

# TEACHING STATEMENT

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Mathematics is unique as a subject, in that it comprises both highly abstract theory and very concrete applications to practical problems. Teaching mathematics, no matter at what level, has to reflect this duality: in an introductory calculus course, for instance, students need to master derivatives and integrals, but also need to learn how to apply calculus to real-world problems; in a graduate course, students need to become familiar with a new area and its results, but also need to understand what those results mean and how to think about them concretely.

In my teaching, I always try to arrange the subject matter in such a way that my listeners can understand and appreciate both aspects. I show many examples to illustrate the meaning of a new concept, to justify why a certain theorem must be true, or to suggest a different point of view on a result. For instance, when introducing the product rule for taking derivatives, I give the proof; but in addition, I show students how the area of a rectangle changes with its sides, and how the product rule can be understood from the resulting simple formula  $\Delta(uv) \approx (\Delta u)v + u(\Delta v)$ . When preparing, be it for a lecture or for a research talk, I spend a lot of time on finding the correct order of presentation, in which each step is well motivated. I also strive for clarity in my exposition by being as nontechnical as possible. It has happened several times that students from unrelated courses began attending my class on the side, because they liked my way of explaining things; for instance, there are again two such students in my course on abstract algebra this semester.

Of course, I know that my teaching is not perfect, and so I try to improve by taking hints from other good teachers. For my courses at UIC, I allow students to submit anonymous comments or suggestions through my web page, and I act on these suggestions where possible. In my first year of graduate school, I also attended a two-month teacher training program, which included discussions about teaching, and practice lectures that were videotaped and then analyzed.

Over the past eight years, I have been teaching many different types of courses. In graduate school, I have been both teaching assistant and instructor for single-variable and multi-variable calculus, differential equations, and for a course about actuarial mathematics. I helped to teach a class for elementary school teachers, and during two quarters, I was the teaching assistant in a graduate course on algebraic geometry. All of those courses had no more than 30 students. At UIC, I have taught single-variable calculus to larger groups of 70 to 80 students; I have also given an advanced course on complex manifolds to graduate students, and I am currently teaching a class on abstract algebra to mathematics majors. At a much more advanced level, I have also given lectures and prepared exercise sessions at two summer schools on Hodge theory.

I realize that, while mathematics is often taught to a fairly large number of students at once, learning or understanding something is an individual act. As a graduate student, the most successful course that I helped to teach was my adviser's class on mathematical concepts for elementary school teachers: instead of lectures, the course relied entirely on worksheets, pair work, and student presentations, and as a result, every one of the prospective teachers mastered the mathematical content and became good at explaining it to others. Since my days as a teaching assistant, I enjoy answering student questions individually, and helping a single person understand something. For example, there was a student in my calculus course last year who, although very intelligent, often became confused after reading the textbook. He also had a poor score on his midterm exam, and was worried that he might not make it into pharmacy school. He started coming to my office hours regularly; each time, I would carefully listen to what he did not understand, and then clear up his confusion. In the end, he had a very good final exam, I was able to write him a letter of recommendation, and he is now happily studying pharmacy. This example shows that individual attention is very important. I therefore try to be very accessible to students, be it during class, during office hours, or through answering questions by email.