

Teaching Statement

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Communicating mathematics is something I enjoy immensely. Since my arrival at Clemson in 2003, I have taught math in a variety of settings. I have presented mathematical ideas to audiences of varying backgrounds, and I have taken the time to reflect on the experiences so as to improve my effectiveness.

My first formal teaching experience was as a NSF Graduate K-12 (GK-12) fellow. As a participant in the GK-12 program, I developed application-oriented activities to supplement the standard middle school algebra and geometry curriculum. These applications included basic cryptographic schemes, the physics of roller coasters, and representations of the geometry of a video game world. I worked directly in the classroom with the middle school teachers. Together, we presented my lessons to their students. So, I saw for myself what worked and what did not. This was one of my most challenging teaching assignments since I had to learn how to adapt my explanations to eighth grade students whose abstract reasoning skills were just developing. I also had to work at making my lessons engaging.

My assistantship duties at Clemson include teaching one or two sections per semester of a variety of math courses. These courses include the first two semesters of the business calculus sequence and the first two semesters of the calculus sequence for science and engineering majors. As the instructor for these courses, my responsibilities include presenting material in lecture format, keeping office hours, and constructing appropriate homework, quizzes, and exams. On several occasions, I taught my advisor's more advanced undergraduate and graduate level classes. The undergraduate courses include an introduction to proofs class, number theory, and honors linear algebra. The graduate courses include abstract algebra, both analytic and algebraic number theory, and a special topics course in elliptic curves and modular forms.

Each summer, I also mentor undergraduate students participating in the math Research Experience for Undergraduates (REU) at Clemson. My duties as a mentor include daily meetings with a small group of REU participants to discuss their research problems. In these meetings, we discuss strategies for attacking the problem and any difficulties that arose since our last meeting.

I am also an active participant in several seminars and research conferences. I regularly attend the Southeast Regional Meeting on Numbers and the Palmetto Number Theory Series and have contributed lectures at both conferences. In addition, I regularly attend and have spoken at the algebra and discrete math seminar and the informal number theory seminar at Clemson. I have given lectures at the graduate student seminar. The graduate student seminar is attended by math graduate students in all areas. This venue gave me the opportunity to explain my work to mathematicians of varying backgrounds.

As a teacher, I view myself primarily as a guide through the course material. My main goal is to make both the problems and the methods as transparent as possible. I believe that this is key to helping my students succeed. It is also my goal to help students develop an appreciation for the subject. I believe that the ability to think mathematically is a powerful and versatile tool and that a teacher should strive to train students to precisely define their problems, identify important components, and apply sound logic towards a solution.

Typically, I dedicate much of the class time to lecture and discussion. I find that lecture is most useful for the purpose of modeling mathematical thinking and writing for my students. I strive to combine lecture with interactive discussion by encouraging my students to actively participate in asking questions and proposing their own strategies. Discussion has the advantage of giving my students practice and keeping them engaged. Additionally, since each class is different and students have varying abilities, this feedback helps me gain insight into how my students think. Knowing how my students think, I can adjust my explanations to their style of learning.

I also have experience teaching my courses in the Student-Centered Activities for Large Enrollment Undergraduate Programs (SCALE-UP) format, which involves short lectures followed by a longer period of time set aside for students to practice calculus techniques under the guidance of their instructor. I have found that guided practice can be particularly useful when the course objectives are more computational. I have noticed that it is easy for students to agree with me as I work through problems, but then have no idea how to start when they are on their own. However, if I assign work to be done in class, my students

quickly realize whether or not they know what to do when they are on their own. Grouping stronger students together with weaker students allows them to talk each other through the problems. This is useful for both the weaker and the stronger students. The weaker students get more individualized help while the stronger students must think about what they are doing and how to explain it. Although, I am nearby during this time, I resist the temptation to merely tell them what to do. Instead I help them summarize where they are in their problem and where they want to go.

Another practice that I have found useful is the use of technology in the classroom. In particular, I have used Maple and other graphing software in the classroom. These tools are useful because they help students become familiar with general shapes of important graphs and can visualize them later with much more ease. It is also nice to be able to create animations to demonstrate mathematical ideas. One particularly useful example is the convergence of Taylor polynomials. Through the animations, my students are able to see the polynomials become better and better approximations of their function on the radius of convergence and note the stark contrast with what is happening outside the radius of convergence.

The wide variety of experience that I have gained over the last several years communicating mathematical ideas to my students and my peers has shaped me into a confident and effective teacher. I have experience working with a variety of students with varying abilities. My experience includes working in middle school classrooms as well as college classrooms. I have worked with the very gifted, such as the REU groups that I advised, and with those that have a fear of math. I have lectured to large groups, and I have worked closely with small groups. Through these experiences I have learned and adapted to become a better teacher. This is something I will continue to do throughout my career.