

Teaching Statement

My teaching goals are to provide students with solid theoretical and technical foundations while developing critical and creative thinking, as well as preparing students to consider broader societal implications. I developed my teaching skills at both the University of Pennsylvania (Penn) and University of California, San Diego (UCSD), where I prepared lectures, advised groups of students, and mentored students from non-traditional backgrounds in computer science. I am qualified to teach networking courses, as well as introductory courses in the computer science major.

Teaching Philosophy

Complementing Classroom Teaching with Experiential Learning Computers provide a quick feedback loop that makes experiential learning especially valuable in computer science. I find that projects help students grapple with applying theoretical foundations while building technical experience and fostering creativity and critical thinking. Testing plays a role in reinforcing theoretical concepts, but I seek to allow students to apply those concepts to open ended projects when the course material allows for it.

Recently, I volunteered to mentor a group of undergraduate students as part of the Early Research Scholars Program (ERSP) course at UCSD. I mentored a group of four sophomores investigating the alleged theft of IP address space from African networks, helping them select a problem, teaching the fundamentals of academic research, and providing any necessary background information to help advance the students toward a solution. In each class—including remote learning—I taught general research skills and foundational data science techniques, and facilitated their work as a group toward designing and implementing a solution. It was clear that the project helped them grow technically and creatively throughout the year as they modified their proposed solution in light of new information and skills.

At Penn, I advised groups of computer science seniors participating in a yearlong capstone course where each group identifies and solves a problem. My role was primarily to guide 10 groups through unexpected difficulties and provide alternative ways of approaching their solutions. For many of the groups, the projects eventually exceeded the students' preexisting knowledge, and part of my role was suggesting possible solutions tailored to the expertise of each group. The open nature of the course allowed them to alter both their problems and solutions over the year, keeping the students engaged in their work, and helping the students learn how to complete projects without a prescriptive solution.

Connecting General Concepts to Modern Applications When planning content for a class, I try to make the material feel relevant to the students by connecting general concepts to modern implementations. I was fortunate to teach in a classroom setting in two courses: I gave the denial of service (DoS) lecture in the Networked Systems course at Penn for three years, and prepared in-class content for the ERSP mentorship at UCSD. I found success when my classes followed a progression, beginning with a relatable problem, shifting to academic theory, and finally connecting the problem and theory to modern solutions.

In each class, I identified the important concepts that I wanted students to take away from the class, and built around those concepts to better engage the students. Specific to the DoS lectures, I discussed the general concepts of how attacks generate large traffic volumes that funnel toward

the target, defenses that block near the traffic sources, and raising the bar for successful attack. Each time I taught the class, I revised the introduction with recent high-profile attacks, and ended with defenses used inside modern scrubbing centers, connecting the dots from academic research to industry trends and techniques.

Discussing Broader Societal Implications As a teacher, my role is to prepare students not only as technologists, but also to grapple with the potential positive and negative impacts of innovation on society. My first teaching opportunity at Penn was as a Teaching Assistant for the Technology and Policy course co-taught by the schools of engineering and law. I used my office hours to help students begin to grasp the complexities of creating and applying policy frameworks for technological innovations. This experience also helped me form direction in my own research agenda, which I conduct with an eye toward informing public policy.

I included broader societal implications when I designed the content I taught in class to the ERSP students. We discussed that the ongoing failure to fully adopt IPv6, coupled with the IPv4 address space exhaustion, leads to the unintended consequences of exorbitant IPv4 resale prices and IPv4 address theft. The students engaged with the discussion, and they decided to study the problem of IP address theft from African networks, and work toward techniques that could better protect IP address space allocated to the third world.

Teaching Interests

Networked systems are my primary research interest, and I am eager to teach undergraduate or graduate courses related to networks or the intersection of networks and security. Currently, I am working with colleagues at UCSD to create material for an undergraduate Internet data science course that will allow students to apply data science and machine learning to real Internet datasets. I am also interested in teaching introductory undergraduate courses.

Mentoring

I expect that much of my teaching will revolve around mentoring graduate students, and I find that mentoring requires different approaches than classroom teaching. In the summer of 2020, a member of my dissertation committee at Penn asked me to help mentor a senior in the Penn computer science department hoping to conduct Internet data science research. Through this process, I learned to give the student space to devise new ideas and solutions while still offering support and suggestions, and the student designed a new technique for estimating the latency between arbitrary Internet routers. I helped guide the student through the processes of collecting raw data, testing hypotheses, creating validation datasets, and submitting our findings for peer review. This fall, the student began doctoral studies at the University of Texas at Austin.