Teaching Statement

Candidate Name

My goal in teaching is to **develop students as critical thinkers**, providing them with a **solid technical foundation** and illuminating the **societal implications of the discipline**. I want my students to approach and think about problems considering the technical aspect and the broader implications to society. I have developed my teaching skills and interests through teaching, mentoring students, studying the scholarship of teaching and learning in STEM through the Kaufman Teaching Certificate Program at MIT, and more recently supporting teaching assistants in developing their teaching skill and adapting to online teaching. As a professor, I am qualified to teach **graduate courses on computer network and network security** and also **enthusiastic to teach undergraduate courses in programming**.

Teaching Philosophy

When I am preparing a class or a talk, I ask myself these 3 questions:

1. What is the critical message I want students to learn?

2. What are the societal implications of the computing topics I am teaching?

3. Am I providing a supportive learning environment where students can thrive?

Putting students and their learning at the center: These three questions help me design a class where students and their learning experience are at the center. I believe the real goal of teaching should be long-term learning and skill development. Therefore, clearly defining content priorities with long-term goals in mind supports better teaching activity topic and time allocations. Starting the class design from the answers to the above questions, I like to use a backward-design process to align learning experiences and assessments and encourage creative thinking.

I have put this backward design and student-centered approach to great use in my role as the EECS Teaching Development Fellow, where I support the more than 200 EECS TAs developing their teaching skills and navigating the new online learning reality. In this role, I have held many office hours for TAs where we discuss their challenges.In these interactions, my interventions usually involve bringing up principles of student-centered teaching for solving problems such as reduced effective teaching time given the usual technical challenges and the lack of student feedback with remote learning. By putting the students and their learning at the center, it becomes clear that content prioritization should be a key step in recitation preparation and in office hours. For example, a repeated challenge that is brought up by TAs, is that debugging through zoom is much slower and harder than in person, and as such TAs are more than doubling the duration of office hours, which is not sustainable. I proposed to TAs that instead of going through every bug, they try to pick a few and ideally representative bugs and show the students a framework of how to go through discovering and fixing the issues. Then, for another bug, that they ask the student to apply the framework and provide support if needed. And finally ask the student to finish debugging by themselves and reach out if needed.

Using active learning and pacing lectures with in-class activities: I strive to include active learning activities instead of non-interactive stretches of lecture as they have been proven to increase student learning and are well-suited to encourage students to think beyond the technical aspects of computing. For instance, I would be interested in teaching a Computer Network class where after a brief lecture about a given protocol, I would have students discuss in small groups and then share with the class the security and privacy aspects of the protocol and overall network architecture. I would also ask them to reflect about the societal and ethical implications of network research. These in-class activities will also provide invaluable feedback about student learning and the success of my approach.

While at MIT, I was a teaching assistant for the Foundations of Information Policy Class, a class for students interested in learning about the intersection of law, policy, and technology, in particular related to the Internet and the technologies it enables. This is a communication-intensive class at MIT and requires students to produce many writing assignments for audiences they are not familiar with. Every lecture, I led at least one small student group guiding their discussion and analysis that would inform their written assignments. As the semester progressed, I saw how they integrated new perspectives and questions about technologies and their interactions with law, government and society.

Providing a supporting and welcoming environment: Furthermore, I'll strive to always provide a supporting learning environment. When students do not feel supported, they become defiant, impairing their motivation to learn. I want students, especially those from non-traditional backgrounds, to feel my class is a supportive environment for

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Margin annotations:

Clear statement of teaching philosophy and how the candidate views their role as a teacher

Overview of teaching experience

Heading clearly indicates content of this section

Bolded subheadings indicate educational principles that are important to the candidate

Impact is quantified

Introductory paragraph serves as a preview for the rest of the statement, including teaching philosophy, overview of experience, and specific classes the candidate could teach

Brief statement of classes the candidate could teach

Educational principles that are important to the candidate

Teaching philosophy is supported by concrete experiences and methods

Concrete method for a future class

their learning. Small actions that can be taken in classrooms, such as paying attention to use constructive criticism when providing feedback and answering student questions, that can make computer science more welcoming for all types of students, and thus, ultimately, more diverse.

Early in my studies, I taught recitations, designed short quizzes and exams, and graded for large introductory classes in Physics and Calculus. Through this experience, I saw first hand the impact that small actions tailored to suit students' different levels of understanding and previous knowledge (or misconceptions) had on their attitude towards learning and their approach to the next step in their studies. For instance, I would start by recapitulating required knowledge and offer additional resources in case someone needed them. I would also assure students that even if they did not know about those topics, they still had time to learn and would be able to get up to speed. And I would remind them that they all deserved their admission and their place in the class. With this increased support, more women in my class ended up requesting the harder version of the next physics requirement compared to the previous year.

Teaching Interests

I am eager to teach a graduate computer networks or network security class. I'd also like to teach a class on how the Internet really works, not just from the protocol perspective but also from an operational and measurement perspective, and covering how the Internet has evolved over time. In addition, I'd like to design a seminar on Internet policy and governance and train students to bridge the gap between technology and policy.

Moreover, I am prepared to teach undergraduate courses in programming, computer system design and computer networks, and have the opportunity to teach fundamental concepts of computing while engaging students in thinking about the broader consequences of the field.

Mentoring

I have mentored many undergrads and high-school students in choosing a STEM degree and supporting policy interests while pursuing a STEM degree. The one I feel the most proud of is a first generation student from a rural area in Chile whom I helped and financially supported the application to local outreach programs from engineering schools and is now finishing up his undergraduate degree in engineering in Chile. He is currently involved in an undergrad research project with a mining company, a promising field in Chile.

More recently, through my experience mentoring a rising sophomore in the summer, I have learned how important it is to be open to new ideas even when they are not fully developed yet. Collaborating closely, she was able to learn enough about Internet protocols, Internet measurements and setting up her own working station to be able to suggest possible ways to improve one of the machine learning models used in my research based on her data analysis. Through analyzing additional data about networks, she found that a category of networks presented a similar characteristic that was likely related to known false positive cases we were looking at. I then realized that this analytical insight was pointing out a new direction for improving the network classification model.

Leadership

I have a particular interest in creating a diverse environment in STEM, to have an engaging and comfortable environment established for all. I have participated in many initiatives to increase the diversity of the student pipeline. For instance, I participated in the Women's Initiative at MIT, visiting over 10 middle schools to promote STEM careers and share my experience with young girls. To relate girls to Internet security, my research field, I designed a game where part of the students were the network and the other part were sending datagrams to communicate over the network. While the game was running, the human network had to cope with security and availability events such as a human node getting disconnected or compromised. After the first 5 minutes of the game, the girls got really into it and the users of the human network usually started sending datagrams hoping they would be wrongly disclosed, to have a good laugh. This activity got many of them interested in computer networking and the Internet, which most girls had initially conceived as being a technology that worked much better and was set in stone.

I am also deeply motivated to help increase the collegiality and sense of community between PhD students in EECS. I believe that collegiality and community are key to improve students' overall well-being, happiness and productivity. I was co-president of the EECS Graduate Student Association, where together with the other co-president and a team of fellow students, we strived to increase the connections and create community between the more than 500 PhD students in EECS. I have also been involved several times in the organization of visit days for accepted applicants to the EECS PhD at MIT, taking special care to integrate minorities and students from different backgrounds so that they feel part of the community from the start of their journey.

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