

## Teaching Statement

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I like to teach. I love mathematics enough to have chosen it as a vocation, and I see teaching as an opportunity to share my enthusiasm for math. Moreover, there is enough beautiful mathematics in undergraduate classes that my enthusiasm is well-placed.

I have been teaching since starting as a postdoc, TAing for the four years prior, and tutoring for the past fifteen years. I have taught a number of different classes in a number of different formats: introductory classes have been Calculus II and Multivariable Calculus; advanced classes include Linear Algebra, Introduction to Number Theory, and Algebraic Structures I (groups and rings); for graduate students, Algebraic Topology I. The undergraduate classes have been medium size classes ( $\sim 30$  students) except for one Multivariable Calculus and one Linear Algebra class which have been large lectures ( $\sim 100$  students). I have taught a class through modified Moore method, but most of the classes have been traditional lecture. Some of the calculus classes had fixed syllabi and finals while for the others, I made my own syllabus and final. I have also designed and taught a freshman seminar on Tilings, Symmetry, and Geometry ( $\sim 15$  students) at Duke University. This class involved a lot of discussions and a final project in the form of a paper and a short presentation explaining material related to the class (with target audience a hypothetical roommate).

I have supervised undergraduate research. At Duke, I supervised the senior thesis of Charles E. Staats (now a grad student at University of Chicago). At the University of Texas, I worked with José Rodriguez (now a grad student at Berkeley) under the Ronald E. McNair Post-baccalaureate Achievement Program, a Department of Education program designed to encourage first-generation college students from disadvantaged backgrounds to pursue doctoral degrees. I received a Faculty Excellence Award from the McNair program in recognition of my mentoring work.

I have done reading courses with several undergraduates at University of Texas. Typically, I have them read a textbook or some research papers and require them to write an expository report. Topics have included spectral theory on graphs, geometric combinatorics, and symmetry groups of tilings. This semester, I am doing a reading course with Christy Sheldon, an undergraduate at University of Texas, on reflection groups.

My persona in front of a class is light-hearted and casual, and I hope that my love of math is unmistakable. I use the standard mathematician organizational techniques like writing Def, Ex, Fact, Thm, but I also write things like Stupid Example for obvious test cases. When erasing, I'll occasionally crack a joke (like telling my students about white-lung disease that has afflicted generations of chalk-using mathematicians) or tell stories about famous mathematicians. After introducing something new but before going to examples, I may say something like, "Okay, that's great, but you may be asking yourself 'why would I ever consider something like that?'" I want students not to be passive receivers of math instruction but to engage with it, ask questions, and to test what they are learning against

their intuition. I also want to seem approachable to my students, so they are unafraid to ask me questions.

I plan for class pretty meticulously. I like to have my lessons and examples thoroughly worked out ahead of time. A lesson in my class consists of several steps: I first try to provide motivation, tying the material to something familiar; I give an example; I state the main result of the lesson; give a derivation of the main result if possible; and supply some more examples and applications. I know that some students may only pay attention to the main result, so I make its explanation independent of the motivation. Since not all students can absorb all the material as it is presented to them, I design my lessons so that they also work as notes in a student's notebook. Students recognize from my planning that lessons need to be reread, tamed, and organized in one's mind.

I let my students know my expectations of them. Because of this, I haven't heard "Is this going to be on the exam?" in years. In the classes that aren't aimed at math majors, my exams have problems at three levels: routine problems similar to homework; problems which combine several topics in the class and may not be immediately familiar; and tricky problems which requires exceptional insights. The tricky problems (which never total more than 10-15% of the exam) are there to shake out future math majors, to tell my students that I have high expectations, and to show that any class, even an introductory calculus class, leads to more math. I tell my students all this and I also tell them what material will be covered on the exam.

In office hours, until it is proven otherwise, I work from the assumption that the student is struggling not with the specifics of the material but rather with some misconception from years ago. If they ask me about a homework problem, I'll first give them a blank sheet of paper and ask them to start working it out on their own. Often they can. If not, I ask them some question about whatever they seem to be missing. Sometimes something clicks and they can do the problem. If that isn't enough, I'll ask them a series of questions aimed at finding what they don't know, often starting at very basic things. Usually I can get at what they're missing. Sometimes they try to get me to do their thinking for them and spout off some random answer without thinking. In that case, I pretend that I didn't hear them until they've given a fully considered answer. I want my students to know that I'm not there to do their work for them but rather guide them towards mathematical independence.

I think I've been a successful teacher so far. My students seem to like my classes. Attendance (even in large lecture classes) is usually high. My colleagues who have subbed for me have said that they've gotten a lot of good questions and discussions from my classes. My classes usually fill up quickly.

There's still more for me to learn about teaching, but I'm excited to hone my craft.