**Bath Royal Institution Mathematics Masterclasses 2023**

All start at 10.00am and finish at 12.30pm and will be held in **8W University of Bath**

28th January **Sarah Penington and Cecile Mailler.**

Algorithms without a computer

In this masterclass, we will learn the basics of programming using only pen and paper, and think about how to make the algorithms we design as efficient as possible. In particular, we will look at different methods for finding prime factors and sorting a shuffled deck of cards, and then compare their efficiency.

4th February **James Davenport**

*Cryptography*

25th February **Karol Bacik and Christian Rohrbeck.**

*Recursion: On cauliflowers, snails and dragons*

Recursion may sound like an off-putting mathematical term, but all you need to understand it is… a cauliflower. If you cut out one floret, you may notice that it looks very much like the whole vegetable, just smaller. Take the floret apart, and what you get is a tiny copy of the cauliflower again. In this sense, cauliflowers are a bit like Matryoshka dolls, one inside another. This repetitive action, where we keep splitting cauliflower into smaller and smaller pieces, is just one example of a recursive process. In this masterclass, we will introduce the mathematical basics of recursion, and discuss some other recursive objects, such as snail shells or dragons made from a sheet of paper.

4th March **Mark Lewis**

*How to a-maze your friends*

 A masterclass looking at mazes. We will use look at how maths can help us to model and solve complex mazes. In particular, we’ll investigate how we can create our own mazes from initial seeds by following an algorithm and how we might be able to use maths to help us solve mazes.

11th March **Benjamin Galbally**

*Seeing Behind the Curtain... a crash course in Group Theory*

In mathematics, we often find that things which at a first glance appear different may in fact behave in a similar way. Over the course of the masterclass, we will investigate the properties of remainders, symmetries of regular shapes, and reorderings of numbers and reveal a surprising connection.

18th March **Communicating Maths students.**

*TTBA*

25th March **Communicating Maths students**

*TTBA*

*In reserve if needed Chris Budd and Matt Roberts*

We are grateful to the Heilbronn Institute, the University of Bath, and the University of Bristol for supporting the RI Masterclasses.

Chris Budd. 5/1/23