Teaching Statement

Muhammad Naveed

I love teaching and mentoring students. Besides research, teaching is the main reason I want to join academia. I am fortunate to have had several opportunities to teach and mentor students.

Teaching Experience

Teaching Assistant. In Spring 2013, I was a teaching assistant for a computer security class (35 students). I gave two lectures: one on confinement and covert channels and one on cloud storage security, a lecture which I developed. I designed and evaluated three course projects where students incrementally developed a secure cloud storage system to search encrypted data.

Guest Lecturer. In Spring 2015, I gave two lectures on modern cryptography in a computer security class (62 students). I developed these lectures to introduce students to the scientific method of modern cryptography—precise definitions, well-stated assumptions, and rigorous proofs. The students favored these lectures and gave comments such as, "enjoyed learning about different encryption schemes" and "like to go in more depth with this topic." I designed one of the three course projects to teach students the concept of private set intersection (open source) and how to use it to find common security incidents between two companies without sharing all the incidents.

I guest lectured at a freshman engineering course about how to conduct research. I also guest lectured at a Cornell security class about my work on inference attacks on property-preserving encrypted databases.

Instructor. I was a lecturer in Pakistan for two semesters before coming to UIUC; I was responsible for a two semester computer networks lab class with 120 students in three sections. I taught students how to set up an enterprise network, including preparing cables, configuring computers, routers and switches, and testing and troubleshooting the network. As per request, I also taught them network simulator (ns2), a popular tool to simulate networks.

Mentoring. I was mentor for an undergraduate research program, called Promoting Undergraduate Research (PURE), at UIUC. PURE helps undergraduate students in CS and ECE learn how to conduct research. Through PURE, I mentored two undergraduate students (Nitesh Nath and Xusheng Zhang) in Spring 2014; Nitesh worked on extending one of my Android work to Apple iOS and Xusheng worked on privacy-preserving photo sharing. I mentored two other students (Stephanie Wang and Xinrui Zhu) in Spring 2015, who both worked on safety and security of Internet of Things. I supervised an undergraduate independent study for Edward Chou, who also worked on safety and security of Internet of Things. I also worked with five masters students (Igor Svecs, Dongjing He, Soteris Demetriou, Gaurav Lahoti, and Peter Fischer), which led to several papers in top-tier conferences.

Teaching Philosophy

I strive to provide students with an effective, enjoyable, and interactive learning experience. To ensure effective and enjoyable learning, I incorporate activities and present material in an amusing fashion. When I was teaching an encryption scheme (one-time pad), I asked students to use the scheme to encrypt and decrypt a message on paper to reinforce the concept. When I was teaching security of encryption schemes, I compared the probability of breaking the scheme to the probability of an asteroid hitting the earth. To make it more interesting, I computed the probability of an asteroid hitting Urbana/Champaign, which was actually more than the probability with which a brute-force attack can break a modern encryption scheme. In a lecture about secure cloud storage, I showed a YouTube video about the benefits of cloud storage with amusing comments about cloud security from YouTube viewers, which the students enjoyed. In a class about privacy implications of wearable technology, I helped the entire class use Google glass while the instructor was lecturing. The students were very excited to play with the Google glass.

To ensure an effective learning experience, I get feedback from students. When I was teaching assistant for the computer security class, I got feedback from students after the midterm and incorporated it in the rest of the semester. When I was teaching a computer networks lab, students asked me to teach network simulator (ns2), so I learned it and taught them, which they found useful; some of them used it in their senior thesis projects.

I encourage interaction and ask students to interrupt me if they have questions. I also pause lecture every 15 minutes to see if there are any questions. In the computer security course at UIUC, we had a 15 minute discussion section in a class of 75 minutes. I prepared questions for my lectures and students actively participated in the discussion. To make projects more interactive, I introduced in the computer security class, project assessment through demos. Students showed me their code and demonstrated their projects and we talked about mistakes or any questions they had. It resulted in a better learning experience and the computer security class continued to use demos to assess projects.

Teaching Interests

I am enthusiastic and qualified to teach undergraduate and graduate courses in computer security, cryptography, and computer networks. I would be happy to teach embedded systems, distributed systems, and introductory computer science courses.

I am particularly interested in developing a course about using cryptography to solve real world problems, such as data breaches, secure cloud storage, and mass surveillance, which is also my research agenda. On the one hand, industries are in desperate need of practical and secure solutions to these problems. On the other, it is unclear how to efficiently use existing cryptographic techniques to solve them. The course will explore how to use existing tools and develop novel techniques to use modern cryptography to solve these and other real world problems.