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Teaching Statement

Philosophy. In face of the rapid and constant evolution in our technology and society, I believe my primary goal as a teacher is to prepare my students to solve new problems they encounter in the future. In my view, this means providing students with a solid and broad foundation of the subject matter, while also making the act of taking my course an exercise in learning how to rapidly learn, even when encountering a new domain. For undergraduate and entry Master’s courses, I will focus on identifying and communicating common patterns in the knowledge and techniques of the subject. I believe this pattern-based approach not only helps students relate new material with knowledge they have already built up earlier in the course, but it also instills a reliable study method in them so that they can use it in any of their future studies. Besides hands-on assignments to help students solidify their subject mastery, I will also encourage the undertaking of independent studies for those who want to jump-start their research experience. For advanced Master’s and Ph.D. courses, I will focus on broadening and deepening the subject knowledge of my students to develop them into experts in the subject. In addition, I will also use suitably-defined course projects to expand their repertoire in both problem solving and research techniques so that they have a higher chance to become successful researchers in the field.

Experience. While studying for my Ph.D. at Carnegie Mellon, I have served as a teaching assistant in two undergraduate courses, one of which was a senior-level course in algorithms. I noticed that students often expressed a common frustration—many students understood the algorithms taught in class just fine, but they felt that these algorithms were akin to rabbits pulled out of a hat because there was little indication on why particular design techniques were chosen. Upon reflection, I realized what they might be missing was an algorithm design framework known as “hypothesis strengthening”, which I was lucky to have learned from my undergraduate teachers at Cornell and an older textbook. Using this insight, I started to explain algorithms in this framework and many students started to agree that there is a pattern in how one may systematically design algorithms. In the decade that followed, two influential algorithm textbooks originating from Berkeley and Cornell would be published, both following this pattern-based approach. To my delight, one of them is now a recommended textbook in the current offering of the course I served.

During my post-doctoral training, I was fortunate to have the opportunity to co-teach a graduate-level course in software security, in which I was responsible for half of the lectures. Validating a wisdom passed down from one of my Ph.D. advisors, this had proved to be as much of a learning experience as it was a teaching experience. Indeed, lecture preparation had constantly led me to ask myself “Is there a better way to learn this topic if this were the first time I encounter it?” This self-examination had helped me hone my explanations by revealing my own obstacles as I reviewed the course topics, which had in turn enabled me to contribute numerous revisions to the slide decks so that they explicitly helped students overcome these potential obstacles with new perspectives and analogies. The overall feedback from our students was very positive, as indicated by a joint teaching rating of 4.54 (out of a maximum of 5).

Teaching Plan. I look forward to teaching courses in systems and information security topics such as software security, web security, and cryptography. With preparation, I am also comfortable in teaching broader Computer Science and Engineering courses such as compilers, algorithms, and web applications.

I am also interested in creating new or renewing existing courses to apply techniques from traditionally non-security-related areas towards security and privacy. These include diverse areas such as program analysis, automated reasoning, and machine learning. In my own research, I have observed that these areas have much to offer to our field, and vice versa. For example, whereas machine learning techniques have played central roles in many recent advances in security areas such as binary analysis and malware detection, practical problems in security and privacy have in turn inspired and informed machine learning areas such as adversarial learning and differential privacy. My goal would be to design a syllabus that provides a rigorous introduction to relevant state-of-the-art techniques in these fields, as well as practical demonstrations of how these techniques can greatly benefit security and privacy applications.