Teaching Statement | Yunming Xiao, Fall 2024

As a researcher, I am drawn to a faculty career not only for the pursuit of knowledge but also for the profound opportunity it presents to teach and mentor students. Teaching and mentoring are pivotal, as they enable me to shape the minds and future of the next generation of scholars and professionals. I have served as a teaching assistant for three courses across six quarters, working with approximately 400 students in total at various levels. Moreover, I have mentored nine students on a range of research projects. These experiences have provided me with a solid foundation and a clear understanding of effective teaching and mentoring practices. In this statement, I will outline my experience, plans, and philosophy for teaching, as well as share insights into my mentoring approach.

Teaching Experience

During my time at Northwestern University, I have had the privilege of contributing to a diverse range of computer science courses: I was a teaching assistant for an undergraduate-level course *COMP_SCI 110: Introduction to Computer Programming* (200+ students, 2020 Fall) and two graduate-level courses *COMP_SCI 340: Introduction to Computer Networking* (100+ students, 2022 Winter) and *COMP_SCI 397/497: Selected Topics in Computer Networks* (10+ students, 2021, 2022, 2023, and 2024 Spring). My duties as a teaching assistant include answering students' questions at office hours, managing the peer mentors (a.k.a. undergraduate teaching assistants), designing and grading homework questions and projects, leading discussions in the class, giving lectures to the class, as well as creating course curricula.

Teaching Plan

My research area is computer networks with a focus on security, privacy, and reliability issues. As such, I am interested and well-prepared to instruct a variety of undergraduate courses ranging from foundational introductions to programming to more specialized subjects related to computer systems/organization, networking, and cybersecurity. At the graduate level, I am equipped to offer advanced instruction in computer systems, network architectures, and information security. In addition, I would like to create a course centered on Internet privacy, and run a seminar on Internet measurement and the efficacy of various privacy strategies.

Teaching Philosophy

Drawing from my diverse teaching experiences, my teaching philosophy is four-fold: guiding learning with intuitive examples, creating an engaging classroom environment, being adaptable based on feedback, and incorporating inclusivity and accessibility. In the following, I will elaborate on each of these principles.

Guide Learning with Intuitive Examples. Initiating discussions with an example serves as a powerful tool not only in research but also in teaching, as it allows students to contextualize theoretical concepts in a tangible way. When tackling intricate subjects, I often commence with a concrete example to set the stage for further exploration. For instance, when I need to explain different network protocol layers as a TA for *COMP_SCI 340: Introduction to Computer Networking*, I often start with the familiar example of sending a letter through the postal service. Each layer of the network protocol can be thought of as a step in the mail delivery process. This analogy helps students understand how data is encapsulated and transmitted over the Internet, akin to a letter making its way through various stages of handling to reach its destination. Students thus can find a clear and accessible entry point into the complexities of network protocols. This paves the way for them to dive deeper into each layer's specific functions and roles within the broader system.

Engagement is Key. Engagement is the cornerstone of an enriching educational experience. Active engagement means going beyond passive listening to encourage students to engage with the material in a meaningful way. In my classroom, I strive to create a dynamic atmosphere that encourages students to participate, question, and challenge the presented concepts. For example, when I gave lectures in the course of *COMP_SCI 397/497: Selected Topics in Computer Networks*, I have engaged students through stimulating policy debates on network neutrality, leveraging their diverse perspectives to deepen the discourse. Moreover, engagement is about connecting with students on a personal level. It is about understanding their interests, backgrounds, and learning styles to tailor the educational experience to their needs. To this end, I also incorporate real-world examples into lectures and offering a variety of assignment types to cater to different learning preferences.

Adaptability Based on Feedback. Recognizing the dynamic of the academic landscape, I prioritize adaptability in my teaching practice. This involves a continuous feedback loop, where student input is not only welcomed but is pivotal in shaping course content and delivery. I always maintain an open dialogue with students and attentively addressing their evolving needs, and thus be able to refine my approach and ensure that the pedagogy remains effective and relevant. This commitment to adaptability reinforces a learning atmosphere that is responsive and student-centered. One example is that following the feedback from the students, I have been actively refining the curriculum of *COMP_SCI 397/497*, such as selecting lecture topics that fit the interests of the students, over four consecutive years of being the TA for that course.

Inclusivity and Accessibility. I believe that creating an inclusive and accessible educational setting is essential. Diversity should be a celebrated aspect of the classroom, and every student deserves equal opportunity to access the learning material. I put this belief into action by providing learning resources in varied formats, acknowledging different levels of prerequisite knowledge, and proactively offering accommodations for diverse learning needs. For instance, for *COMP_SCI 340*, I tailored support for students with disabilities, arranging for extra time on assessments and providing materials in larger fonts to aid visibility. In *COMP_SCI 397/497*, I encountered students with diverse levels of understanding on computer networks. To bridge this gap, I curated supplementary reading materials to ensure comprehensive understanding of complex research papers discussed in class. Such measures not only address the immediate educational needs but also reflect the rich, cooperative spirit of our society.

Mentoring Experience and Philosophy

Mentorship, in my practice, is a fusion of guidance and encouragement, a role enriched by my interactions with a diverse cohort of students. My philosophy centers on tailoring mentorship to align with a student's interests, which I find crucial in nurturing not just their research pursuits but also their career plans. This personal alignment proves to be a dynamic stimulant for their motivation and an effective method for tapping into their inherent potentials. I have put this philosophy into practice with mentoring nine students to date, one of whom received a university award, and seven of whom co-authored papers with me, including an award-winning paper.

During my PhD at Northwestern University, I had the opportunity to mentor multiple undergraduate or master students. One junior undergraduate, passionate about user privacy, worked with me on a project on semantic cookies for online streaming analytics system. The student's commitment and innovative approach to this project eared recognition from the university, winning the *McCormick Summer Undergraduate Research Award* in 2022.

I also collaborated with two Northwestern students eager to involve in research and gain programming experience on complex systems. We have decided that the best option is to work on developing a prototype of PDNS, a privacy-preserving DNS system based on a cryptographic primitive called Private Information Retrieval. We have had consistent dialogue and brainstorming sessions as well as detailed discussions on the actual coding. As a result, we presented a demo of PDNS in *SIGCOMM'23*, and also co-authored on a submitted paper. This shows the embodiment of mentorship driven by individual goals, supported by consistent motivation and acknowledgment of their efforts.

In addition, I mentored students from outside Northwestern University. One undergraduate from Dalian University of Technology worked with me to expand their technical knowledge for graduate studies. Our collaboration on the FIAT project led to a submitted paper and the student's acceptance into a master's program at Rice University. I also mentored two students from ShanghaiTech University. With one, our year-long collaboration on the semantic cookie project resulted in an accepted and award-winning (*Best Student Paper Award*) paper at *EuroSys'24*. This student is now pursuing a PhD at University of Maryland. With the other, we worked on a CDN pre-authentication project, leading to a paper submission and the student's acceptance into a PhD program at Northwestern.

After joining the University of Michigan, I had more opportunities to mentor students. While it has not been a long time, I have been mentoring three students, with two being PhD students and one undergraduate. I have worked on different projects with them, and we have made good progress so far: with one of the students coauthored a *HotInfra'24* paper and one will present a demo at GENZERO workshop, potentially leading to a grant opportunity.

In each of these cases, my mentorship approach has been predicated on commitment of my mentoring philosophy. Through personalized mentorship, I aim to continue fostering an environment where students are not just learners but emerging professionals and scholars deeply engaged in their pursuit of knowledge and success.