

## MIGSAA Students' Experience of Outreach

A number of MIGSAA students are involved in public outreach events, primarily through the University of Edinburgh Mathematics Outreach Team (MOT). The MOT is a group of undergraduate and postgraduate students, and staff, who organise events to communicate their passion for mathematics to the wider community. These events include school talks, Royal Institution Masterclasses for S2 students, mathematics art projects. However, the two highlights of the programme are taking part in the Edinburgh International Science Festival (EISF) (<http://www.sciencefestival.co.uk/>), which is one of the largest science festivals in Europe, and organising the Edinburgh Maths Circle (<http://www.maths.ed.ac.uk/school-of-mathematics/outreach/maths-circle>), which is an opportunity for children aged 5 to 16 and their families to take part in afternoons of fun and stimulating hand-on mathematics.

In the past two academic years, MIGSAA students and staff have been instrumental in organising these events. For the 2016 EISF Zoe Wyatt and Ben Goddard helped to design posters and activities for a public drop-in event entitled 'Finding the Arc in Architecture', which focussed on the, sometimes surprising, contributions of mathematics to the design of buildings and other structures. The exhibition was visited by around 3000 people over the course of five days and MIGSAA members were amongst the volunteer helpers who explained the activities to the general public.

For the 2017 event, which is still in the planning stage (it will take place on 6-10th April 2017), MIGSAA students are taking an even more central role. The event is based on the theme 'Maths: Connecting Our World', and MIGSAA's contribution will focus on the applications of analysis to areas such as signal processing and communications. Zoe Wyatt, Aleks Plochocka, Nora Tanner, Paul Dobson, Isabelle Hanlon and Ben Goddard are contributing to all four or five main activities designed for the EISF, and are taking the lead on at least two of them, providing a substantial boost to what would otherwise be possible. In addition, it is particularly exciting to be able to present current research topics to the general public; this is one of the main aims of the universities' contribution to the EISF, but requires the input of postgraduates and staff, which in the past has not been a main focus of the MOT's contribution.

The Edinburgh Maths Circle was started in 2015 by Zoe Wyatt who helped out at similar events in Cambridge as an undergraduate. Each Maths Circle is a 3-hour session where children and parents can drop-in and attempt some of the many problems spread across tables. The problems are labelled according to age group and difficulty. So far there have been four Maths Circles, averaging around 250 children and parents each time, with the most recent event attracting 310 parents and children. There are around 10 helpers, namely undergraduates, postgraduates and staff, who walk around to offer suggestions and advice to the children. The aim of the Maths Circle is to expose children to mathematics in a fun and relaxed environment. The focus is not on correct answers, but rather on getting children to think creatively



about problem solving and how to logically analyse a problem and write down their ideas in a structured manner so they can come to an answer. There are no solutions provided and most problems are asked in an open-ended way so that children can make generalisations based on the results they have found. The problems are mainly sourced from NRIC in Cambridge, as well as some other problems from the Edinburgh Mathematics Outreach collection, however, a MIGSAA student has written new problems for the most recent Maths Circle and there will be more opportunities for this in the future. Further events have been run in local schools and there is definitely scope for organising an event at Heriot-Watt in the future, hopefully strengthening MIGSAA involvement. Finally, it has brought us another industrial link through sponsorship by Rathbones, an Edinburgh Investment company.



Another event being organised for 2017 with a strong contribution from MIGSAA (including Zoe Wyatt, Aleks Plochocka and Ben Goddard) is an event for the Festival of Creative Learning (<http://www.festivalofcreativelearning.ed.ac.uk/>), which aims to organise innovative learning events for students, staff and the general public. Our contribution will be a mathematics-themed 'escape room', in which teams of people are locked in a room and need to solve a series of puzzles to escape. In our case, these are mathematically-themed but require minimal mathematics knowledge to ensure accessibility for a wide audience.

As well as benefitting these events, the MIGSSA members involved in the MOT receive training in a wide variety of skills, including presentation to general audiences, communicating ideas at different levels, and in designing activities.