

# TEACHING STATEMENT

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The opportunity to work with students and help them achieve their goals is one of the main reasons I am pursuing a career in academia. My goal as an educator is to help my students, both in the lab and in the classroom, be independent thinkers. To that end, I plan to challenge my students both in the classroom and in the lab, understanding that each student is different.

## 1 Mentoring Experience

Throughout my PhD and postdoctoral experiences, I was fortunate to work with eight students at different stages of their graduate studies. It was very exciting to adapt to my advice and feedback based on their unique perspectives and skill sets. I chose my project framing and problem definition to appeal to their preferences and help them reach their goals.

Two exemplar students I worked with were Mouhyemen Khan and Yimeng Zhao. Mouhyemen Khan was an engineer that just finished his undergraduate degree at CMU-Qatar when we started working together. Although we collaborated remotely, it was a prolific collaboration. Mouhyemen has remarkable coding and hardware prototyping skills. He was interested in research. I assigned him tasks that leveraged his skills in prototyping to help create and run experiments for an autonomous video surveillance system, leading to a full conference paper that was presented at IPSN '17. Due to his interest in research, I also involved him in our writing process. He is now a PhD student at Georgia Tech.

My experience working with Yimeng was completely different. I started working with Yimeng towards the end of our third year in the PhD program at Georgia Tech. At the time, Yimeng was an experienced PhD student with a strong theoretical background and remarkable coding skills. However, she did not have a strong background in systems. She helped with the evaluation of the Eiffel system, leading to a paper that was presented at NSDI '19. I assigned her tasks that balanced building the components that we needed for the paper and building her knowledge of the host networking stack, highlighting the differences between userspace and kernel architectures. The background she developed was the basis for her follow up work on developing a network stack that doesn't drop packets, accepted at CoNEXT '19. Yimeng is currently a software engineer at Facebook.

## 2 Teaching Experience

My approach to teaching is centered around **personalization and interaction**. This approach allows students to connect the concepts introduced in class to broader topics and problems that they can easily relate to and where the introduced solutions can be applied. This approach lends itself to moving back and forth between the fundamental concepts underpinning the discussed topics and their practical aspects and applications. I found this approach to be especially effective for classes with significant hands-on components at different levels (e.g., from introduction to programming to advanced topics in networks).

My teaching experience started right after I finished my undergraduate studies. I spent a semester as a teaching assistant at Alexandria University. I was a TA for an introductory class to computer programming, targeting all engineering students. My role in such introductory classes was to help students, that might not be especially interested in computer science, learn about basic data structures and algorithms. My approach was to develop an arsenal of examples and use cases for every concept to help appeal to students with different backgrounds. I also encouraged students to keep asking questions and didn't change topics until no more questions were asked. This approach was very helpful in such an introductory class due to the diverse backgrounds and interests of students attending this class. During my PhD, I was the TA for the graduate networks class three times. Graduate classes required answering more challenging questions, even acknowledging that I might not have the answer at the time the question was asked, getting back to the students at a later time. The role I enjoyed the most as a TA for a graduate class was helping students with their class projects. I particularly enjoyed helping students find problems in computer networks *they* found interesting.

I gave a few guest lectures at Georgia Tech and MIT as part of the graduate network classes. These lectures required distilling the latest research ideas in the fields of datacenter congestion control and Inter-

net architecture. I made my lectures interactive with multiple questions aimed at engaging the students, while making low-level infrastructure problems relevant. For example, after explaining the current Internet architecture and the limitations of BGP, I encouraged students to think about how they would redesign the Internet to overcome its current limitations. The exercise included going through the key problems I presented earlier, brainstorming mechanisms and algorithms that can solve them. Then, I concluded that exercise with what the latest research proposed to address the problems we discussed.

During my PhD, I worked on improving my teaching skills by attending several workshops on student motivation, diversity in the classroom, and evidence-based teaching. These workshops helped me when I created my guest lectures and when mentoring students. I plan to keep improving my teaching skills, attending more workshops. I look forward to applying all that I learn in my future classes.

### 3 Potential Courses

Given my research background, I can teach any undergraduate or graduate classes on computer networks, and operating systems. I can also teach basic computer science undergraduate classes like introduction to programming, data structures, and discrete math.

I am looking forward to developing two special topics classes. The first class will introduce students to theoretical and practical topics in resource allocation, performance isolation, and congestion control in modern networks. It will be a graduate seminar class focused on reading papers, with most of the credit given based on a semester-long project. The projects will require students to apply the concepts they learn in class by modifying and extending open source implementations of algorithms discussed in class either in simulations or in CloudLab.<sup>1</sup>

The second class will be a hands-on class focused on the host networking stack, helping students understand the different steps that a request goes through from when it arrives at the server's network card, until a response is sent. The class will cover both kernel and userspace architectures. It will expose students to the different optimizations needed to handle different types of requests (e.g., comparing the requirements of RPC workloads and Video on Demand workloads). The class will require students to implement some stack components from scratch or modify the implementation of existing components. The class targets both students interested in research problems in host networking and students looking to improve their engineering skills. Students interested in research in the area will be encouraged to propose their own algorithms and solutions, focusing on specific parts of the stack.

In conclusion, I am looking forward to beginning my journey as a professor. I am excited about all aspects of the journey including research, classroom teaching, and advising PhD students. My chief goals are producing high-quality research and helping students reach their goals.

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<sup>1</sup><https://cloudlab.us/>