

Teaching is one of the joys of being in academia. A professor is uniquely positioned to not only pursue excellent research, but also teach and mentor students to become excellent researchers in their own stead. Teaching gives me joy, as seeing my students succeed gives me great personal happiness. This statement outlines my philosophy and vision towards being a good teacher and highlights my past teaching experiences.

Teaching Philosophy

My goal as a teacher is to shape students into the next-generation leaders in computing. So, I aim to ensure my students not only master the technical content of the course, but also learn to think critically, so that they continue learning even after they complete their study with me. So, in my lectures, I try to orchestrate a multi-pronged conversation between myself and the students to collectively unpack concepts through active learning and critical questioning. Additionally, for learning tools like homework and assignments, I include open-ended components (with competitive grading) and peer-learning to challenge students to do their best and encourage them to develop their creative abilities. Through my teaching, my end goal is to ensure students not only have a deep understanding of the topics covered, but also take away the fundamental principles of the field (*e.g.*, in my discipline of hardware security, these would be guiding principles behind securing systems and designing practical hardware). Based on my experience as a student, a good understanding of the guiding principles helps students apply learned concepts much better to real world problems.

Another essential part of my teaching philosophy is ensuring an inclusive learning environment for students. This has its origins in my first teaching role more than a decade ago, as a teaching assistant for a first-year programming course, where I had students from highly diverse backgrounds. Some students grew up in rural areas, never having owned a computer before, while others were already programming competitively. The philosophy of “*leaving no student behind*” that I developed during that formative experience still influences me today. Lastly, I believe teaching is a process of continuous learning. Feedback from students has been a useful tool that allows me to make classes more engaging and improve the learning experience I can facilitate for my students. Personally, my teaching has considerably evolved by applying this philosophy throughout my experiences as a teaching assistant and in my current role as co-instructor of a course at Georgia Tech.

Classroom Teaching Experience

I have been a teaching assistant for several courses: one graduate course at Georgia Tech in my Ph.D., and four courses at IIT-Bombay, India during my undergraduate program, where I gained experience conducting recitations and grading assignments. I also delivered guest lectures on hardware security in two graduate courses in ECE at Georgia Tech.

In Fall-2021, I was the co-instructor for a graduate course in the School of Computer Science at Georgia Tech, “[Reliability and Security in Computer Architecture](#)” (CS 7292), which I co-designed with Prof. Moinuddin Qureshi. My responsibilities spanned all aspects of teaching, like designing course curriculum, teaching over 30% of the lectures, designing exams and assignments, and overseeing students’ course projects. The curriculum was designed to cover recent advances at the intersection of security, reliability, and computer-architecture. I also had a chance to apply several of my teaching principles outlined above, including a conversational style of instruction, open-ended assignments, and frequent feedback. Overall, the course was well-received: in the mid-semester course feedback collected anonymously, students rated the course 4.5 (on a scale of 1 - very poor to 5 - very good), averaged over metrics like course content, clarity of teaching, and pace of the lectures. Overall, my teaching was also well-liked by the students. Some student testimonials collected anonymously as a part of the mid-semester feedback are provided below:

- *Gururaj’s [lecture on] Transient Execution was one of the clearest and most engaging lectures of the semester.*
- *He has a very good ability to explain complex topics in a very easy to understand way.*
- *He is very responsive and knowledgeable. He is approachable as well which I believe makes [him] a good teacher.*
- *Gururaj is clear and very precise in his teaching. It is a fun experience taking this class.*

In the future, I am excited to create new courses building on my recent classroom experience. Given the increasing relevance of security and computer architecture, I will develop a graduate course on “Advanced Topics in Secure Computer Architectures”, including several security-related topics from my recently designed course and other emerging research in this area. Additionally, this course will have a new seminar component focusing on paper presentations and a research project to encourage graduate students to explore new research at the intersection of security, computer-architecture, and systems. This course will equip students with the expertise to become effective researchers and practitioners in the increasingly relevant field of security for hardware and systems.

Based on my research and teaching, I am also qualified to teach a range of undergraduate and graduate courses in computer architecture and security and introductory courses broadly in computer systems and engineering.

Mentoring Experience

A good teacher also needs to be a good mentor outside the classroom. I am currently mentoring several junior students in their research across different research labs, universities, and countries.

In my research lab at Georgia Tech, I am mentoring two Ph.D. students. Although both of them came from very similar undergraduate backgrounds, I realized through engaging with them that each student can have unique strengths and areas for development. One of the students was quite proficient technically but inexperienced in project execution. So I coached him on time management, presentation, and communication with systematic planning and feedback sessions. The other student had adequate project management skills but was weak in technical aspects like programming and domain knowledge. I coached him on performing effective literature surveys and helped him improve his technical skills by pair-programming with him. Through this process, I helped both students successfully submit their first conference paper to ISCA'22 recently.

I am also mentoring several students as a part of independent research collaborations. First, I am mentoring a Ph.D. student in another research lab at Georgia Tech, working on fuzzing. I mentored this student on writing since it was his first security conference submission. We recently published a CCS'21 paper together. Second, I am mentoring a Master's student from University of British Columbia, Canada, in his research on DRAM integrity, given my expertise in the area: we submitted two papers together, one each at ASPLOS'22 and ISCA'22. Third, I am also mentoring a junior Ph.D. student at TU Graz, Austria, in his research on new micro-architectural side-channel attacks, providing my expertise on out-of-order core micro-architecture to him: we are working on a conference submission together.

My learning across these mentoring experiences has been that different students respond to mentoring differently. I have learned to customize my mentoring style to each student to help them benefit the most. I look forward to continuing these mentoring relationships and seeing these students grow and succeed.