Cameron, Carrillo, Chambolle, Chemin, Dahmen, Dal Maso, Degond, De Lellis, De Philippis, Elliott, Esteban, Etheridge, Fonseca, Figalli, Fusco, Isett, King, Kristensen, Leimkuhler, Marcati, Mishra, Mori, Nochetto, Scott, Sethian, Seregin, Struwe, Süli, Székelyhidi, Zou.

Contribution to the discipline:

Members of UoA10 have a wide variety of external and interdisciplinary collaborations both at the national and international level. In the REF period, they have produced almost 400 peer-reviewed papers in international journals, they have run successful seminar series where new mathematical ideas are presented and discussed, they have organised conferences and workshops at the University of Sussex attended by world-leading mathematicians, they are active in the organisation of conferences, workshops and research programmes both at the national and international level, they are often invited speakers at conferences and workshops and they serve the mathematical community as editors of international peer-reviewed journals and evaluators of research proposals.

Leadership in the academic community:**Directorship of international research centres:**

Prof. Charalambos Makridakis was seconded to direct the Institute of Applied and Computational Mathematics (IACM) of the Greek Foundation for Research and Technology (FORTH) in Crete.

Establishment of research groups in learned societies:

In April 2020, Prof. Enrico Scalas was one of the proposers of the group PRISMA (PProbability In Statistics, Mathematics and Applications) within UMI (Italian Mathematical Union). The group was later approved and Scalas is a member of its board.

Workshop and conference organisation at Sussex:

During the REF period, 24 [workshops and conferences](#) have been organised at Sussex by UoA10 researchers, with more than 700 participants, including the annual meeting of the Commission for Developing Countries of the International Mathematical Union organised by Prof. Madzvamuse in 2017.

National and international conference and workshop organisation:

Members of the department have been active (either as organiser or on the organising committee) in the organisation of thematic programmes, conferences, workshops, minisymposia and schools both in the UK and abroad. Some examples are:

- **thematic programmes:** Isaac Newton Institute Cambridge six-month programme on *Coupling geometric PDEs with physics for cell morphology, motility and pattern formation* 2015 (**Madzvamuse**), Fields Institute programme on *Delay Differential Equations* 2015 (**Kyrychko**);
- **conferences:** British Applied Mathematics Colloquium 2018 (**Venkataraman**), Mathematics and Science: In Honour of Professor Sir John Ball 2018 (**Koumatos**), ENUMATH 2019 (**Styles/ Madzvamuse/Venkataraman**);
- **workshops:** ICMS 2015 *Gradient flows: from theory to application* (**Düring**), ICMS 2015 *Conference on Partial Differential Equations* (**Taheri**), Sussex 2017 *Mathematical Analysis of Incompressible Fluid Flows* (**Koch**), Oberwolfach 2017 *Emerging Developments in Interfaces and Free Boundaries* (**Styles**), ICMS 2018 *Gradient flows: challenges and new directions* (**Düring**), 2013-2019 *Fractional Calculus, Probability and Non-Linear Operators* (**Scalas**);
- **minisymposia and special sessions:** BAMC 2017 (**Blyuss, Kyrychko** 2017), BAMC 2019 (**Düring**), SciCADE (**Düring** (2015), **Styles** (2017), **Madzvamuse, Venkataraman** (2019)), Dynamics Days Europe (**Blyuss**, 2017, 2019), ECMTB 2014 (**Madzvamuse, Venkataraman**), ECMTB 2016 (**Blyuss, Venkataraman**), ECMTB 2018 (**Venkataraman**), SIAM DS 2017 (**Blyuss, Kyrychko**), SIAM PDE 2017 (**Düring**), ECMI 2018 (**Kiss**), ICIAM 2015 (**Düring, Melgaard, Venkataraman**), ICIAM 2019 (**Blyuss, Düring, Styles**), ECM 2016 (**Düring**), AIMS 2018 (**Madzvamuse**), Numerical Analysis biennial conference 2017 (**Madzvamuse**).

Summer schools delivery or organisation:

Members of UoA10 participated in or organised several summer schools. Examples are: Summer School on Numerical Methods for Stochastic Differential Equations, Vienna University of Technology, Austria, September 2013 (**Düring**), Spring School on Finite Element Methods, Sanandaj, Iran, April 2016 (**Lakkis**), Alan Turing Institute Summer School on Mathematical Aspects of Inverse Problems 2017 (**Dashti**), 46th Winter School in Abstract Analysis, Charles University, Prague, Czech Republic, January 2018 (**Chlebik**), Log-correlated Gaussian fields and random matrices, USTC (University of Science and Technology China), April 2018 (**Simm**), Intensive Programme on Fluids and Waves, L'Aquila, May 2018 (**Lakkis**), INdAM Summer Course on From Markov chains to semi-Markov processes: The consequences of time change, Salerno, June-July 2019 (**Scalas**).

Interdisciplinary research at Sussex:

Faculty members run interdisciplinary projects with Life Sciences (**Madzvamuse**: PhD project leading to a postdoctoral position in the genome centre of the University), Chemistry (**Melgaard**), Engineering and Informatics (**Kiss, Dashti, Jensen**), Global Studies (**Dashti, Lakkis**).

Invited lectures:

Members of UoA10 are often invited as speakers at conferences and workshops. Examples are: Oberwolfach (**Lakkis** 2014, 2016; **Venkataraman** 2015, 2017, 2018, 2019; **Dashti**, 2019), BIRS Banff (**Cagnetti**, 2018; **Düring**, 2019; **Jensen**, 2019; **Madzvamuse**, 2019), Oaxaca (**Düring**, 2017, 2020), Fields Institute (**Blyuss**, 2015; **Kyrychko** 2015), Isaac Newton Institute Cambridge (**Venkataraman**, 2015; **Dashti**, 2018), ICMS Edinburgh (**Styles**, 2015; **Taheri**, 2015; **Kiss**, 2016; **Jensen**, 2017; **Cagnetti**, 2019; **Düring**, 2019; **Styles**, 2019), ICERM Providence RI (**Scalas**, 2018), Mittag-Leffler Institute (**Simm**, 2018), Dublin Institute of Advanced Studies (**Melgaard**, 2015), Institute for Mathematical Sciences NUS (**Düring**, 2019), Instituto Argentino de Matematica (**Melgaard**, 2016), Lebesgue Centre (**Koch**, 2015), Lorentz Centre (**Düring**, 2017), IMPA (**Georgiou**, 2014), ZIF Bielefeld (**Jensen**, 2017; **Simm**, 2018), EPSRC Symposium Warwick (**Koch**, 2016; **Jensen**, 2017; **Düring**, 2017; **Styles**, 2017), LMS-EPSRC Durham Symposium (**Jensen**, 2014; **Lakkis**, 2014), Econophysics Colloquium 2015, 2017 (**Scalas**), SIAM conference on Applications of Dynamical Systems (**Kyrychko** 2017), RICAM (**Jensen**, 2016; **Lakkis**, 2016; **Dashti** 2019), Growth and division in mathematics and medicine at UCL (**Wang** 2019), LMS Invited Lecture Series, Support Lecturer (**Scalas**, 2020), The Tata institute (**Jensen** 2020).

Editorships:

Various UoA10 members serve on editorial boards. Examples are: Computational and Mathematical Methods in Medicine, PLoS Collection on Mathematics of Infectious Diseases (**Blyuss**), Acta Mathematica Universitatis Comenianae, ISRN Discrete Mathematics (**Chlebik**), Foundations of Data Science (**Dashti**), International Journal of Computer Mathematics (**Düring**), Complexity, Far East Journal of Dynamical Systems (**Giesl**), IMA Journal of Applied Mathematics (**Kyrychko**), Computational and Mathematical Applications (**Lakkis**), Royal Society Open Science, PloS ONE (**Madzvamuse**), Journal of Economic Interaction and Coordination, Fractional Calculus and Applied Analysis, Advances in Complex Systems, PLoS ONE (**Scalas**), SIAM Journal on Numerical Analysis (**Styles**), Bulletin of the Iranian Mathematical Society (**Taheri**).

Membership in committees:

UoA10 members are actively shaping the future of learned societies. Examples of committee membership are: LMS Women in Mathematics Committee, Scientific Advisory Committee, Dynamics Days Europe conference series (**Kyrychko**), Isaac Newton Institute for Mathematical Sciences Gateway Scientific Advisory Panel (**Madzvamuse**), LMS Mentoring African Researchers in Mathematics Board Member (**Madzvamuse**), LMS Society Lectures and Meetings Committee (**Styles**), Applied Probability Section of the RSS Committee (**Wang**).

National Panel Memberships:

UoA10 members have participated in the following panels: EPSRC Mathematics Prioritisation Panel Meetings: Nov 2013 (**Kiss**); September 2016 (**Koch**); September 2017 (**Cagnetti**); May 2019 (**Madzvamuse**), Royal Society Future Leaders, African Independent Researchers (FLAIR) (**Madzvamuse**), December 2019 NERC Landscape Decisions Programme Moderating panel (**Styles**).

EPSRC Grant Peer Review:

UoA10 members that have acted as reviewers for EPSRC grants include: **Blyuss, Cagnetti, Dashti, Giesl, Jensen, Lakkis, Scalas, Styles, Taheri**. **Scalas** is a full Peer Review College member.

Other Grant Peer Review:

The interdisciplinary character of our research and the international projection of our researchers is shown by the range of institutions for which UoA10 members acted as referees: BBSRC, Royal Society FLAIR Fellowship (**Blyuss**), Hungarian Department for Researcher Excellence (**Blyuss**), Academy of Finland Mathematics Funding Review (**Chlebik**), European Commission H2020 Marie Skłodowska-Curie actions Individual Fellowships (IF) (**Düring**), European Commission H2020 Marie Skłodowska-Curie Actions Twinning (**Düring**), Swiss National Science Foundation (**Lakkis, Jensen**), UK research council MRC (**Jensen**), Italian Evaluation of Research Quality exercise (VQR 2011-2014 (**Düring**), Italian MIUR Progetti Ricerca di Interesse Nazionale (PRIN) (**Düring, Scalas**), Italian MIUR Programma per Giovani Ricercatori "Rita Levi Montalcini" (**Düring**), Romanian Executive Agency for Higher Education, Research, Development and Innovation Funding (UEFISCDI) (**Taheri**), Netherlands Organisation for Scientific Research (NWO) (**Düring**), Czech research council, GACR Croatian Science Foundation (**Jensen**), German Research Foundation (DFG) (**Styles**). In the period 2013-2020, **Chlebik** has evaluated research proposals for Czech Republic, Finland, Slovakia. **Scalas** has evaluated research proposals for Canada, Croatia, Italy, Sweden, UK.

Fellowships and Prizes:

During the REF period, the following awards were received: Royal Society University Research Fellowship (**Simm**), Royal Society Wolfson Research Merit Award (**Madzvamuse**), Theodore Von Kaman Fellowship, University of Aachen (**Madzvamuse**), John Ockendon prize 2018 (European Journal of Applied Mathematics) (**Styles**), Letters of Gratitude by the Prydniprovsky Scientific Centre of the National Academy of Sciences of Ukraine and of the Ministry of Education and Science of Ukraine (**Blyuss, Kyrychko**).

PGR training networks:

The department is a member of the national MAGIC Taught Course Centre and has been a training site of three international EU Marie Curie Innovative Training Networks: STRIKE – Novel Methods in Computational Finance (2013-2016, associate partner), InCeM – Integrated Component Cycling in Epithelial Cell Motility (2015-2019, full partner), ModCompShock – Modelling and Computation of Shocks and Interfaces (2016-2020, coordinator).

Partnerships outside academia:

UoA10 engages in partnerships with external institutions, where interactions stimulate innovation and contribute to research dissemination. An Innovation Partnership Fellow and the Research and Enterprise services assist in many activities, including: providing opportunities for working with companies and helping with the legal aspects of collaborations. Examples include:

- The Sussex Research Impact fund supported (£3k) a three-day study group funded by KTN with an additional £12k on *Mathematics in Energy Systems*, organised by **Jensen, Scalas** and **Duncan** together with **Innovate UK's Knowledge Transfer Network**. **National Grid** and **Williams Advanced Engineering** presented problems at this study group (see also Section 1 under the subsection Impact).
- **Kiss** received £5k from the Sussex Research Development Fund to support a feasibility study which led to a PhD studentship half funded by **Aviva**.
- **Madzvamuse's** postdoctoral fellow was funded by MPS for a full year to work on a cell-tracking code together with **TissueGnostics**.

Research in Mathematics from Sussex in the REF period had impact on the following specific beneficiaries:

- **Ambiental Technical Solutions** collaborated with **Lakkis** on *Numerical methods for flood risk assessment*;
- **Blyuss, Kyrychko** worked with **Ukrainian authorities** on *Combating crop losses and improving global food supplies through mathematical models and "gene silencing"*;
- Research-led **public engagement and outreach** has captured public interest in mathematics (**Georgiou, Jensen**);

- **Kiss** has a student paid by a fully industry funded PhD studentship and started a collaboration with **Moogsoft**.
- **Kiss** is working on *Big Data Machine Learning for Human Behaviour Modelling* with **Quotemehappy.com/AVIVA**.
- **Jensen** received an *Innovate-UK grant on Electrical and thermal storage optimisation in a VPP* (£238000) together with Engineering within an industrial collaboration with **Sunamp** and **Moixa**.
- **Blyuss, Kyrychko** developed a freely available interacting online COVID-19 simulation tool for any UK region featured on **FutureNHS** on the list of national dashboards.
- **Madzvamuse, Van Yperen** worked with **Sussex public-health authorities** on predicting and forecasting the impact of local resurgence and outbreaks of COVID-19.

Further collaborations included:

- Practitioners in industry and policy making interested in quantifying uncertainties and risk assessment (**Scalas**).
- Medical doctors and patients undergoing heart surgery, where statistical analysis of real-life data by the current members of the growing Probability and Statistics group has contributed to the shaping of medical-practice guidelines and the improvement of patient-health outcomes (**Robinson**).
- People and communities in developing countries, where epidemiological modelling by the Mathematics Applied to Biology group contributed to the development of mitigating policies for meningococcal infections in sub-Saharan Africa (**Blyuss**).

Industrial Research Talks:

UoA10 members gave presentations at industrial conferences (e.g. **Madzvamuse** at InCeM Symposium on Cell migration 2018; **Venkataraman** at InCeM workshop 3, Vaals, Holland, 2016), hosted visitors from industry interested in their research (e.g. **Jensen**, South East R&D of Electricité de France, 2019) and industrial seminar speakers (e.g. Ecker, **TissueGnostics**, 2018).

Public engagement:

UoA10 members have communicated their research and mathematics to a wide range of audiences and through different media outlets. In this REF period the number of outreach activities increased by a factor of 5. Examples include:

- Since April 2020, **Madzvamuse** leads the *UK-Africa Postgraduate Advanced Study Institute in Mathematical Sciences (UK-APASI)*. This initiative is supported by an EPSRC-GCRF grant, to deliver research and pedagogical activities around fundamental global development challenges with partners from over 40 universities in the Sub-Saharan African region;
- Since 2017, **Georgiou** regularly creates puzzles based on mathematical theorems for the BBC Radio 4 *Today* show which reach and engage thousands of listeners in the UK;
- **Georgiou, Kiss** and **Scalas** wrote four articles for *The Conversation* discussing large deviations for polling on the Brexit referendum, queuing theory, mathematical epidemiology and prisoner's dilemma. According to *The Conversation's* analytics, these articles have been read, from that website alone, more than 125,000 times. The articles have also been used by international news agencies such as *Newsweek* and have been translated to several languages by international newspapers;
- Four researchers (**Blyuss, Cagnetti, Kyrychko, Scalas**) described their research activities to a wider audience of Brighton and Hove residents at the *Nerd Nite Brighton* in March 2016;
- Various members of the department have given a number of *Sussex POP lectures* each term to undergraduate students and the wider audience at Sussex, organised by the Sussex University Maths Society and University of Sussex Students' Union;

- **Jensen** and Skarvelis-Kazakos (Sussex Engineering) had a stand at the Rushlight show in January 2019, discussing the results of their Innovate UK project.
- **Blyuss, Kiss, Kyrychko** have appeared in expert comments on COVID-19 since January 2020 in numerous media outlets.