Teaching Statement

I love teaching, and the opportunity to teach and to interact extensively with students is one of the primary attractions of academia for me. As a sophomore in college, I was a teaching fellow for the first course in Computer Science, and I enjoyed it immensely. I continued teaching through the rest of my undergraduate career, and only came to like it more. As a graduate student and postdoctoral fellow I have had more limited teaching opportunities, although I have had the new experience of guest lecturing in classes. I am eager to return to teaching regularly, this time with more freedom in designing my classes. I see three broad tasks in front of me as a teacher and educator.

Designing Classes

I am looking forward both to teaching introductory classes that convey a core of knowledge and to designing my own classes for students who are interested in my areas of expertise. I would enjoy teaching introductory classes ranging from programming to essential mathematics and statistics for computer science students. Programming is the most basic tool and mathematics the *lingua franca* of the discipline of computer science. In my day-to-day research I spend a lot of time both programming and framing my thoughts in the language of mathematics, so I would be excited to attempt to convey my enthusiasm for these basic topics to students who are beginning their study of computer science. My experience serving as a teaching fellow and guest lecturer for classes in artificial intelligence (including machine learning, probabilistic reasoning, and knowledge representation and reasoning) targeted at advanced undergraduates and beginning graduate students has given me plenty of experience in that area, and I would love to teach similar courses in the future. I see a dynamic relationship between my research and teaching, so I would be thrilled to have the opportunity to teach more advanced classes directly related to my main areas of research. Depending on the needs of the department, I could teach graduate classes on a variety of topics, such as machine learning, decision making under computational resource constraints, agent-based modeling of complex systems (especially market systems), and computational economics and finance. Since these are all deeply related to my primary field of research, I am well versed in both the historical and current literatures, and in the relation between literatures from computer science, decision and control theory, and finance and economics.

In designing the curriculum or structure of a class it is crucial to know one’s audience. I served as a teaching assistant for a graduate course in artificial intelligence at MIT. This course was taken by doctoral students, master’s students, advanced undergraduates and graduate students at the National University of Singapore who would watch lectures on video and participate in sections by videoconference. I spent a lot of time interacting with each separate constituency, and realized the unique perspectives that they brought to the class and to projects and exams. It was important to keep them all in mind, especially when designing homework assignments – some students were better programmers, while others were better at math, technical writing, or seeing the big picture. We could not afford to lose the interest of a sizeable portion of any of the groups. I will keep the lessons I learned from this teaching experience in mind when I work on structuring the classes I teach in the next few years.

In the Classroom

I believe that the key to being a good teacher in the classroom is preparation. I do not mean simply preparation of the material that is to be taught, but thinking through the best possible way to teach every part of it so that students are excited about what they see and understand it well. Good teaching is also a function of experience – the task of predicting how students will respond to particular parts of the material I teach gets easier as I teach more often. At Harvard, in my junior and senior years, I served as a teaching fellow for two undergraduate courses focused on different aspects of artificial intelligence. While I received good evaluations the first time I taught these classes, my students were significantly happier with me the second time, and I received teaching awards for both classes.
Only the rarest of teachers has a style of lecturing that is powerful and exciting enough to keep a classroom enthralled while listening passively. The rest of us must work harder in planning how to present material to students and in using specific techniques to keep them engaged. I have found some techniques particularly useful in this respect. In smaller classes, I like to present students with problems to be solved collaboratively, typically in groups of two or three. In addition to helping students achieve a deeper understanding of material, this can also serve as a break in the middle of class and help students refocus for the remaining time. When this technique is not suitable for a situation, I increase the frequency with which I call on students in class. I like to encourage students to make extensive use of computational packages. Writing programs and doing quick calculations with real numbers is an active and engaging way to learn concepts that might otherwise be difficult to imbibe properly. For example, the concept of dynamic programming often troubles students until they themselves implement a program that uses the technique. Of course, the one rule that overrides everything is the need to be flexible and to understand the dynamics of the class one is teaching. If a teaching method is not working well, no matter how often and how well it has worked in the past, it is important to change that method. I will actively solicit feedback from my students on what is going right and not going right in class, and I would also be open to receiving input from more experienced teachers.

**Mentoring Students**

As an advisor, I hope to introduce students to problems that excite them and to give them the right amount of direction as they work on these problems. The first part of being a good advisor, then, is to identify interesting problems that are of the right scope for students to pursue. At the very beginning of my graduate career, my advisors would point out potentially interesting problems to me, and I would investigate them more deeply. In the past few years I have been pursuing many independent research directions, and I think I have developed the ability to identify problems of the appropriate complexity to possibly be both interesting and tractable. As part of MIT’s undergraduate research program, I had the opportunity to advise two MIT undergraduates, and I have recently begun advising a master’s student at UCSD. I look forward to further improving my skills in advising as I gain more experience.

The maxim “know your audience” is as important in advising as it is in teaching classes. Students may be at very different stages in their evolution as researchers – some may need a more “hands-on” approach from their advisor in order to be effective, while others may do better with a freer rein. In either case, I think it will be important to work on problems actively with my students so that they can follow my thought processes. I will also need to make sure that students interested in careers in research can stand on their own feet by the end of their time in graduate school. I am sure that being an advisor will present challenges that I have not yet considered, but I am excited about the opportunity to face them.