

Teaching Statement

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For the past decade, I have had the opportunity to teach a variety of math courses at different universities at both undergraduate and graduate levels. I have learned from many experienced teachers and participated in active-learning seminars, and my approaches to teaching have developed considerably over the years.

It is very important to be efficient at teaching. Given enough time and access to information, I believe that anyone can learn anything. I want my students to comprehend as much as possible in each class. I taught two sections of Math 233 Multivariate Calculus at UMass Amherst in Fall 2012. When preparing my lecture notes, I first reflected on my own experience of learning the material for the first time. I worked out several examples to get a sense of what the statements were about. Therefore, I added several examples and applications to my lecture notes. During the class, I spent some time explaining the meaning of theorems and the necessity of the assumptions. Then I worked out several examples to demonstrate how to apply the theorems in different situations. This allowed students to learn by doing.

Students' learning ability can be seriously affected by their financial status. I taught the course Math 3336 Discrete Mathematics at the University of Houston in Fall 2014. During the first few weeks, I noticed that one student struggled with very basic notions. The student seemed to be a genuine guy and really wanted to do well in my class. One day, I chatted with him after class and learned that the student came from a lower-income household. He had two part-time jobs at that time, one of them being unloading at Walmart from 11 p.m. to 4 a.m. seven days a week. I was completely shocked and could not get my head around it. Since then, I have become more and more understanding of the students that struggle in classes and try my best to help them.

Important concepts and theorems need to be repeated and revisited frequently. During my first year at the University of Mississippi, I attended the Workshop on Effective College Teaching Through Active and Cooperative Learning with Dr. Felder and Dr. Brent in January 2016. At the end of the second day, they introduced several strategies for active learning. When quizzed about these strategies the very next morning, none of the attendees (including myself) could recall what they were. Then they explained to us that this was exactly what happened to the students in our classrooms: the understanding of new concepts and formulas could only be established gradually. It was at that moment that I came to understand why many students could not recall what we had taught in the previous class. It also connected me with my own learning experience. I needed to read my notes and my textbooks to refresh my memory, even though I had understood the materials in class. I had to go over these cycles several times before I could apply the formulas to related problems. From that moment, I repeated and reformulated the important formulas frequently later in the semester to enhance students' understanding and their ability to retain them.

The teaching styles of math courses at different levels are quite different. I have taught Calculus multiple times at the University of Oklahoma since Fall 2017, and many of the students I have had were freshmen. To them, some math concepts seem very abstract and not easy to understand if the students do not have some examples in their minds. I believe that intuitive arguments are more helpful to undergraduate students, and understanding the ideas of mathematical statements comes before the mathematically rigorous proofs. When teaching Calculus, I explain to the students the meaning of concepts and theories in various aspects. After stating the main theorems, I often give some counterexamples when some of the assumptions of the theorem are not satisfied. The students were really surprised when they first learned that the limits of some functions of two variables may depend on the path, and one function can have different limits along different paths. My experiences have taught me that examples and applications are critical components for grasping the meanings of concepts and theories.

The students can have very different backgrounds in the same math class. For example, I have taught the course Ordinary Differential Equations (ODE) at UMass Amherst, at the University of

Mississippi, and at the University of Oklahoma, and there were students of all kinds of majors, including physics, engineering, computer science, and music, just to name a few. While some of the students have had some experience with differential equations and are comfortable with the concepts that I teach in class, many of the students lack confidence when it comes to ODE even though they have done well in Calculus. To get them on their feet, I explain to them that solving a first-order ODE is a generalization of the Fundamental Theorem of Calculus and how to solve a first-order ODE by reducing it to two separate problems in Calculus. In this way, the students build a connection between ODE and Calculus and the confidence of knowing where to aim for when working on a first-order ODE problem.

Student engagement is the key to a course's success, and keeping the students involved and interested is a good starting point. While most of my teaching experience has been in the traditional lecture format, I have attempted to make courses more and more focus on student participation. During the lectures, I usually post some questions and discuss them with the students. Then I collect several responses and help them make some improvements. Many students were amazed when I showed them plots of planar curves of polar equations and were very excited when they were able to plot various polar curves themselves. Students told me that this interactive teaching gets them involved and results in them absorbing the main points developed in class. The classes with good communication with students have had great success.

Learning mathematics can be enjoyable after one gets familiar with it and especially after one makes some progress. In my approach to teaching, I always try to pass this belief on to the students in class by promoting motivational questions, explaining concrete examples, and giving interactive lectures. After introducing a new formula, I will give an example to illustrate how to apply the formula. In addition to working on the examples by myself, there will be a similar problem for the students to work in smaller groups. I give the students a few minutes to try and let them know that I am right there to help. Then the students have some more time to discuss their progress between groups. I pay close attention to see if the students are getting puzzled somewhere. Then I pause for a while, ask questions, and give further explanations. This helps the whole class to master the materials and develop their communication skills, analytic reasoning and critical thinking about math.

When grading, I always read and grade the students' work carefully. I have always tried my best to make sure that all students in the class are treated equally and fairly. Grading not only gives a grade to each student, but also tells me where they are and what their weaknesses are. This is vital for me to prepare the lectures for the following weeks. I also hold weekly office hours, during which students can walk in and ask questions. I always help them to find out if they missed something and how to make corrections. After finishing a chapter, I give a review of the sections and show them where the pieces are placed in the flow line of the subject. I always highlight the connections between the new concepts and the ones that they have already understood. This helps them get their mathematical bookcases well organized.

I am interested in teaching mathematics courses and am committed to excellence in teaching. It not only helps me to reformulate clear statements of what I already know, but also broadens my perspectives on different subjects besides my research topics. To improve my teaching, I have attended the workshop on Effective College Teaching Through Active and Cooperative Learning at the University of Mississippi, which is particularly helpful. Also, I have learned many invaluable teaching techniques from experienced colleagues, many of which I have incorporated into my own teaching. Now looking back on my twenty years of student life, I have had many great teachers that have supported and encouraged me. I hope I will be able to pass that on to my own students.