

Teaching Statement

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As a mathematician, I always want to share my knowledge of mathematics with others, no matter peer mathematicians or non-math major students. However, to different people, I need to use different styles of communication and should have different expectations. Teaching a low level math course to first year students is quite different from giving talks in a seminar. In the class of college students, I try to teach interactively, give students problems to work in class, and encourage them to work together. I strive to improve their problem solving ability, and also show mathematics as a powerful tool in other disciplines.

I have taught Techniques of Calculus (a) and (b) at Brandeis University for three semesters, and am currently teaching the fourth. As a sole instructor, I give lectures, handouts and quizzes to the class, which consists of 10 to 20 students. I have formed my teaching philosophy mainly from this experience, and have benefited from an apprenticeship before teaching, discussions with course coordinators and peer graduate students, and feedback from yearly faculty review. I will present my teaching philosophy in practice.

Good teaching requires clear presentations and logical and organized notes on the blackboard. However, they are not enough to motivate students. In preparation for my class, I write handouts for delicate graphs and long word problems, so that I save time for interaction with students. When I introduce examples or proofs, I pause at critical steps, and ask students how to continue. I encourage correct answers, but I find incorrect answers to be more important, since I learn what the students do not understand and can explain these points in detail. Sometimes, when no one responds, I slow down my pace and spend more time on these steps. The drawback of this kind of interaction is that good students may field all questions and other students are underrepresented. Thanks to the small size of classes, I know the level of each student, and give priority to less advanced students to answer questions, and top students usually understand.

After explanation of theorems, techniques and necessary examples, I let students solve more problems in groups. I believe that learning is through practicing, and discussion sharpens one's ideas. I walk around the classroom to keep an eye on the progress of each group, and give hints when their thoughts deviate. Sometimes I even join their discussion to get a better solution. After group work, I give concise solutions, and remarks on their difficulties and other possible solutions.

The core of mathematics is solving problems, and solutions to some difficult problems, especially various integrations, require some creativity. For such topics, I analyze some

sophisticated examples, and show students the natural reason for the solution. However, I am aware that different people may have different ideas on “natural”, so I encourage students to give their solutions, and compare them with mine. In this manner, I help students to solve problems in their perspective, and understand them from other angles.

Most students learn math because they are going to use math in their study in other disciplines, but when freshmen take calculus, they may not realize it. To motivate their interest in math, I try to exhibit derivatives and integrals in word problems in chemistry, biology, economics etc. In that way, I hope mathematical reasoning strikes a student’s mind when he/she tries to solve problems in his/her own major. I also hope students who really love math can understand calculus better to prepare for further study. If time permits, I discuss more advanced concepts related to those required, such as the Cauchy principal value of the type II improper integral. In this way, students understand the required material better.

I gain my ideas of teaching from experience in teaching small classes of calculus, and I would use different approaches in teaching much bigger classes or higher level courses. Whatever courses I teach, as a teacher, I see my students as individuals and want to help them learn the knowledge and applications of mathematics, and to know how to think mathematically. I will adapt my approach to meet students’ needs in other mathematical courses.