BRISTOL MASTERCLASSES 2021-2022

5 Feb 2022 Nina Snaith (University of Bristol, School of Mathematics)

Keep your distance

What is similar about people queuing in COVID times, buses in Mexico, locations of birds' nests and DNA? We are interested in the space between things and the mathematics that models this.

Please bring a notebook and something to write with.

12 Feb 2022 Harriet Mills (University of Bristol, Social and Community Medicine)

How networks rule the world!

Networks are everywhere in the world around us, for example: travel, computers and social networks. In this session, we will look at the role that networks have in the spread of an infectious disease, explore simple ways we can model disease spread over populations and how we can use network structure to stop the disease.

You will need a pen and notebook for this session.

5 Mar 2022 Penny Whiting, Jessica Watson and Hayley Jones (University of Bristol, Bristol Medical School)

Have you ever had a swab test for COVID-19? Do you know what the results meant?

We will explain how the accuracy of tests is measured using maths. We will explore how maths can be used to understand the meaning of COVID-19 test results using something called Bayes' theorem. You will have a chance to put this into practice, based on real-life patient stories, with some surprising results!

You will need a pencil and some paper.

12 Mar 2022 **Catherine Hobbs** (University of the West of England)

Using Mathematics to keep secrets

Secret codes have been around for almost as long as we have been using the written word, and are just as relevant today as they were to military commanders thousands of years ago. We now use them (probably without be aware of it) every time we use the internet! We'll look at a number of ways of using mathematics to create secret codes, and also look at how maths can be used to break codes. You will have a chance to pit your wits against others in the class to see who is quickest at breaking codes and who can design the sneakiest messages that make it hard for others to break!

You will need to have pen and paper with you.

19 Mar 2022 **Cameron Hall** (University of Bristol, Engineering Maths)

How does a calculator calculate?

Calculators and computers are great tools for doing calculations quickly and accurately. But how do they do these calculations using electricity running along wires? How do computers add and subtract? How do they multiply and divide? How do they do more complicated functions like square roots? What sorts of problems do computers find hard? When might computers have problems with accuracy? In this masterclass, we'll look at how calculators and computers do arithmetic – you'll learn about the different ways that computers represent numbers and about how computers process electrical signals to do arithmetic. Along the way, you might learn some new ways of doing calculations yourselves!

You will need some paper and something to write with. It will be useful to have a calculator with you but it isn't necessary.

26 Mar 2022 **Alison Rust** (University of Bristol, School of Earth Sciences)

The Mathematics of Volcanoes

Volcanic eruptions are spectacular but also damaging and dangerous. We can't stop magma spewing out of the ground but understanding how volcanoes work helps us to make decisions that reduce their harmful impacts. In this session you'll learn about the fundamental importance of mathematics to a range of topics in volcanology from how quickly magma erupts to predicting where it will end up.

Please bring a notebook, a ruler and something to write with.