Teaching Statement

The classroom is one of the most important venues for communicating mathematical and engineering advances to the people that will use them. I hope to use the classroom to produce students who are well-versed in the skills vital to their discipline and who are self-motivated enough to continue learning after the class is completed. Specific strategies that I will employ are listed below.

Encouraging Interaction

I have observed three types of undergraduates in any particular class. A small number of persons lack the ability or motivation to learn the course material. These persons generally weed themselves out of the class within the first few weeks.

The second group is capable of learning the material, but requires assistance to do so. In part, this is due to the format of the classes. Most freshman are not used to attending lectures with 100+ students. Unlike high school, personal attention during lectures is generally not practical. And so, if students are not comprehending the material, they must take it upon themselves to seek help. Therefore, it is important to emphasize venues for seeking help. Office hours need to be strategically scheduled so as to encourage and accomodate students. For example, they should be held a couple of days before homework is due. Very early in the term, students who are performing poorly on homework, quizzes or tests should be contacted and asked to visit with the professor or a TA. Perhaps most importantly, feedback on homework and exams must returned to students in a timely manner, so that students can better gauge the need for additional help.

The third group is made up of students who quickly and easily learn the material. These students may be capable of passing the class without faculty assistance. Some may even be able to pass the course without attending the lectures. Faculty interaction with this group is assumed to be a low priority, but I disagree. Students with this drive and ability are prime candidates for undergraduate research or other advanced activities. Also, they deserve the opportunity for further challenges. One technique to challenge them is to place open problems on homework assignments as extra credit. Another technique is to encourage informal post-lecture discussions. In my experience as a TA, highly motivated students often remained after class and displayed an interest in situations that were not covered in the lectures. The TAs should be told to identify these students to the professor so that the students can be encouraged to go beyond the basic course requirements.

Research-focused Instruction

For courses intended for graduate students or upper-level undergraduates, my goal is to prepare the students for future research. There are two practices that I have been exposed to during undergraduate and graduate school that I believe are particularly effective.

Incorporate Recent Results into the Coursework

While classroom lectures cover important classical results and relevant proofs, homework problems should be based on recently published results, ideally within the last year or two. In part, this ensures that students are exposed to new developments. But more importantly, this provides students an opportunity to immediately use skills learned in class. Recently published papers often identify open problems that may be vulnerable to attack through techniques relevant to the class. For me as a student, few things were more motivating than seeing open problems that were practical to solve with techniques similar to those recently covered in class.

Encourage Collaboration

High school and early undergraduate classes often require that students work independently; students may be penalized for "collaboration". While working alone at early stages is important to develop a familiarity with basic concepts, "independence" is not usually effective in conducting research. Collaboration should be encouraged, and if feasible required, for every assignment. Like other skills, collaboration requires practice.

In groups settings, students must learn to communicate ideas clearly and critically evaluate ideas presented by others.

Teaching Experience

In the Spring 2011 semester, I was placed on the List of Teachers Ranked Excellent by their Students for my work as a teaching assistant for CS 373, an automata theory class intended for sophomores and juniors. In addition, I was named as one of five Outstanding Teaching Assistants by the computer science department. My duties included developing problems for homework and exams, holding office hours, and running three discussion sections. The class had three lectures a week, two of which were delivered by the professor to the entire class of approximately 125 students, and the last being performed by a teaching assistant to one fifth of the class at a time in a "discussion section".

Course Preferences

I would prefer to teach a course in combinatorics, automata theory, or algorithms, though I would be interested in running any undergraduate course. I would also at some point like to develop a course devoted entirely to visibility problems, such as the Art Gallery Theorem and related work, as a significant portion of my research is devoted to such.