



Lancaster University

Maths at Lancaster University

MATHS – EXPLORING SHAPE AND SPACE

Geometry has been a major part of mathematics since the days of the Ancient Greeks. This course will explore some of the different questions arising from geometrical problems from 2000 years ago to the present day. You will meet concepts from university-level mathematics and experience what it is like to study mathematics through formulating problems precisely, looking at examples, generalising and applying logical argument and proof.

What's it all about?

We will explore topics including:

- Combinatorial geometry: e.g. the construction of the five Platonic solids (and why there can only be five!).
- Discrete geometry: if we connect some rods together by some joints, when is the result rigid or flexible? This is an interesting pure mathematical problem with some very applicable answers from small scales (understanding atomic lattices and crystals) to the large ones (construction of bridges).
- Topology: how might we formally capture the idea that two different-sized squares are “the same shape”? We need to ignore lengths and focus on how shapes are joined together – this is what topology does.
- Fractal geometry: fractals arise when simple geometric patterns are repeated to infinity but surprisingly also occur in nature. Fractals can have dimensions that are not whole numbers – you will find out what this means!

What will I be doing?

- Short lectures introducing problems and techniques
- Mini-projects based on the lectures
- A major group project, extending the mini-projects
- A presentation of your project results to the other participants
- Experiencing university academic and social life in lecture rooms, computer labs and halls

Would this course suit me?

If you think you would like to study mathematics at university, then yes! You will need to be studying A Level Mathematics or an equivalent course, such as International Baccalaureate Mathematics HL.

Exposure to Further Mathematics is advantageous but not required. If you are interested in problem-solving and exploring new ideas through logical thinking, this course will suit you. It will contain both pure and applied aspects of mathematics and show how these interact with each other.

Course dates: Monday, July 25, 2022 to Thursday, July 28, 2022 (3 nights residential)

Course cost: £375

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