Sharon Goldberg --- Teaching Statement

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My objective is to empower students with the skills, confidence, and independence required to solve complex problems. Below I discuss my goals in teaching and advising, as well as my interest in diversity issues.

1. TEACHING

Given the vast array of careers that students embark upon after graduation, I believe that it is crucial to teach courses that provide students with transferable problem-solving skills.

My teaching style emphasizes learning through projects, labs, and homework assignments that stretch concepts learned in class and applies them to everyday problems. At Princeton, I was awarded an Outstanding Teaching Assistant Award for my work in an introductory course in electrical engineering (ELE201). I ran a weekly precept, supervised bi-weekly labs, and prepared the course homeworks, midterm and final exam. The course targeted both electrical engineering majors, and non-majors from other departments (including the sciences and humanities), with the dual objective of teaching fundamental concepts in signals and systems, while conveying the principled approach that electrical engineers use to solve problems. Thus, I made an effort to apply interesting concepts from the course to familiar situations; for example, a homework on coding theory focused on the JPEG encoding used for digital images on the Internet, and a homework on information security considered a visual encryption scheme used on certain international passports.

In classes and seminars, my lecturing style tends to be highly interactive, and I regularly receive positive feedback on my ability to explain complex concepts in a simple way. As an undergraduate at the University of Toronto, I ran extra-help sessions for an introductory course in electronics and electromagnetics. I began my weekly sessions by clarifying a few concepts from the week's lecture, and then spent the majority of the time working through sample problems with the students. My sessions started with about 10 students; by the end of the semester, over 100 students were voluntarily attending. I have also presented my research at number of conferences and seminars in industry and academia, and guest-lectured in an advanced networking course at Princeton.

Introductory courses. Given my teaching experiences at Princeton and my interest in increasing diversity in science and engineering (see below), I am especially interested in teaching an introductory course that targets both majors and non-majors from other departments. The nature of the course is less important to me than the opportunity to encourage students to consider a career in a technical profession. To that end, I am comfortable teaching a wide range of introductory courses, including courses in data structures and algorithms, discrete math and probability, calculus, programming, signals and systems, circuit theory, digital logic, or communications.

Advanced courses. At the advanced undergraduate and graduate level, I would like to teach courses in security, cryptography, algorithmic game theory, or networking. At this level, I am interested in developing project-based classes that allow student to develop problem-solving skills, and can potentially segue to further research opportunities. At all levels, I am also willing to 'learn through teaching', by teaching courses outside my immediate areas of expertise.

2. ADVISING

I have found that students are best equipped to discover their strengths and interests when they are aware of a variety of problem-solving techniques (e.g., empirical, theoretical, system design/implementation). Moreover, because my research is problem-driven and tends to draw on a variety of solution techniques, I expect to continue working with a diverse group of students with interests in various areas.

At Princeton, I am supervising a graduate student who is using empirical approaches to extend results from my earlier theoretical work. I have also had the opportunity to mentor a number of junior graduate students; I have especially enjoyed working with 'theory' students as they explore the practical implications of their work, and working with 'systems' students as they formalize and articulate the assumptions and results of their research.

I believe that it is crucial to create an environment in which students can feel that their work has an impact on a problem domain and other researchers. Thus, I intend to arrange reading groups and seminars in order to provide opportunities for students develop a 'taste' for choosing research topics, and to facilitate relationships that can lead to research collaborations.

3. DIVERSITY ISSUES

I have a very strong interest in increasing the number of women in technical professions. I have participated in a number of initiatives that address this issue, and expect to continue such efforts throughout my career.

Informal support structures are an important tool for retaining women in the academic setting. During most of my time at Princeton, I took a leadership role in the Graduate Women in Science and Engineering (GWISE) organization. (I was Secretary in 2005-6, Vice-President in 2006-7, and President in 2007-8.) I organized welcome lunches, monthly socials, professional development seminars, and two day-long conferences that brought women graduate students from five universities together with together with women leaders in industry and academia. GWISE has had noticeable impact on the women around me, including mentoring relationships that I (and others) have built with younger female graduate students, and the internships and scholarships that students have obtained from connections they made a GWISE events.

To increase the number of women enrolled in undergraduate programs in science and technology, we need to reach out to women while they are still in high school. In 2008, I lead the organization (with another student) of day-long colloquium about opportunities in engineering for girls in 9th-10th grade in New York City. I oversaw the budget, secured funding from Google, and oversaw program developed by over 20 graduate students and faculty from NYU and Princeton. Over 120 students from nine different high schools in New York City attended our colloquium, and responded enthusiastically to our speakers, demonstrations, and engineering design competition.