Teaching is necessary for advancing society and is a vital skill for successful researchers. It is only through the ability to explain complex ideas that researchers can disseminate knowledge. However, there is no "one-size fits all" model of teaching. Instead, flexibility and adaptation are key to successfully teaching others about new concepts. With this in mind, I am excited to leverage a variety of teaching styles and methods to provide a rich and fruitful learning environment for every student, helping to guide them to a successful and fulfilling learning experience.

Experience

My teaching experiences are most recently shaped at MIT Lincoln Laboratory, where I have had many opportunities to mentor students and junior colleagues. I work collaboratively with colleagues and students to develop solutions to problems and explore new research paths. I am also active in Lincoln's summer research intern program, mentoring students each summer. The summer interns work closely with lab staff on focused short-term research goals. I have been fortunate to work with many talented students each summer, resulting in several workshop and conference publications. In many cases, collaborations continue beyond the initial summer internship, in many cases leading to long-lasting collaborations. One student in particular spent two summers at the lab working on papers that would eventually become core components of his dissertation. We worked closely together during the summer, and continued to collaborate while he was at his university. He has since joined the computer science department at a top-ranked university as an assistant professor.

During my tenure at Lincoln, I have also had the fortune to refine my skills in developing courses. My research group has developed a number of courses that are taught internally for other researchers within the lab, as well as offered to others within the government (including a short-course offered for the Naval War College). The *Introduction to Cybersecurity* course provides a broad overview of computer and network security to researchers that do not have a background in computer science. In developing lectures for this course, I have continued to hone my ability to break down and explain complex topics in ways that speak to the largest number of students.

While Lincoln has offered opportunities to develop my skills as an educator, my teaching experiences started in graduate school as an instructor for *Introduction to Algorithmic Processes (CMPSC 101)*, a course offered by the Computer Science Department at Penn State targeting non-computer science majors. Teaching this course was one of my most difficult, but rewarding, experiences as an educator. Working with students from a variety of different backgrounds required me to think quickly and adapt lessons to best explain concepts to the students. I found that the most successful lectures were ones where I could engage the students and interact to explain new concepts, instead of simply lecturing to the students as they passively absorbed the lecture material. The course also taught me to focus on the students and read non-verbal cues, looking for comprehension or confusion. In learning to read these cues, I was able to adapt the lessons to suit the needs of the students.

After teaching CMPSC 101, I realized that teaching is vital to being a successful researcher, and looked for opportunities to mentor younger students. I would often work with students to develop research ideas, design systems and experiments, and craft arguments for research papers. Through these experiences I learned the value of one-on-one and small group teaching. It is this mentorship experience that helped me realize my passion for advising students, a passion that I continue to pursue to this day.

As I became more senior within my research group in graduate school, I became involved in developing a reading course in *Web Security*. My role was to develop the reading list, schedule, course projects, and prepare several lectures. The course was offered at the graduate level, and required students to take an active role in the course by presenting papers during the lectures. I quickly learned that this is a daunting process, but is also incredibly rewarding. The discussions during the class would often result in new ideas and fruitful discussions about a paper's strengths and weaknesses, and how to better craft the arguments presented in the paper. These experiences helped to hone my skills as both an educator and a researcher.

Approach

My approach to teaching has evolved over the years. When I first started teaching, I quickly learned the value of planning and preparation. When the educator is ill-prepared to teach, the students suffer, while a well-prepared educator allows students to flourish. Additionally, passion and an ability to adapt are critical to being a successful educator.

Planning: Teaching begins long before entering the classroom. An educator must think carefully about the topic being presented, the students in the class, and how best to present material. The professor must develop an intuition for what topics may prove more difficult, and what can be safely covered more quickly. Careful planning results in lectures that are well-received by the students and provide fewer opportunities for students to become disengaged from the lesson. I plan to approach course development through careful planning, surveying similar courses at other institutions, as well as input from industry about critical topics for any course that I teach.

Preparation: Diligent preparation is the next step towards a successful lesson, including building lecture materials and notes to guide students to successful comprehension of the course material. This often involves gathering and presenting relevant examples, based on the students' backgrounds, current events, or both. Another important step in preparing a lesson is working with students outside the classroom to gain a better understanding of how they learn and provide them the best support possible to succeed in their academic careers, and become successful professionals.

Passion: Once the planning and preparation are complete, the educator must approach the lesson with a passion that is evident to the students. Many aspects of communication are non-verbal, and students will quickly decide from the professor's cues just how important a topic is. If the professor is passionate, the students remain engaged and interactive. This passion is not something that starts and stops with the lectures; instead, the professor demonstrates this passion not only for the subject itself, but for the students and their ability to succeed. This requires a willingness to go above and beyond, working with students to thrive.

Adaptation: Finally, adaptation is key to effective teaching. Understanding the students and their comprehension of the lecture material and using these to adjust the lessons can only help the students succeed. If many students are asking the same questions, that indicates a need to slow down and review material more carefully. If students are demonstrating deep understanding of a topic, then moving on, even if ahead of schedule, is warranted. Through careful adjustment in teaching tempo, students remain engaged in the lessons and bring an energy to the course that results in a successful course.

Future Plans

I am excited to teach at both the undergraduate and graduate levels. I am especially interested in teaching computer and network security, systems programming, and web and mobile security. Additionally, I look forward to developing courses in more focused areas, including information flow security, embedded and mobile security (cyber-physical systems and Internet of Things), and the science of security. These are all topics that I am passionate about and have broad applicability to both research and industry, leading to enthusiastic and engaged students. Finally, I plan to explore the NSF "Research Experiences for Undergraduates" (REU) program as a means of introducing undergraduates to research early in their academic careers.

Student	Mentored Skills	Results
Adam Bates (Graduate Intern)	Systems design, systems programming, idea generation	Multiple conference and workshop papers on secure data provenance that formed part of PhD dissertation. Currently at University of Illinois Urbana-Champaign as an Assistant Professor.
Katie Han (Undergraduate Intern)	Technical skills, system analysis	Code and presentation for research group. Currently at Brown University pursuing a BS in Computer Science.
Brandon Pullig (Undergraduate Intern)	Technical skills, systems programming	Code and presentation for research group. Currently at US Naval Academy as a midshipman.
Frank Capobianco (Graduate Intern)	Idea generation, system analysis	Code and presentation for group, conference paper on secure data provenance. Currently at Pennsylvania State University pursing a PhD in Computer Science and Engineering.
Mark Lemay (Graduate Intern)	Idea generation, structuring arguments	Presentation and code deliverables for group. Currently pursing a PhD at Boston University.
Chrisantha Pererra (Graduate Student)	Idea generation, system programming, structuring arguments	Code deliverable for group. Currently working at Oracle.