

My experiences as a student, mentor, and teacher have illustrated the rewarding nature of education for both learners as well as educators. During my undergraduate education in India, my teachers helped me understand the importance of combining theory with practice to produce impact in real-world applications. Teaching as a graduate student instructor and substitute instructor for graduate-level computer security courses has demonstrated the value of discussing cutting-edge technologies grounded in societal and ethical considerations. During my PhD program, my opportunities for mentorship and outreach have revealed that learning can produce excitement and unveil new possibilities. These experiences, along with the chance to contribute to my students' development, serve as my main motivation for aspiring to become a faculty member.

My teaching philosophy has three core principles:

- **Practical Learning:** I encourage students in my courses to apply theoretical knowledge to real-world scenarios. This active learning approach not only enhances their understanding of the subject but also equips them with practical skills relevant to their future careers.
- **Reflective Learning:** I emphasize a commitment to continuous improvement, both in my own teaching practices and in fostering a culture of lifelong learning among my students. This involves regularly soliciting student feedback and keeping updated on the latest advancements in pedagogical techniques. In the classroom, I integrate interactive exercises that stimulate critical thinking and provide opportunities for students to engage in self-reflection.
- **Student-Centered Learning:** Most importantly, I prioritize understanding the unique goals and aspirations of each student enrolled in my course. This involves proactive communication to identify their individual learning objectives and diverse backgrounds and perspectives. Based on this insight, I tailor course content to align with their specific needs and benefit from their participation, thereby enhancing the overall learning experience of the entire class.

Teaching Goals and Experience

My enriching moments with learning and teaching so far have encouraged me to pursue a career in computer science education, in which I would like to (1) design interactive courses that cater to students with diverse expertise and backgrounds; (2) promote student learning through practice, focusing on the varied applications of computer science education; (3) instill in my students critical-thinking which enables them to evaluate the effect of technology on society; and (4) practice lifelong learning by actively seeking feedback and staying updated on the latest trends in both education and my discipline. These goals are crafted based on my previous experience in both teaching and learning, which I describe below:

One of the strengths of computer science is its expansive array of topics and applications, and this makes it crucial to **design interactive courses that cater to students with diverse expertise and background**. As a Graduate Student Instructor at the University of Michigan for EECS 588, a graduate-level course on computer and network security, I helped create a curriculum that considered the varied backgrounds of graduate students taking my course. Among the 38 students in my class, 36 had expertise and interests outside of computer security, such as in human-computer interaction and autonomous vehicles. Leveraging this diversity, my co-instructors and I took steps to (1) curate learning objectives and topics that highlighted the practical application of computer security principles across a range of fields, such as experiments to evaluate usability in security and assessing security reviews of IoT devices; (2) leverage the virtual format of the class to invite experts in different disciplines to share insights on the multi-faceted applications of computer security in their respective fields; (3) use a combination of in-class and online discussions and exercises, providing students with an accessible platform to discuss the latest trends in computer security; and (4) designed assessment methods such as autonomous group projects and exercises that both engaged the curiosity of students as well as evaluated their diverse learning objectives. The student feedback showed that these instructional methods were highly effective in generating engagement with the course and I received a GSI Honorable Mention Award from my department recognizing my efforts.

In addition to helping students relate to the subject, our approach **promoted student learning through practice**, an approach I am eager to emulate in my faculty role. To achieve learning through practice, we designed exercises accompanying course lectures as well as a course-long project that encouraged students to perform research related to applications of computer security in different focus areas. Many of the research projects from our class eventually resulted in top-tier security conference publications. Through my experience, I have observed that practical learning can help students understand and advance the latest state of the art in the field, as exemplified by this anonymous comment from the class evaluation:

“The discussion based aspects allow us to cover cutting edge topics in security, making the state of the art field feel approachable. Most classes feel limited because they’re “just a college class”.”

Through my education and research in computer security and privacy, I have seen that computer scientists can have a profound impact on society through the technology and knowledge they create, which is why I believe that computer science students should be able to **critically evaluate the societal and ethical impacts of their learning and application**. As a substitute instructor for graduate computer security, one of the first learning objectives I incorporated into the course was the ability for students to understand the double-edged nature

of computer security technology, create frameworks that promote the inclusion of ethical considerations in the design of computer security technology, and critique choices made in state of the art literature. One immensely gratifying aspect of this exercise for me was witnessing students assimilate this knowledge and subsequently apply it to different topics throughout the remainder of the course. I believe that an educational approach that prioritizes the societal impacts of computer science practice has enduring effects on students throughout their careers.

A feature of computer science and technology is its rapidly evolving nature, which encourages **continuous learning of the latest advancements in the field**. The experiences I have had in teaching and mentoring students have been the most instructive for my own knowledge growth, as a diverse group of students can bring in new perspectives that can contribute to collective knowledge. I also aim to improve my quality of instruction through **soliciting continuous feedback from my students** on whether they are able to achieve their learning goals. For instance, students in my first graduate security class indicated that they would prefer more timely reviews of their assignments in order to improve future submissions. In the second edition of the class, I portioned a part of the lecture time to discuss their assessments in person, especially for students facing difficulty with the assignments, and give them timely feedback. This design was especially useful towards the beginning of the course, and enabled students to understand the objectives of the assessments better.

Finally, I also aim to keep abreast of the **best practices in education and teaching**, through programs organized both within and outside my department and university. I have attended several seminars and workshops on course design and learning strategies organized by the Center for Research on Learning and Teaching at the University of Michigan, such as the Preparing Future Faculty seminar, and I plan to incorporate my learning from these seminars into my courses, adapting to students' diverse needs.

Mentorship and Outreach

I have been fortunate to mentor and collaborate with several undergraduate and graduate students on research projects during the latter stages of my PhD program. As a mentor, I believe it is important to provide students with the **freedom to pursue different research directions while scoping for time constraints, and communicate frequently and openly**. It was useful for me and my students to set multiple milestones and divide large research questions into smaller goals. For example, I worked with two undergraduate students on a project related to large-scale detection of censorship of COVID-related websites, and we divided the problem into multiple milestones such as problem formulation, review of prior work, collection of measurements, analysis of censorship, and writing, each of which involved multiple iterations and finally resulted in a conference publication. Involving the students in all stages of the research process and giving them ownership helped them build multiple skills, and both are now successful graduate students at top universities. I also focused on **helping students achieve their research and career goals** by understanding their desired outcomes from the project. For instance, one of the students I worked with was eager to get hands-on experience in network security data analysis and enter the network security industry. Therefore, I worked with her to tackle specific research problems that helped build key skills like developing time series anomaly detection methods to analyze network security events.

I was elected to serve as the **outreach chair** of my department's graduate student organization, CSEG, through which I taught several classes focused on introduction to computer science for school students in Michigan. Collaborating with other organizations such as FEMMES and Michigan Engineering, I organized and led workshops and projects on practical introduction to computer algorithms and computer hardware. Working with FEMMES gave me the unique opportunity to introduce women and non-binary students to computer science, and I will continue my outreach efforts in my faculty role.

Future Teaching

As a faculty member, I envision myself teaching courses that both draw on my research interests while also incorporating my dedication to outreach. Teaching undergraduate and graduate courses in security and networking, with a particular emphasis on exploring the diverse applications within these domains, has been my dream. I would also like to teach introductory courses on computer science foundations, tailoring to students from different backgrounds with the intention of fostering their curiosity and engagement in the fundamental principles of computer science. Examples of courses I would love to teach include:

- **Introduction to Computer Security and Privacy:** This foundational course will introduce mid-to-upper level undergraduate students to the basics of computer security and help them adopt a security mindset. Students will apply the principles and practices of computer security and privacy on various systems, including computer software, hardware, networks, and critical infrastructure. Students taking this course will be able to build and maintain secure systems, identify vulnerabilities and gaps in production systems, and develop defenses against common attacks.
- **Censorship and Privacy Tech:** This upper-level undergrad and grad special topics course draws on my research focus and will enable students to explore advanced topics in privacy, censorship, and surveillance. Through readings, class discussions, guest lectures, and research exercises and projects, students will learn the technical and legal background surrounding censorship systems and privacy technologies, build network systems to measure and defend against privacy attacks, and advance the state of the art in privacy enhancing technologies.