

Garner Cochran's Teaching Philosophy

"I'm bad at math" is a phrase I don't like to hear from students. I try to persuade such students to revise their statement to "I am currently struggling with math," which implies that they are actively engaged and can make progress with effort and determination. My teaching philosophy is that students must be actively engaged in the practice of mathematics.

As a teaching assistant at the University of South Carolina, I have had the opportunity to teach four different classes as the instructor of record: Precalculus (full semester), Brief Precalculus (a half semester refresher for struggling Calculus students), Business Calculus, and Finite Mathematics. I have been instructor of record for 6 semesters. My advisor trusted me to substitute teach a unit on basic proof techniques in South Carolina's Introduction to Proofs class. I am able and willing to teach any of the standard math curriculum, and am interested further in teaching discrete math, intro to proofs classes, and operations research/combinatorial optimization. Through my experiences teaching Finite Mathematics, a terminal course designed for non-math majors, I found that I also enjoy teaching mathematics to non-mathematics majors in a way that challenges their assumptions about mathematics, showing them that math is not a dead science and can be genuinely fun. I can also teach basic statistics courses or entry level computer science courses.

I highly value my liberal arts degree from Trinity University. The training that I received in interdisciplinary research, courses, and presentations has helped me talk with researchers from other fields to understand their problems and to disseminate mathematical knowledge to a broad audience in the classroom. I participated in a first-year seminar while at Trinity titled "Energy and the Environment" where we had a broad reading program including the history of energy policy, the current geopolitical climate, and some fiction works related to the environment. This course was one of the highlights of my undergraduate experience, and I look forward to providing a similar opportunity to other students.

I begin most classes with a multiple-choice problem, employing Plicker (Paper Clicker) technology. (Plickers, which the instructor can grade with a cell phone, are a low cost alternative to conventional classroom clickers.) I typically count these Plicker quizzes only as an attendance grade, which provides feedback without punishment for wrong answers. The quizzes also serve as a useful assessment mechanism for me.

During the main portion of class, I often have the students rearrange their desks into groups so that they can work on problems together. Initially, I arrange them into groups at random. Later in the semester, without telling the students that the groupings aren't random, I group stronger students with weaker students. Ideally, this creates an environment in which the stronger students can practice their skills by providing help to their classmates whose grasp of the material is more tenuous.

Allowing students to learn from their mistakes is important. I usually allow students to re-take graded quizzes, as I find that this tends to encourage students to take advantage of my office hours. Students who do so usually improve their performance considerably. My grading scheme allows for redemption if a student can demonstrate mastery of the material by the end of the course.

I also like to show students that I make mistakes, too, and sometimes those mistakes lead to learning opportunities. One of my best classes occurred after I had made a subtle but serious error in an example during the previous class. During the next class period, I had the students discuss the error I had made and asked them to explain how to correct it without much direction from me. Very few students missed this problem on the exam.

After the first exam in most of my classes, I take time give individual feedback to struggling students to help them understand their standing in the class as well as to help guide them through study strategies to improve their understanding of the material in future classes. Getting to help students' study habits like this and seeing these students improve are some of the most rewarding parts of teaching lower level classes.

The opportunity to engage in mathematics research was a highlight of my undergraduate experience, and as a result I am a strong believer in providing research opportunities to undergraduate students. It is

rewarding to change students' preconceptions about what mathematics research looks like and to encourage them to explore an area in which the answers can't be looked up in a book or on the internet. My research area is graph theory, which lends itself to undergraduate research because the problem statements are relatively easy to understand and the problems usually can be restricted to cases within the reach of a strong undergraduate student.

During my undergraduate degree, I studied abroad at the Budapest Semesters in Mathematics program. My experience there cemented my decision to come to graduate school, and I would love to advise undergraduate students who are interested in what to expect at such a program as well as help them to get in.

Outreach is also an important responsibility for an academic. I have participated in several Pi Mu Epsilon functions at the University of South Carolina, including a talk about the Stable Marriage Theorem, which illustrates the application of mathematics to real world problems. I also delivered this talk at the Carolina Math Seminar, a one day seminar aimed at undergraduate research. I regularly serve as a proctor at our local Advanced Placement practice test as well as the yearly Math Competition. I have also participated in a math circle at a local elementary school, helping guide students in problem solving. While in South Africa, I participated in a science day exhibition at an elementary school in Soweto, using the Towers of Hanoi puzzle to explain exponential growth and problem solving. If programs like this exist, I would love to be a part of them, and if they do not, I am interested in beginning them.

Through my teaching and outreach, my main goal is to help students appreciate the beauty and power of mathematics and to improve their problem-solving skills. This serves as a benefit not just in future math courses, but also in real life situations not directly related to mathematics.