

## Teaching Statement

My top priorities for my students when teaching mathematics can be broken down in to three categories: learning skills and concepts, thinking more effectively about problems in mathematics (as well as other disciplines), and enjoying the material they are learning. For beginning students, these priorities manifest as making sure they have a useful level of mathematical literacy, the ability to think critically, and the knowledge that mathematics is (or at least can be) fun. With more advanced students, the first category becomes more concerned with the exact content of the class, such as understanding key theorems and their proofs, and also in being able to communicate with mathematical language appropriate to their audience. In terms of thinking effectively, I strive to improve their skills in logical reasoning and generalization. Finally, I want them to see that mathematics is not only fun, but beautiful.

There are many ways in which I address these priorities in lower level classes, to put things in context. Even just the goal of general mathematical literacy has a few different aspects in which it comes up. In all lower level classes, students need a good amount of computational skill, which gives an opening to make sure to fill in any gaps in their knowledge not addressed in previous classes. In statistics classes, I aim to have my students leave with a better ability to critically understand the uses (and abuses) of statistics in such common contexts as advertisements and the news. In calculus classes, the students' skills with high school algebra are often places where gaps in knowledge must be filled. In multivariable calculus specifically, one of the most difficult, and most important (both for that class and for general knowledge), skills to learn is 3D visualization. This is one of the areas where I have seen technology used very effectively in the classroom. With all calculus classes, I also like to be sure that my students realize how pervasive some of the concepts, such as rates of change, are in the world, if not as explicitly as statistics, but still as useful to understand.

In my experience, linear algebra is the bridge between the types of priorities I have for upper and lower level students in mathematics. More specifically, the foremost reason for this is that linear algebra is the first mathematics course that really involves students in writing and understanding proofs. This teaches the logical thinking which makes mathematical education invaluable, regardless of what field a student eventually settles into. The various ways of expressing the fundamental problems of linear algebra: systems of linear equations, matrices, and vector equations, teach students to generalize in a new way, realizing for themselves how the tools they learned to deal with the problems from one perspective can be applied in others. For students continuing in mathematics and related fields, the concepts and tools from linear algebra are some of the most powerful and widely applicable that they will have at their disposal. Finally, as an algebraist, linear algebra is the first introduction a student has to the patterns (i.e., algebraic structures) which I find to be a key element in the beauty of mathematics.

Mathematics is a subject best taught by doing. This is not a revolutionary concept, but one which I find is hard to over-emphasize. My best introduction to the power of this concept was as a counselor for the PROMYS for Teachers program at Boston University. In this program, Number Theory is taught by numerical experimentation, leading to generalization of patterns. As a counselor, my job was not to tell them answers, but to ask questions which would lead them to find answers for themselves. I have found this technique to be effective in all mathematics courses, leading to a deeper understanding of the question at hand.

A second lesson I learned from the PROMYS program, and my experiences as a teaching assistant, is the importance of a positive, collaborative environment. The PROMYS program is a lot of hard work for the teachers, taking up the majority of their summer breaks, and is taught in an unusual and sometimes frustrating manner. However, with the clear encouragement of working together, and the large group of enthusiastic counselors, it quickly becomes an extremely positive

place to be working. In that setting, it is incredible how much the teachers learn in such a short time. Similarly, throughout my teaching experience, I have always found my own enthusiasm to be one of my most effective tools. Even Calculus I students in 8:30am discussions become engaged in working through problems. As a teaching assistant, I try to run my discussion sections collaboratively. I start working out only the most difficult questions without input from the students, after it has become clear that the entire class is stuck on a problem. Often, when presented with a problem, students will suggest approaches different from my own, which we then work through together.

In closing, teaching is a very fulfilling experience for me. I love mathematics and spreading that enthusiasm, while teaching valuable skills and knowledge is a lifetime project. Along the way, I plan to continue gathering ideas and methods which will teach me even more ways to engage students even better in their own learning experiences.

## Appendix

As further illustration of my teaching experience and abilities, below is the complete set of student comments from the last class I taught as primary instructor, Introduction to Linear Algebra in Summer 2009.

About the Instructor:

- Good examples of Problems; interesting proofs were presented; excellent test preparation materials.
- Very engaging. She is there to teach. Very dedicated.
- Eleanor was always responsive to student questions and comments. She made mid-course adjustments to her office hours and exam prep materials based on our feedback. She was very responsive outside of class as well. Additionally she covered course material in a manner that was clear and engaging.
- Very clear in presenting material and explaining problems. Goes through material quickly and thoroughly. Improve: Allow time for reflection and questions/discussion.

About the Course:

- The instructor had great enthusiasm and was inviting of questions. Improve: I personally would have liked a few more chapters of the book covered but there was a lot of material to cover in a short time so it probably didn't make sense to try and cover more.
- This course covered a good amount of material in sufficient depth for an introductory course. Amazing that it was only a few weeks!
- Strong: Covers what we need to know in less time.
- Strong: Comprehensive assignments. Improve: Limit course material.