Teaching Statement

In my teaching, I endeavor to help students use computing to make a substantive and lasting impact in the world around them. My philosophy on impact, grounded in both my academic experiences as both a student and instructor, as well my industry experience, espouses that success in any endeavor is based on three factors: experience, motivation, and ability. In order to see how I translate the need to foster these goals into educational practice, consider my ECE 422 Computer Security I class which I rebuilt in 2015.

ECE 422 is now taught as a systems programming class with five machine problems (MPs) carefully chosen every semester to create experiences that match today's security practice—from cryptography to network security and forensics. As an example, MP 1, the systems security MP, asks students to perform a variety of attacks including: stack overflow, return into libc, return oriented programming, heap overflow, and string format attacks. These experiences directly map to real-world attacks. Using the skills developed in these MPs, the class requires the students to reflect on their experiences by engaging in "adversarial thinking." In adversarial thinking, students are asked to question the underlying assumptions about a system's design and implementation and to understand the means and motives of potential attackers. This adversarial thinking is applied to a myriad of high-impact, real-world security problems such as the Equifax breaches, implications of the Snowden documents and WikiLeaks, and the challenges of Spectre and Meldown attacks.

Motivation begins with the instructor and I actively seek to convey my enthusiasm for the field by including instruction on problems from my research which I am passionate about—including TLS, Malware, and DDoS. Students have control over the content of the course both implicitly in how lectures are guided by student discussion, but explicitly through the use of interim course feedback, and by allowing students to define the last two weeks of instruction themselves. In the last two semesters, this has led to student-selected topics on Container security, Crypto currencies, the NSA Firmware attacks, and the Dark Web.

Finally, the course seeks to support a myriad of learning styles matched to student abilities. I provide content in the form of small group discussion sections, readings, PowerPoint slides, and recorded lectures. Students are encouraged to learn from their peers and the MPs are designed to be worked on in pairs. All the MPs are scaffolded with multiple checkpoints—moving from easy tasks with large amounts of background material to increasingly complex ones with significant independent inquiry required.

Students have responded favorably to this class saying the class is "one of the best designed classes" and "the way this class is taught is fantastic." The class has Q2 (Rate the Overall Quality of this Course) evaluations ranging from 4.5 - 4.9. When speaking of the MP experiences the students stated "The MPs were really well prepared and taught us a lot and were super fun," and "the MPs were super awesome, practical experience with hacking." Addressing the nature of the instruction, the students remarked "The lectures were the most engaging of any course this semester," "you are an awesome lecturer," and "Bailey is a really great prof, and I would definitely take another class with him." The instructor Q1 (Rate the Instructor's Overall Teaching Effectiveness) evaluations range from 4.5 - 5.0 and I have been listed on the "List of Teachers Ranked as Excellent by Their Students" (Fall 2016, Spring 2016, Spring 2018, Fall 2018).

My passion for teaching extends beyond course development and execution. For example, consider the College of Engineering City Scholars program where I have been involved each semester (three) since its inception. The program, launched in 2018, seeks to leverage "the University of Illinois' nationally renowned College of Engineering to build Chicago's tech pipeline." Juniors and seniors majoring primarily in Computer Science, Electrical Engineering, and Computer Engineering balance living in Chicago, taking classes, and interning. In addition participating (online) with campus sections of a class, small cadres of students receive 90 minutes of instruction from faculty who travel to Chicago each week. In addition to the obvious direct connection to impact of teaching students who are simultaneously engaged in internships, the smaller class size allowed for substantial flexibility for flipped-class room style education.

Helping students change the world through computing is one of the joys of teaching. As an instructor, I build student experiences that directly translate into performance beyond the classroom. I motivate students by connecting education to real-world applications, to my research, and to the students' own goals. Finally, while I rigorously evaluate student progress, I also support multiple paths to success based on each student's abilities. I continue to look forward to teaching classes where I can speak with authority and enthusiasm on topics including networking, distributed systems, and security.