

## Jared White: Teaching Statement

### **Experience**

During my four years at Lancaster university as a PhD student I worked as a graduate teaching assistant (GTA). The undergraduate teaching at Lancaster was organized around workshops, which are one or two hour classes during which students work through exercises. As a GTA I would lead between one and three workshops per week, usually with another GTA. My duties included marking students' homework, giving feedback on the homework, and helping the students with exercises during the workshop. I would often go through solutions to exercises or recap key proofs on the board during a workshop. Last year I was winner of the first annual award for GTAs in the Department of Mathematics and Statistics at Lancaster.

In addition, I was employed at various times to cover the work of absent lecturers. This kind of work was not typically offered to graduate students. This included giving revision lectures, marking exams, and covering the lecturer's office hour, which involved helping students on an individual basis who came to my office with questions. The particular subjects involved were second year Complex Analysis, and a third/fourth year course called Hilbert Space.

The maths course at Lancaster comprised a three year undergraduate degree, with an optional fourth year leading to an integrated master's degree. I taught students in all four years, mainly taking pure maths courses. The modules I taught were called: Real Analysis; Linear Algebra; Groups and Rings; Number Theory; Groups and Symmetry; Rings, Fields, and polynomials; and Hilbert Space. I also led problem solving classes, which were workshops for first year students aimed at improving their general problem solving skills and mathematical maturity. I would also feel comfortable teaching a broader range of topics, including other pure subjects, such as combinatorics, as well as methods courses, such as calculus or differential equations. Indeed, I have had some experience teaching these subjects when covering for other GTAs.

I am enthusiastic about communicating mathematics, and also about widening participation, and for this reason I volunteered each year that I was at Lancaster as a helper for 'Florence Nightingale Day', a maths activity day run annually by the university for girls aged 15–18. My job was to help with a mathematics quiz by acting as a 'coach' for a team of about eight girls, and to talk to the girls over lunch about studying mathematics at university.

I was also employed by Lancaster University for three years running to give two or three 'mini-lectures' per year to prospective mathematics students. In my case this was typically a twenty minute lecture about prime numbers. Only three or four postgraduates were asked to do this each year.

Unfortunately, as my current position is for only one year, and because teaching here is conducted in French, it has not been possible for me to teach this year. However I continue to be passionate about teaching and communication, and I am continuing to give talks to audiences of postgraduate students.

### **Philosophy**

As a teacher of mathematics my central aims are twofold. Firstly, I aim to help my students to understand course material that is often abstract and complex, to develop problem solving skills, and to gain a perspective on the scope of mathematics more broadly. Secondly I aim to communicate something of the beauty and intrigue of mathematics, with the hope that the students might more easily foster a deep passion for the subject, as I have. I find in general that these aims reinforce one another. Below, I shall outline something of my approach to achieving these outcomes.

One of the main challenges faced by students of mathematics, especially pure mathematics, is digesting the large volume of abstract ideas and definitions that come their way. I believe it is important to explain where each idea fits into the wider story: where does it come from, what is it used for, and how might you (the student) have come up with it? Similarly, when going through a

proof I usually try to give the argument as much of narrative feel as I can. I believe that this aides both understanding and retention of the proof, and often makes it more enjoyable as well. For example, when introducing students to the formal definition of convergence in terms of epsilons, I often like imagine that the students are giving me smaller and smaller epsilons, each time forcing me to find an  $N$  such that the sequence is within epsilon of its limit after  $N$ .

Another way that I employ this narrative technique is by explaining a proof by telling the story of how I might have come up with the proof myself. This is nice in part because it can lend a sense of discovery to the demonstration, but it also fits in with another of my key teaching philosophies. Watching a tutor go through a proof or a solution to an exercise should act a way for the students to witness the process of mathematics as done by an expert. The students should have the opportunity to see the process of creating a proof, so that they themselves might build on this when they have to come up with their own proofs. For me this is one of the most important functions of a lecture, since it is something that the students cannot easily gain from reading the proof in a book.

It is important to remember that students often do not have the same knowledge of the goals of mathematics that a maths teacher has, and it is often necessary to spend time motivating the course material and putting it into a wider context. For this reason, when I was a graduate teaching assistant at Lancaster, for certain subjects I would take the initiative to prepare some additional material and spend 3-5 minutes of the workshop presenting it to the students. For instance, when teaching a third year course on commutative rings, I would outline for my class applications to problems in number theory, as a way of motivating concepts such as unique factorization domains. The students told me that they really valued this part of the workshop.

When teaching I present myself in a friendly and approachable way, and I am always certain to make sure that the students feel that I have time for them. I encourage students to come to my office outside of class if they want help, and this offer is often taken up. I also encourage students to work together and to help each other. Although I think that it is important for students to spend a certain amount of time trying problems by themselves, I think that the students learn more when this is balanced with time spent working together. Indeed, when one student asks another for help, it is usually the case that both students benefit from the exchange.

For me, the relationship between student and teacher is a very important one, and I see myself teaching for the rest of my career. I bring to my classes a genuine passion both for education and for the subject being taught. I hope to continue to make a valuable contribution to learning at in my next position.