

Dear Freshers

We are looking forward to welcoming you to Wadham in October. This letter is to help you prepare to start a Mathematics degree. We are the three tutors who will be organising your first year tutorials and we are writing with suggestions based on our experience of what it is like for new students.

Roughly speaking, the ‘applied’ courses are something like a continuation of your school work, but at a much faster pace. The ‘pure’ courses (Analysis and Algebra) will come as quite new to you, and in fact may come as rather a shock. To help you prepare for this step-change, there is an excellent guide called ‘How do Undergraduates do Mathematics?’:

<http://www.maths.ox.ac.uk/system/files/attachments/study_public_1.pdf>

This has a lot of general explanation but also some detailed material illustrating how the degree course will demand a new level of logical thought and careful writing out of proofs.

We expect you to ensure that you are completely familiar with all your A-level or equivalent school work. Apart from a couple of lectures on complex numbers, there is nothing in the way of revision or refresher material. It is up to you to fill in any gaps. For this purpose there is a special page

<http://www.maths.ox.ac.uk/study-here/undergraduate-study/practice-problems>

**which you should work through** (in the first week of Michaelmas Term we will be running tutorials to discuss your solutions to these problems). You do not necessarily need to write up detailed solutions for exercises you can confidently solve, but please do keep a note of which problems you found novel or difficult so that you remember to discuss these in Week 1 tutorials. Your school text-books should be enough, but there is a recommended book, *Mathematical Techniques,* D W Jordan and P Smith, OUP, 2008, which would give extra depth. As a particular and important example, you must regard the Taylor series in sheet 5 as being as basic as 2+2=4. At school you may have thought of these series as a collection of various weird facts, safe to forget about. But in the degree course they become central. Both in Applied and Pure courses you will be at a great disadvantage if you are not fully at home with the geometric, binomial, logarithm, exponential, sine and cosine series.

We would encourage you to work your way through Siklos' Advanced problems booklet, the PDF version is freely available here:

<https://www.openbookpublishers.com/product/1050>

The solutions are particularly rewarding as they guide you through the thinking process required to problem-solve.

As a more general kind of preparation, it is a good idea to read more about modern mathematics to give you some idea of where you are heading. The books of Ian Stewart and Marcus du Sautoy, for instance, will lead you into fascinating topics.

An especially beautiful and classical overview of Mathematics is the book:

*What is Mathematics?: An elementary approach to ideas and methods* (R. Courant and H. Robbins, Oxford paperbacks).

There are many Internet resources which you may find interesting to browse. The Wikipedia articles on almost any topic in mathematics have become rather good over the past years: for example, if you need a precise definition of a mathematical term, just google for the term and add ‘wiki’ (for instance search for ‘wiki vector space’).
<http://en.wikipedia.org/wiki/Mathematics>

With best wishes —

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