

Making space for interaction



Improved interaction is a key motivation behind the Department of Mathematics' £500,000 building refurbishment plans, due to be completed by September. Come the start of the academic year, it is planned that undergraduates will have a new quiet study area and social space, staff and postgraduates will have an expanded and refurbished common room, and visitors will arrive to find a welcoming reception area.

The department has seen huge success over the past five years and has expanded rapidly, far outgrowing its building. Staff members are spread across eight buildings and more space is needed for students and staff to meet and work. The University had developed plans for a new building

for mathematics, but these are currently halted. In the meantime, the refurbishment will meet the department's most pressing needs.

'Firstly, we want to provide better facilities for undergraduates. The other key element is interaction. We want to create buzzing spaces where people can meet,' explains Professor Noah Linden. 'Interaction is crucial for mathematicians; the most exciting breakthroughs often happen as a result of chance meetings or incidental exchanges.'

Professor Linden believes the refurbishment will make a big difference to students and staff. 'It will build the sense of collegiality that's so important.'

Dr Ivor McGillivray has won the University of Bristol Students' Union 2010 Teaching Excellence Award. The award celebrates Bristol staff whose teaching is of a particularly high standard. The panel of students received over 50 nominations for just six awards. Dr McGillivray was nominated by students in mathematics.



Welcome

This newsletter gives you just a taste of the range of exciting activities taking place in the department. As you will see, there's a lot of talk about 'interaction'. You'll also see that there's a lot of it going on, whether that's students working with local schools or the extraordinary films made to give the public an insight into the world of mathematicians and their research.

We're very keen to 'interact' more with our maths alumni, and it was great to see some of you visit the department during the Centenary Alumni Weekend in July. We've set up a new web page for maths alumni at www.maths.bris.ac.uk/people/alumni. Please do have a look and let us know what you think.

Professor Guy Nason
Head of Mathematics

Inside



Becoming an FRS



The future of maths



Inside ethnographies

Becoming an FRS

Last year, **Professor Jon Keating** (PhD 1989) (pictured right) was elected a Fellow of the Royal Society (FRS). The fellowships are given to the most eminent British and Commonwealth scientists, engineers and technologists. Jon explains what becoming an FRS meant to him.

'I suppose it's something I dreamt of, or secretly aspired to. Until recently, I never imagined it would happen to me. I was the first person from my family to go to university. At school, I never thought I'd go to university, never mind get a PhD, become a lecturer, and become a Professor. With each step you get closer to believing the next step is possible.

'I see the fellowship as an endorsement of the body of research that's gone on at Bristol before me and that will continue after I've left. It not only recognised my contribution, but also the education I received here at Bristol, and the education I try to give to my own students. This has not been a solo journey. I was a PhD student at Bristol, and my supervisor, Michael Berry, who is himself an FRS, has been a mentor throughout my life. I'm grateful for that, and I try to offer this mentorship to my students. The University has been supportive of my research. I have excellent colleagues. Also, when I first came to Bristol my position was funded by Hewlett Packard. I'm indebted to them.

'One event I'm looking forward to the gathering of all the Fellows. This happens once every 50 years. I was lucky to be elected when I was as it's happening later on this year.'



The future of maths

Bristol maths students are gaining teaching experience and credits towards their degree through a scheme that encourages undergraduates to work in local schools. **Eamon Brennan** (Maths 2007-) reports on his time as an Undergraduate Ambassador.

'It's competitive to get on to the Ambassador scheme. They're looking for people who work hard, get good grades, and are aware of teaching issues today.

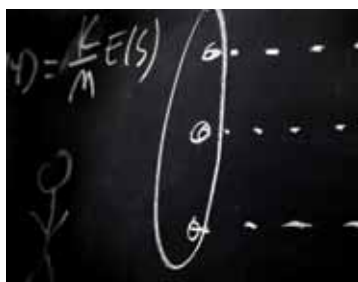
'I was based at St Bede's Catholic College, a comprehensive in Lawrence Weston. The kids I taught were GCSE level. My aim was to help the ones who were struggling to get the grade they needed. I hope I inspired a few to study maths at a higher level as well. I guess I showed them that maths isn't a dusty old subject.

'When I was studying maths at GCSE level I had a fantastic teacher. His sheer enthusiasm for the subject inspired me. He influenced the way in which I

taught and the approach I took. I applied for the scheme partly because I wanted to gain some new skills, such as presenting – the kind of thing that employers will be looking for. Maths students often don't get much opportunity to develop these 'soft' skills.

'One of the biggest things I learnt is how to communicate well. You need to be able to get your point across clearly at the first attempt. You have to lead your class through an idea. You can't just tell them what the answer is; you need to help them understand so they can work things out for themselves. You need to be aware that some of the kids don't know the basics. You need to take yourself back to when you were that age and think 'How did I learn that?'

'It was a taste of teaching maths. I'd definitely recommend it to other maths students. It's great fun, you get loads of new skills, and it reminds you that there is a real world out there beyond the university bubble.'



Mathematical ethnographies

Is doing research in mathematics a creative process? When mathematicians talk of their subject as beautiful, what do they mean? What are their motivations? Their dreams? Their disappointments? These themes were explored in the collection of short films produced by Chrystal Cherniwchan, Azita Ghassemi and Professor Jon Keating. The films, which were part of the Mathematical Ethnographies Project, were funded by donations from alumni. Below, Chrystal, Azita and Jon give an insight into the making of the films.

JON

'I love my colleagues and the way they behave. As scholars, I find them thoughtful and deeply interesting. I wanted to find a way to showcase them. I like people to be able to express things in their own words, so I imagined a documentary. But I didn't have the resources or skills to develop it – until Chrystal came along. I chatted to her about my idea and she immediately latched on to it. She went away, researched the art/science interface and came up with the idea. Then the project just took off.

'The public response has been fantastic. Not everyone loves the films – but we didn't necessarily expect them to. These are serious films not fluffy pieces, so they're not going to be everyone's cup of tea. We hope they challenge as well as entertain. We've started to show the films to groups of undergrads. It gives them an insight into what motivates researchers.'

CHRYSTAL

'Jon wanted to somehow capture and celebrate the people here in the department. My background is in the arts – I majored in

photography – so it was easy to visualize this project and get excited about it. The Alumni Fund deadline put fuel on the fire – we had a short time to prepare and submit the proposal. We interviewed almost everyone in the department – approximately 60 people. We decided to focus on five questions. We started out with more, but it soon became clear which ones were firing imaginations. This was my favourite part – listening to people's stories, their passions.

'I'm interested in exploring the classic divide between science and art, if indeed there is one, and am currently planning future projects that touch on this theme. When I joined the department, I was struck by the creativity, the excitement, the collaboration, the sharing of ideas – it reminded me of being at art school.

'We screened the films at the Arnolfini and were full to capacity. It was great to see people – staff, students, alumni and the general public – of all ages and all backgrounds come along because they were genuinely fascinated by the mathematicians here at Bristol.'

AZITA

'I've been making films for the past six or seven years on and off. So my main role was the actual film-making – the editing and camera work.

'One of the challenges was the sheer number of people to interview. Then there was the daunting task of editing 100 hours of footage. I had to prepare for it psychologically – one video at a time. I was up late into the night! I find this the most interesting stage of film-making though; you have all these fragments of footage and interviews, then there's a point where the whole thing comes together.

I was generally surprised by the answers. I hadn't realised how much of an emotional roller coaster mathematical research is. It seems to me to be the most extreme form of research, with the highest highs and the lowest lows. The endurance that's needed is incredible. Then the reward is a moment of discovery that they might never get.'

www.maths.bris.ac.uk/research/videos/

Project day

Maths students were given the chance to hone their skills by presenting their final-year projects to staff and students at the department's first-ever Project Day held on 7 May. Anna Beresnevich's (Mathematics Erasmus 2009-) topic was 'Martingales and their Applications'. She presented 'the Mabinogion sheep problem'.

'In a beautiful river valley, there is a flock of black sheep on one side of the river and a flock of white sheep on the other, each with the same number of sheep. Then, at discrete times, any (random) sheep bleat. If a white sheep bleats, one of the black sheep crosses the river and turns white; if a black sheep bleats, then one of the white sheep crosses the river and turns black. The process stops when all of the sheep are the same colour.

'An interesting conundrum is whether we can define a method that maximises the final number of black sheep. The following method is proven to be the best: if we have a larger population of black sheep than white sheep, we need take no action, otherwise we need to change the situation in our favour by removing white sheep. The same question was asked during the presidential campaign in France in 2007, where two candidates were running for president, and this method was used to model the voters' choices.

'It was interesting to listen to other presentations and compare the results. You can always learn a lot of new things from people, and the questions asked were useful for developing my project.'

student focus: maths cafe

Coffee meets calculus at the Maths Café, where final-year students have been helping second years delve deeper into the world of maths. Huw Wells (Maths 2006-) and Harriet Bass (Maths 2007-) talk about their role as student teachers.

HUW

I was basically hijacked into doing it by the undergraduate co-ordinator for maths, because I got good exam results. Also, I thought it was a good opportunity to improve my presentation and teaching skills.

'It's good practice. You go in cold and the students ask the questions. There's no time to prepare. At first it's nerve-racking, but I found it was actually a good way to teach. I'd make mistakes and go down blind alleys. The students got to see the process of working things out. You don't necessarily get exposed to that during your degree – you're more likely to be on the receiving end of presentations or lectures.

'The students who got involved were generally the top ones who wanted to extend their knowledge of the subject – to feel around it. The biggest thing the students get out of it is the interaction. The Maths Cafe sessions tend to be more fluid and give people the time they need to explore things. Also, students are more relaxed with other students. They can say what's on their mind, and not worry if it's right or wrong.

'I've learnt a lot, including how to keep calm when presenting – to step back, pause and think. I'm going to do a PhD in Quantum Mechanics here at Bristol. I'll be giving seminars, so it feels like I've had some great practice.'

HARRIET

'The experience has been a really positive and enjoyable one for me. The skills it's given me? I've learnt to write on a blackboard! It's been great to develop my presentation and coaching skills. I've also learnt how to put an idea across clearly. A lot of maths students have a problem explaining what's in their head.

'I worked differently depending on the size of the group. If a lot of people turned up, I'd get them to work individually. If there were just a couple of people, we'd work together on a problem. People learnt from listening to other people.

'Word of mouth soon got people coming along. One guy turned up who was having a difficulty with probability, which we went through together. The next time he brought all his friends along.

'I think some students are a bit scared to ask their lecturers questions, because they don't want to look stupid. They feel more at ease with me, so they can be more open.

'My area is statistics. I'm hoping to do a PhD when I finish. My experience of coaching will definitely help me if I need to take tutorials. I work hard and I think that I got that across to the other students – if you put the effort in you will be rewarded.'

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