TEACHING STATEMENT

FIONNTAN ROUKEMA

I have four years university teaching experience in mathematics at the Universities of Sheffield and Toronto, where I have gained diverse teaching experiences. I have taught students of all types, including mathematicians, social scientists, engineers, scientists, and distance learners at levels varying from developmental to advanced, and in groups varying from one to over two hundred.

Teaching Experience

Research and Teaching Associate, Sept. 2011-present School of Mathematics and Statistics, University of Sheffield.
- **Classes taught**
  Lecturer MAS5050 Mathematical Methods for distance learning graduate students (year long), 2011-2012 class size 37, 2012-2013 class size 26.
  Lecturer MAS242 Mathematics III for electrical engineers (complex analysis, Laplace and Fourier transforms), 2011-2012 class size 116.
  Lecturer MAS241 Mathematics II for electrical & aerospace engineers (multivariable calculus, transforms, Fourier series), 2012-2013 class size 219.
  Lecturer MAS002 Mathematics 1 (foundation year general mathematics), 2012-2013 class size 54.
  Lecturer MAS001 Mathematics 2 (foundation year calculus), 2011-2012 class size 60.
  Lead demonstrator MAS100 Mathematics with Maple for mathematicians.
- **Thesis supervisions**
  Gemma Halliwell, M.Math. student 2012-2013
  "Dehn Surgery and the Berge Conjecture".

Teaching Assistant, 2005-2007 Department of Mathematics, Uni. of Toronto.
- **Classes TA-ed** MAT135Y1 Calculus for Life Sciences, MAT186H1 Calculus 1, MAT187H1 Calculus 2, MAT223H1 Linear Algebra 1, MAT244H1 Intro to O.D.E.s, approximate average class sizes 25-35.

Private Tutor, 2001-2008 Independently organised tutorials, levels varying from middle school to final year undergraduate, remedial to enrichment. Writing and delivering of self-designed course on introductory analysis and topology.

Japanese Exchange and Teaching Program, 2004-2005 Akita City Board of Education, Japan.

Teaching Philosophy

Perhaps my most important lesson in education came as an English teacher in Japan, where I found that mistakes in public were very difficult for students to bear. As a result, many students had a severe lack of confidence when speaking English in front of others. At junior high school a typical mistake was;

> *'What is the weather like today?'*
> *'It's Thursday.'*

The answer usually has some merit however, for example it may be Thursday, and the pronunciation may be excellent.

> *'Excellent pronunciation! It is Thursday! It's also very cold today.'*

I choose to focus on merit with a view to instilling confidence and always focus on this before making a correction. This approach produced extremely positive results. In particular, one boy who found it difficult to say 'hello' to me when I arrived, was coming to my desk to speak to me every lunch time by the end of the year.

In mathematics, I use the same philosophy;

> *'Why are continuous functions on closed bounded intervals bounded?'*
> *'Because they can't go to infinity'*
> *'Right, this is exactly the idea! If the function did go to infinity, it*
> *would happen at a point on the interval. Let's formalise this idea.'*

My lunchtime visitors continue, and I do my best to motivate and inspire. I try to foster an environment in which students feel comfortable to interact and learn; my faculty teaching reviewer said that he had never seen so much student contribution in a large lecture room, and I have had a great deal of positive personal feedback from students about my approachability and encouraging teaching style. When a student believes they can learn, they usually can. My philosophy is "confidence creates competence"!

Most importantly, I find mathematics beautiful, and I am enthusiastic about conveying this. Enthusiasm is contagious and I have had many personal compliments from students about how helpful they have found this when I teach.

Further Engagement with Mathematical Education

I have a passionate interest in mathematical education and curriculum development, and I try to avail of every opportunity to develop my teaching experience and promote mathematics.

Curriculum Development. This academic year saw the introduction of the outreach STEP preparation course for secondary school students at Sheffield. I was one of the principal organisers for this programme and I played a role in the development, writing, and implementation of the course. In addition, I designed MAS241; the second year electrical and aerospace mathematics course, first taught in the 2012-2013 academic year. The course was designed to replace two modules which were historically poorly received by engineering students. I have included the student feedback MAS241 questionnaire to illustrate my success.

Moreover, I attend educational conferences and teaching committee meetings whenever possible, and I have participated in the dialogue and meetings for the restructuring of the first and second year mathematics degree programme at Sheffield.

Broadening Participation. In addition to the outreach programme described above, I am involved with Sheffield's Maths Academy; a programme aimed at introducing interested secondary school students to University topics such as knot theory, non-Euclidean geometries, cardinality etc.. I appeared on a U.S. radio show to speak about a day in the life of a mathematician, and I would like to build on this experience to reach a wider audience. I have been invited to give my first talk at a comprehensive school in Manchester about the "joy of mathematics", and I hope to build on this and deliver public lectures with a view to promoting the beauty and importance of mathematics beyond the standard context.

I am on the advisory board for Mathematical Spectrum, a journal for mathematical hobbyists, and I am currently involved in the dialogue to reinvent the magazine for the twenty first century. I have written a book review, and I am preparing problems and articles for the periodical. I am also a member of the admissions team at Sheffield and I am involved with the open days; I take this opportunity to enthuse visiting students about the wonders that they will learn about during their studies.

Teaching innovation. Teaching innovation is important, and I have implemented innovative ideas in my courses at Sheffield; in particular, I pioneered the use of a student run wiki for our distance learning graduate students in MAS5050, and I began a North American style problem solving class for our foundation year students in MAS002. However, I try not to be innovative just for the sake of being innovative. Rather, when I teach, I try to replicate my most positive and enjoyable learning experiences as a student across five universities and four countries. In particular, I try to use blackboard and chalk, and I try to be as passionate, enthusiastic and engaging as possible when I teach.