

## Tara Small - **Teaching Statement**

Teaching mathematics has also been a prominent component of my life for as long as I can remember and I have gained a large range of different experiences. Over the past nine years, I have taught many diverse subjects from mathematics and computer science to music (piano and voice) and drama. In addition, I home-schooled a student in grades six, seven and eight mathematics, who won first place on a provincial Junior High Mathematics Competition. I have served as a mathematical enrichment instructor for junior high school, in which I presented six weekly workshops for gifted students. At Cornell University, I was a teaching assistant for computer programming and discrete mathematics, and an instructor for Calculus classes of roughly 20 students each. Each of these experiences provided challenges and fulfillment. This diverse perspective has unquestionably affected the way I perceive mathematics, academic research, and my teaching strategies.

In all of my classes, I stress the fundamental concepts and believe that the basics must be solid before we can build new material on top of them. At the same time, I feel it is very important that students feel completely comfortable in an interactive atmosphere in the classroom. With smaller classes of 20-25 students, I make a special effort to learn all the students' names and something about each of them during the first class. This way, I am able to call on each of them by name if they look confused or they want to ask/answer a question, and I am able to focus the examples toward their interests. I have found that the students appreciate this individual attention.

From this point on, I will focus primarily on my ideas and experience in the teaching of Mathematics. Although I attempt to bring many different teaching methods to the classroom, I always try to keep an interactive atmosphere. During any lecture, I periodically ask the students basic questions with short answers, just to make sure they are following the process of the problem we are discussing. I also ask some questions that require more thought and perhaps some calculations. In these cases, the students are given a couple of minutes to work on the problem, then I call on one of the students to answer the question. Some of the students will finish in this time, but not all of them. If a student takes more time and does not finish, this time is still valuable because nearly all of them can begin the problem and develop strategies to tackle it. I also walk around the class during that time and find out which students were having trouble and help them to begin the problems. If they understand the way to begin and the idea of the problem, they are much more well-equipped to understand the rest of the lecture. When calling on the students to give answers to these questions, it is very important to handle wrong answers carefully. I try my best to emphasize the correct parts of an answer from any student and then mention the parts that we need to solve differently. It is very important to me that the students do not get discouraged, are not embarrassed to share their answers, and are not scared to make a mistake.

I organize group activities both to reinforce basic concepts, and to explore new ideas. I walk through the class during this time to assist the students, but since they have already seen these ideas, I let the students explain the problems to each other when they are not sure about the answers. For particularly

challenging concepts, I ask the students to work in groups just after the topic is introduced to reinforce the ideas with concrete examples. For example, related rates are always a problem for the first-year calculus undergraduate students. I might have several activities like understanding the relationship between shadow length and angle of a flashlight, or the relationship between amount of sand passing through a funnel and its height in a container.

Since mathematics is best learned through experience and repetition, I plan to assign a fair amount of weekly homework in introductory classes. These homework sets involve a mixture of easier and more challenging problems. I encourage the students to work on the ideas of the homework problems together, however each student must pass in separate work. In more advanced classes, I intend to give fewer problem sets, but also assign larger projects. For example, in a probability class, an appropriate project would be to investigate the Monty Hall problem, or in a number theory class, the students could investigate Fermat's Little Theorem with finite fields. These projects would be broadly defined and if needed I would help the students find a topic, but I would hope that they could find specific topics (of interest to them) on their own and we could all learn from their oral presentations about these topics.

I am also very confident in my ability to supervise graduate students. During my PhD, I worked very independently, making all of the major decisions about the directions for my research while at the same time I was open to collaborations. Both as a senior member of my PhD advisor's lab and as a postdoctoral fellow, I often find myself helping the other students often and discussing possible new directions for their work, a valuable skill to help me lead my own graduate students. My largest collaborative effort to date involved my PhD supervisor and members of Cornell's Lab of Ornithology, a project supported by a grant from the National Science Foundation. I also attend and make presentations at major conferences such as Mobihoc, the Internet Engineering Task Force meetings and SIGCOMM, where I have been able to meet some of the leading researchers in my field to discuss my current research and continue learning about the newest research being performed.

I have received very good evaluations for the courses/recitations I have taught in the Mathematics Department at Cornell. In fact, I was nominated for the Department of Mathematics Teaching Award for graduate students in December 2002. Note that these nominations are submitted by the undergraduates themselves. Some of the comments from the students were: "Tara is great. She really knows what she is talking about and really knows how to help students who are not understanding the information", "Tara is a really good TA! She is always vibrant, enthusiastic and excited in section, which is a great help when learning something as inherently boring as Math". For me, teaching is always a dynamic process, constantly being revised and updated through new experiences, so that I can help students understand the material, allow them to move through their problems, and challenge them to attain their full potential. I realize that I will still go through considerable growth and development as a teacher. I intend to discuss teaching strategies with fellow instructors and attend teaching development seminars on campus, and I also believe I will receive valuable advice by listening to the students themselves. By soliciting feedback often from the students, I will be able to correct any problems immediately rather than waiting for the traditional the end of the semester evaluations. Furthermore, I wish to learn more about the development of my own courses, and the technology available to aid in the teaching of Mathematics.