1 Aims and scope

Anyone who engages in research level mathematical writing—in particular, any PhD student in mathematics—has to deal with a number of issues, ranging from the purely technical (e.g., how to do something in \LaTeX{}), to proper English usage and good exposition, and to the question of how to get a paper published. The quality of the writing in a paper can make a difference in whether the paper gets accepted for publication, and in the impact it has once it does get published. A well-written paper is likely to be read by more people, and leave a better impression with its readers, than a poorly written one.

This course is aimed primarily at advanced graduate students who are at, or close to, the stage of writing up a thesis and/or preparing a paper for submission to a journal. Its goal is to help such students in this process by teaching them good writing skills and techniques.

2 Course topics

Below are some possible topics for this course. Because of the limited time available, not all of these can be covered in depth, so some choices have to be made, depending on the background and interests of the audience.

- **Advanced \TeX{}**: The course is not intended to be an introduction to \LaTeX/, but cover more advanced topics and, most importantly, teach good \TeX{} practices.
- **Mathematical typesetting**: Conventions and aesthetics of mathematical typesetting; issues like when to display a formula, when to number a formula, etc.
- **English style**: Proper English usage in mathematical writing; spelling, punctuation, grammar, and style.
- **Exposition**: This covers a wide range of issues such as how to structure a paper; how to write a good introduction; how much detail to provide; when to call a result a theorem and when to label it as a proposition or lemma; how to present complex arguments; etc.
- **Mathematical publishing**: An overview of journals in mathematics and the publication process.
- **Refereeing**: What refereeing is all about, what to expect (and what not to expect) from a referee, and (possibly) how to go about refereeing a paper.
3 Course details

- **Prequisites:** No formal prerequisite, but students should be at, or very close to, the point in their graduate studies where they have to do some research level writing, whether it be a PhD thesis or a paper.

- **Text:** There is no required text. Below is a list of books on mathematical writing. All of these will be available on reserve in the Mathematics Library, and some of them may be worth purchasing. However, while such books are useful, mathematical writing is best taught through examples—both good and bad ones. Thus, I expect much of the time will be spent studying, and critiquing, examples of mathematical writing, such as articles posted online.

- **Course format:** Some of the course time will be taken up by lectures on specific topics (e.g., on \LaTeX or on “Mathematical publishing”, or “Resources for research”). However, the bulk of the course will be in a “discussion” format, where real-world examples of mathematical writing will be analyzed and critiqued. Students will be asked to revise or rewrite poorly written material, as homework assignments or projects, possibly working in groups.

- **Grading:** The precise grading policy will depend on the audience and their background and on the nature of the material that we will be covering. I expect the grading will be based mainly on homework assignments/projects (e.g., correcting a poorly written paper pulled from the ArXiv), but possibly also take into account attendance, and (perhaps) short in-class presentations.

4 Books recommended for purchase

- **G. Grätzer, “Math into \LaTeX”:** The best guide for mathematical \LaTeX. If you are going to buy a \LaTeX book, buy this one. Unlike most textbooks, this one is likely going to remain useful for many years to come, and won’t become obsolete if new editions come out. The 3rd edition is available at amazon.com for about $30, a great value; I recommend that you order it. (A 4th edition is supposed to come out soon, but I would not wait for it.)

- **N.J. Higman, “Handbook for writing for the mathematical sciences”:** The best among the non-\LaTeXnical writing guides.

5 Resources

Here are some books and other resources on mathematical writing. Most of these books are available on reserve in the Mathematics Library.

The books mentioned above as recommended for purchase are in boldface.

\LaTeX

- **G. Grätzer, “Math into \LaTeX”**
- H. Kopka and P.W. Daly, “A guide to \LaTeX”
- F. Mittelbach and M. Goossens, “The \LaTeX companion”
- \LaTeX tips: http://www.math.uiuc.edu/~hildebr/tex/
- \TeX FAQ: http://www.tex.ac.uk/cgi-bin/texfaq2html?introduction=yes
General texts on mathematical writing

- N.J. Higman, “Handbook for writing for the mathematical sciences”
- Steven Krantz, “A primer of mathematical writing”
- L. Gillman, “Writing mathematics well: A manual for authors”
- D. Knuth et al., “Mathematical writing”

Mathematical typography

- Ellen Swanson, “Mathematics into Type”
- Steven Krantz, “Handbook of typography for the mathematical sciences”

6 More information

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7 Some background

I have refereed, or handled as editor, hundreds of papers, so I have seen the good, the bad, and the ugly in mathematical writing.

As Managing Editor of the Illinois Journal of Mathematics, and as editor of several conference proceedings, I have prepared hundreds of papers for publication. This involved reading each paper line-by-line (usually more than once), identifying and correcting problems with the language, grammar, style, and typesetting and \TeX. Altogether, I have “fixed up” in this manner around 10,000 pages of mathematical writing. In the process, I have encountered most of the common mistakes in mathematical writing and typesetting and learned to avoid or correct them.

I have covered some of the material of this course, at a lower level, in in REU/REG summer programs in 2001, 2002, and 2009. The lectures, titled “Introduction to \LaTeX”, “How to get published in mathematics”, “Introduction to mathematical literature”, “Introduction to mathematical journals”, were geared towards the undergraduate students in the REU programs. This course is a much expanded, and more in-depth, version of what I did for those programs.