# Teaching Statement

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My personal and pedagogical goals form the foundation of my teaching philosophies and love of teaching. Through my committment to students, creating a comfortable learning environment and an adaptive teaching style I am able to work towards goals shared with students and be an effective teacher. My methods and adherence to my purpose and goals have been respected and appreciated by students. I have been fortunate enough to receive two awards for my teaching: one from Washington University in St Louis (*Dean's Award for Teaching Excellence*) and one from the Mathematics department ( *Guido Weiss Teaching/Service Award*).

In teaching mathematics, I hope to develop a student's creative thinking and to inspire each student to learn the ideas within mathematics, both its beauty and its power in problem solving. To me, nothing is more exciting than when students start grasping concepts and use them to solve problems. One of the challenges that is often faced when teaching lower division courses is to get students to develop an understanding of mathematics and problem solving skills, as opposed to using rote memorization. In my experience, this is one of the most common problems; one which in turn many students develop before coming to college. It has always been difficult to break their habit of trying to memorize solutions to many different but very similar problems. When teaching a class, I continuously challenge students and gauge their understanding by asking them more conceptual questions or giving them problems that exhibit this understanding.

I once had a calculus student who was failing after the first exam. He was an engineering student and did not want to drop the class. He came to me to describe his situation and to ask for help. I noticed that this student's study habits needed improvement. As many students do in calculus, he was trying to memorize the solutions to every *type* of problem that could be asked and would regularly look at his notes or the book for formulas and solutions to other problems. I told him that if he was willing to work hard to understand the concepts and learn how to apply them instead of trying to memorize the solution to every type of problem that could be asked, he would be fine. To remedy his study habits, I asked him to try to study the material first, and, without looking at any notes or books, to try to do as many problems as he could. He had particular trouble solving problems that involved calculating work, for example the amount of work needed to pump water out of a cylindrical cone. In my experience, a student's difficulty with these problems lie in their lack of understanding of the relationship between definite integrals and Reimann sums, which causes confusion about how to set up the correct integral for doing this type of problem. I made it a point to help this student understand this relationship very clearly, walked him through setting up a problem one way and asked him if we could do the problem a different way. Needless to say, he succeeded. He was successful the rest of the semester and ended up with an A in the class.

To foster student learning and creativity, one must set some smaller, more specific set of goals. For me, the most important goals are to help students develop the same skills that are important to research mathematicians. In teaching mathematics one must first develop a students' fundamental

and conceptual understanding of mathematics. Knowledge alone is not as important as a conceptual understanding which is what allows one to do mathematics. In order to do mathematics, one must have some basic set of problem solving skills. This is key to any mathematics class and at the heart of any education. One of the hardest things to teach students is to be able to translate their abstract geometric intuition into the rigorous framework of mathematics. Although developing this skill may be reserved for upper division courses, it can and should be developed in calculus courses, and having this skill can help curb a student's desire to just memorize formulas. An example of where I set out to meet these teaching goals is when probability and continuous random variables are covered in a calculus class. I usually approach this subject by stressing that areas under the curve of the pdf are probabilities of the associated continuous random variable. When you introduce the cdf, students become confused about how to compute probabilities, especially once they get used to using the pdf. I address this by drawing a picture and reinforcing the definitions, which reminds them that the value of the cdf at a point gives the area under the pdf to the left of the point. Understanding this they can now use their geometric intuition about areas to calculate probabilities. For example, a typical problem that I give them to gauge their conceptual understanding is the following: suppose you know the value of the cdf (without giving them the cdf explicitly) at a point $a$, and you want to know the probability that the random variable takes a value larger than $a$. After I sketch a graph of the pdf, remind them what area the value of the cdf at $a$ represents, and show them what area corresponds to the probability they want to compute, students understand the cdf more conceptually and how to use it to calculate probabilities.

In teaching, I try to create a comfortable learning environment and to have an adaptive style. By creating a comfortable learning environment, I mean creating an environment where students feel comfortable enough to ask and answer questions as well eager to contribute to the progress of the class. Some of the things I have done to achieve this is to get to know the students names and something about them during the first week of class. Talking and interacting with them during class in the way I would do one on one has helped create a comfortable learning environment and students participate in class more. Focusing a little more on my individual interaction with students also helps me adapt my teaching style to better suit the needs of the entire class. Having an adaptive teaching style means teaching in a way that meets the students' needs for learning. For me, this includes teaching from varying perspectives, comparing illustrative examples to clarify misconceptions, and balancing the levels of abstraction and concreteness to match the needs of students. Throughout my graduate career I have been able to interact with students from diverse backgrounds in mathematics and drastically varying goals. Adapting my teaching style helps to acommodate the different backgrounds and differing goals that students have for the class. Admittedly, I have had to waiver slightly from my goals to adapt to all situations, but in the end what was accomplished benefitted me as well as the students.

Teaching is an evolutionary process that I wish to continue to be a part of, at a personal level and on a larger scale by inspiring students to want to learn and to help develop their creative mathematical skills. I hope that your school will give me an oppurtunity to continue my, thus far, short journey down a long path.