

Teaching Statement

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One of the joys in learning is the *aha* moment—the satisfaction associated with grasping an important concept or coming up with a cool idea. To help someone arrive at that moment through my experience and perspective is immensely exciting and gratifying. I am eagerly looking forward to such opportunities in my role as a teacher and an adviser.

My experience thus far stands me in good stead to take on this challenge. As a graduate student, I have assisted in two courses, quite different in their goals. The first was an entry-level freshman course, “Introduction to Computer Tools for Engineers”, designed to equip engineers from all branches with basic computer tools such as Matlab and Unix CLI. I was responsible for three lab sessions with 30 students each, every week. The lab work involved experimenting with the tools they learned in class and working on projects designed to extensively leverage these tools. Apart from the lab work, I designed pop quizzes (called Checks For Understanding), graded all their deliverables (quiz work, projects, exams), and held office hours. Next, I assisted in a senior-level course, “Operating Systems Engineering”, designed for the serious computer science undergrad. Apart from lab sessions, office hours, and grading, I helped design projects that gave students hands-on experience in implementing and learning important operating system concepts such as process synchronization, file systems etc. on top of DLXOS, a bare-bones operating system. I have also conducted a few lectures for the graduate class in “Distributed Computing Systems”. My role here was to engage the class in an active discussion on the research work being presented by a student.

I am confident that my experience as a student will prove equally valuable in my teaching endeavors. As a student, I had a great vantage point to learn from the best and many opportunities to sharpen my teaching skills—I led in-depth discussions of published results and presented tutorials on current research topics to a classful of peers. I had a chance to develop my mentoring skills outside the class room as well, during one-on-one interactions with junior students. I mentored four students at Purdue, guiding them in their research from project inception up to final evaluation. I also mentored students working on the Data Oriented Transfer project at Carnegie Mellon University. I am honored to have received the Violet Haas Engineering Educator Award from Purdue University, given to one student across the University. This recognition of my efforts has motivated me further to strive to excel in my teaching career.

My teaching experience was replete with interesting challenges; to give a sense of my approach and style in handling them, I would like to highlight a few significant ones. As teachers, we all face a diverse audience—students with different strengths and interests. This was very evident, for example, in my freshman class. There were students who could manage an entire project without any external help and had been hacking since a very young age. There were also students who were new to programming. I carefully adapted my approach to meet this challenge. Of particular importance was to ensure that in a team with an expert programmer, the remaining students did not starve and had a fair chance to learn the material. To achieve this, I encouraged students to divide up the work equally among all the team members. I also broke down the assignments into different learning components such that every student had a chance to work on every stage of a problem over the course of the assignments. Further, I devised a few extra problems based on current research and real-world systems and encouraged the experts to tackle those. The real world relevance of these problems motivated the students and helped sustain their interest in the material.

To be an effective teacher, it is important to keep the students actively engaged in a class and inspire passion and interest in them to learn the material. Coming from a systems background, I plan to use my expertise with real-world systems to my advantage. I will instill excitement for the course material in the students by presenting how the principles and concepts under discussion apply to real world scenarios, especially scenarios they can identify with. I will further augment my lectures with live demonstrations of these systems. For instance, I can use Facebook or YouTube as example scenarios to introduce key concepts ranging from graph theory to fundamentals of networking, demonstrate content distribution networks using a real-world deployment of Akamai

or illustrate TCP dynamics by analyzing an ongoing TCP flow. In addition, I believe that such correlation of concepts with visual cues and examples helps their retention.

Also in the spirit of keeping technical material relevant, I plan to keep project and lab assignments grounded in reality and motivate them with suitable applications. My goal would be that the students build something real and useful through these assignments. Say in the operating systems class, the students can learn about file system operation by building a mini-version of the file system which they could use themselves. I hope that such a practice inculcates a feeling of satisfaction of building something real within the students and addicts them to that feeling. I plan to have small checks for understanding to keep the students motivated to be up-to-date with the class. I also realize the importance of putting in my share of the work by constantly updating the course material and adequately preparing for the class.

I will continue to harness technological advancements to improve my students' educational experience. For example, in the freshman class, we successfully experimented with students collaborating through instant messaging and shared work spaces to complete their projects. This gave students flexibility to work in their choice of environment, and collaborate effortlessly.

While the undergraduate classes have a significant teaching component, teaching and advising graduate students involves an equal emphasis on research. I plan to approach this task with a different flair. Apart from focusing on imparting the key concepts, my goal will be to help my graduate students and advisees become keen researchers. I will encourage them to constructively analyze and criticize existing work, brainstorm why alternate approaches to tackle the problem did not pan out and identify open questions related to the problem/solution. I will encourage the students to pursue research-oriented projects to enable them to identify their areas of interest and exercise their creativity. I will provide them with access to various testbed and development resources so that they can build prototype systems and experiment with the same. For the budding researchers, I will help them brainstorm about an idea, discuss an action plan, encourage them to set small milestones and carefully observe their progress. When the time is right, I will gently steer the wavering students towards the right approach, giving them a chance to analyze the changes as we move along.

Finally, I believe that my role as a teacher and an adviser is not just one of imparting knowledge but is in fact one of turning my students into well-rounded individuals. I will ensure that my students and my advisees are in a comfortable and open environment and that they can approach me with their problems in confidence. I am aware of my responsibility of being an academic and I approach this as my opportunity to make a contribution to the society. I sincerely hope that I can pass on at least some of the experience and advice I was so graciously given by my mentors over the years.

Given my research background and experience, I am confident that I can handle any programming, networking, operating and distributed systems class at the undergraduate level. At the graduate level, I can comfortably teach any advanced networking and distributed systems classes. I am particularly interested in developing a class on "Real-world Systems" that focuses on successful real-world systems and the technologies and concepts behind them. Examples include MapReduce, Bigtable from Google, Dynamo from Amazon, and so on. I would also like to offer a seminar class on topics related to parallel computing and their impact on current multi-core trends. This should be a fun and valuable learning experience for faculty and graduate students alike.

To conclude, my experience in teaching graduate and undergraduate classes and advising students one-on-one has given me a chance to hone my approach and I am confident that I am well prepared for my future endeavors.