Imperial College London

A UROP perspective by Joshua Liddicott

Summer 2023 (undertaken in the Department of Mathematics)

Joshua was a year 2 undergraduate at Imperial College London in 2022-2023: MSci Mathematics with a Year Abroad, Department of Mathematics.

UROP title: Topology

A favourite Year 2 Maths module was Analysis II by Dr Davoud Cheraghi. Amongst the many topics covered there was topology, but, after the week it took to cover it, I was left wanting more. I particularly wanted to know why it would sometimes be more useful than the notion of metric spaces, and where it fits into the field of maths.

After discussing with Dr Cheraghi t the possibilities for a UROP in this area, I was later pointed by another member of staff to Dr Noah Porcelli.

Dr Porcelli and I met and discussed the potential for a 6 week project and eventually settled on two objectives, firstly working up to my explaining a paper back to my supervisor, and then the remaining time would be dedicated to something more complex such as manifolds. As part of preparing for the project, I agreed to study some notes Dr Porcelli provided to ensure I was at a suitable level before beginning the 6 weeks.

The actual project involved meeting with my supervisor twice a week to share progress, to consolidate understanding, as well as to receive pointers on more challenging aspects. In the end manifolds ended up being the initial focus, with this later becoming a study of a proof for the classification of all closed and connected compact surfaces. After explaining the initial results back to my supervisor, I had the opportunity to extend the results to all compact and connected surfaces which I succeeded in doing.

I have increased confidence in my capacity as a mathematician, my ability to do research-style maths, and have learnt new ways of tackling problems. This has certainly made me consider more seriously whether research is something I will pursue. I am very grateful to Dr Noah Porcelli for his time and advice, and particularly his pushing me to work at problems that initially seemed too difficult.