Teaching Statement

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One of the key factors that draws me to academia is the opportunity to teach and mentor students. My professors have been influential in shaping my interests and career. It would be extremely rewarding if I could exert a similar positive influence on students. In graduate school, I was actively involved in teaching and mentoring as the Teaching Assistant (TA) for four courses and a mentor to five students. This experience reinforced my interest in pursuing a career in academia. To me, interaction with young minds is intellectually stimulating and personally gratifying.

Teaching Philosophy

My broad area of interest is computer systems which includes computer networking and cloud computing. As a student, I was captivated by the elegant modular design of the Internet which enabled interconnection of millions of devices. All popular systems today are a result of careful consideration of constraints and goals, with separation of functionalities across multiple modules, and simple, but expressive interfaces between them. I believe that teaching about features of a working system without exploring the motivation for the design renders a systems course meaningless. My goal is to teach systems by first analyzing the environment they target including key challenges, objectives, and constraints, then encouraging the students to find possible solutions for addressing each challenge, and finally discussing the design decisions that led to the actual system.

I am a strong advocate of teaching concepts through hands-on experience. Engaging students with assignments and projects that convey the core concepts will enable them to apply these concepts elsewhere. In the teaching workshops at the University of Illinois, Urbana-Champaign (UIUC), I learned about the importance of active learning and continuous feedback. I employed these techniques in my guest lectures which proved to be very effective. For example, during my lecture on the future of service provider networks in the advanced networking course at UIUC, I first discussed the past cellular technologies and sought students opinion on the trajectory of evolution. The discussion that ensued brought forth interesting ideas about the future of cellular networks. I want to incorporate such learning techniques in the design of my future classes using questions that walk students through the design considerations in existing systems, periodic feedback forms requesting suggestions for improvement, etc.

Teaching in a cutting-edge field such as computer science also involves certain responsibilities. Through my courses, I would like to dispel the myth that systems building, and computer science in general, is restricted to hackers with decades of programming experience. I will take special care to make my courses accessible to all students, even those with limited computer science background prior to college, by fostering an inclusive environment for students of all races, genders, and religions. In my courses, I will emphasize that analytical skills are equally important, if not more, compared to coding skills in computer science, and anyone can cultivate the required skill-set through practice. While discussing system vulnerabilities, I will also convey the ethical implications of working with systems and our responsibilities as individuals with technological expertise.

Teaching Experience

In graduate school, I had the pleasure to serve as a teaching assistant four times — once during my Ph.D. at UIUC and thrice during my Master’s at the University of Pennsylvania (UPenn). At UIUC, I was the TA for the graduate course on Advanced Computer Networks for which I received a TA rating of 4.5/5. As a part of this appointment, I gave two guest lectures, designed parts of the assignments, held weekly office hours, and guided students on their research projects.

At UPenn, I was the TA for three courses — Introduction to Networks and Protocols, Advanced Networking Protocols and the Telecommunications lab. As these courses were taken in sequence by students in the Master’s program in Telecommunications and Networking, I was able to interact with the same set of students over the course of a year. The courses had approximately 40-50 students and the lab had 24 students. I held weekly recitations where I helped students with their homework and went over the parts of lectures. Handling the Telecommunications lab in parallel with the Advanced Networking Protocols course reinforced my understanding about the importance of hands-on experience. I observed that students grasp concepts better and retain them longer when they employ them in practical assignments.

Courses I Can Teach

Based on my research and teaching experience, I would be qualified and excited to teach courses in Computer Networks, Distributed Systems, and Cloud Computing at the graduate and undergraduate levels, and introductory computer science courses. I am particularly interested in designing advanced graduate courses in emerging research at the intersection of different sub-fields. Inspired by my research on inference of application needs for automated resource management and network scheduling for deep learning systems, I would like to design a course on Systems and Machine Learning exploring topics ranging from the impact of efficient learning techniques on various facets of system building to the design of state-of-the-art systems for distributed deep learning. I am also interested in offering an advanced course on Programmable Networks covering programmability at various levels (Software Defined Networking...
(SDN), programmable hardware switches, etc.) and the influence of Programming Languages (PL) in networking. As a part of my courses, I will encourage students to build/contribute to open-source software through their final projects.

**Mentoring experience**

As a mentor, I strive to create an environment that allows students to hone their research skills in alignment with their tastes. I worked with several motivated undergraduate and Master’s students during the course of my Ph.D. I have guided three undergraduates — Shekar Brahma, Bryant Hong, and Ruiyang Chen — on various projects at UIUC. Two of them decided to continue on to the Master’s program at UIUC and all of them still approach me for career advice. This positive experience assuaged my initial apprehensions about working with students with no prior research experience. Ruiyang worked on the inference part of my recent project on automated resource management for distributed micro data centers and is the second author on our paper under submission. Inspired by his enthusiasm and dedication to research, I am currently working with him on formulating a new problem in the space of programmable networks which he can lead.

I also work closely with Vipul Harsh, a previous Master’s student at UIUC who continued on as a Ph.D. student. While the undergraduates required close supervision, Vipul was more independent, approaching me only for solving roadblocks in his work and higher-level directions. His first-author paper on our joint work is currently under submission. I have also mentored Vojislav Dukic, a graduate student at ETH Zurich on predicting network flows in data center environments. Our joint paper will be appearing in NSDI’19. Working with a broad range of students has helped me tailor various facets of mentoring to the nature and preferences of the student including the level of involvement, the frequency of meetings, means of conveying feedback, etc. It was a rewarding experience to see students evolve as researchers during the progress of their projects.

As a Professor, I will strive to convey my enthusiasm for the subject, help students absorb complex concepts and equip them to apply these concepts in relevant scenarios, lay out well-defined expectations and goals in my courses as well as in research projects with my graduate students, and build meaningful mentoring relationships that will help students in school and beyond. The opportunity to mold the next generation is a privilege which I intend to handle responsibly by constantly improving myself as an educator and a mentor.