Teaching Statement

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I have been interested in Mathematics from when I was in high school and I believe I owe my fascination and subsequent accomplishments to many of my teachers. After finishing my undergraduate and Masters studies at Sharif University of Technology in Iran, I joined the PhD program in Computer Science at Dartmouth College. Having been a woman studying Mathematics and Computer Science in Iran, I am aware of the role of teachers in motivating and encouraging students from any gender and background to find their interests, pursue them, and become successful in them. Throughout my academic experiences, I have been fascinated by problems of Discrete Mathematics and Theoretical Computer Science, and I enjoy talking about these problems and sharing the joy of thinking about them through teaching. To me, teaching, learning, and research in an area are very interwoven.

My PhD studies at Dartmouth made me passionate about teaching. I found the methods of teaching in the United States more effective compared to those in Iran, and I learned much easier at Dartmouth. Dartmouth is a very good teaching school and teaching assistants have to meet high expectations.

It fascinated me that the class environment at Dartmouth was very interactive. As a student, I felt that Dartmouth professors are approachable and considerate about making the process of learning easier. As a teaching assistant, while I devoted a lot of my time to be responsible and available to students, I made sure the students are hardworking and not dependent.

I was a teaching assistant for “Data Bases” (Winter 2010), “Introduction to Theory of Computation” (Spring 2010), “Discrete Mathematics” (Fall 2013, Spring 2012), and “Computer Architecture” (Summer 2011, Spring 2012, Winter 2012). In many of these courses, I was the only teaching assistant or the leading teaching assistant. Sometimes as a part of my duties, I helped the new instructors in preparing homework assignments, I held extra session and office hours for students who were struggling, etc.

Although Dartmouth does not require Computer Science PhD students to teach their own class, my interests in teaching motivated me to ask the chair of our department to teach “Discrete Mathematics”. In this class, I had 33 students of Computer Science and Engineering majors; for most of them Discrete Mathematics was the first theoretical class and hence challenging.

To become prepared for teaching Discrete Mathematics, I took the “Teaching Seminar” course in the Dartmouth Mathematics Department. In this course, I learned a lot about various pedagogical methods as well as designing lesson plans, specifying the goals for each lesson plan and evaluating whether the goals were achieved.

I also learned about different techniques to have an interactive class in which the teacher is approachable, group work is encouraged, and students are confident to ask their questions. As a part of the teaching seminar course, I and a few other graduate students, organized two one week long math camps for high school students on Probability theory and Knot theory. In our lesson...
plans, we included many games, puzzles, and various applications of Probability and Knot theory in everyday life. We prepared quizzes and worksheets to evaluate our success.

The math camp was a fruitful experience, and provided me a better insight how to design a successful lesson plan. The following is a list of pedagogical goals that I mastered during the math camp and later employed in Discrete Mathematics class.

**I evaluate students’ understanding, motivation, and engagement through interactive lectures and homework assignments.** To make interactive lesson plans I employ the following rules: 1) I give the students time to think about problems in class. 2) I ask frequently if there are questions. 3) I discuss challenging homework assignments in class. 4) I ask for students’ intuition. Examining students’ performance in homework and through their class engagement, helps me to become acquainted with the students goals, struggles, and confusions. I use this information to design the next lesson plans more effectively.

In my Discrete Math class, I tried to be available to my students at all times and make the class interactive and lively. I learned the students’ names in the first week, used their names in my examples, and made sure I was approachable and nobody was hesitant to ask questions. When teaching Set Theory and Probability Theory, I used Venn diagrams for the students who were visual learners. After the midterm, I held extra office hours to review the pre-midterm material for the students whose grades were less than the median. I had a student, Roby, who was shy in answering questions in class. When teaching the principle of inclusion and exclusion, I asked him a few questions and led him to the statement of the theorem; then I wrote his name in front of the theorem in paranthesis and called it Roby’s Theorem.

**To me, teaching fundamental concepts is different from teaching complicated, advanced problems.** When teaching fundamental concepts: 1) I start by providing intuition, and build new knowledge on students’ prior knowledge. I use puzzles, games, paradoxes, etc. 2) I provide simple and accessible examples and walk the students through definitions. 3) I elaborate the subtleties in the definitions. 4) I repeat the concepts in various examples, review them, and ask them from students frequently in lectures, and in homework.

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which the problem has a one line solution.

**I use homework for evaluation, but also a continuation of the past lectures or a preface to future ones.** As mentioned earlier, homework can be utilized to facilitate learning. I give a many easy homework assignments to help the students to practice the fundamental concepts. When giving hard assignments, I sometimes break them to easier parts. In my Discrete Math class, I repeated some homework assignments throughout the term and asked the students to solve them with the newer techniques that they learned.

Students are usually fascinated to see they are capable of solving complicated problems. The problems that have applications in real life are amazing for many students and they promote their curiosity about mathematical problems. I used the problems involving card games, cryptography, economics, etc in homework assignments. Many of my examples were motivated from Computer Science applications to make the material accessible and interesting to students.

In future my main goal in teaching will be trying to fascinate the students and make them interested in the subject such that they will be curious to read about the material independently and potentially considering researching in that area. I am interested to teach classes in Mathematics and Computer Science. My main interest will be to teach theoretical courses that are closer to my own research interests such as Discrete Mathematics, Probability Theory, Combinatorics, Designing Algorithms and Data Structures, Combinatorics, Theory of Computation, Complexity Theory, Theory of Languages and Automata, etc. I also have the expertise to teach other basic classes of Computer Science such as Programming Languages and Computer Architecture and basic classes of Mathematics such as Calculus and Algebra.