Allison McDonald | Teaching Statement

One of my motivations for becoming a faculty member is the opportunity to continue working with smart and creative students. I am excited to mentor and teach the next generation of researchers and technologists, and contribute to a future of safer and more reliable systems by teaching security and privacy as foundational components of computer science.

Teaching experience

I have experience teaching in small and large classrooms with different types of students, and I am excited to grow my expertise in teaching as a faculty member.

Computer security courses. As a graduate student, I was a teaching assistant (TA) twice for the University of Michigan's undergraduate security class (EECS 388). This is a project-based course with over 350 students that covers a wide range of security topics, including basic crypto attacks, network penetration, and return-oriented programming. My responsibilities were to teach a weekly lab section of about 30 students, hold regular office hours, and update and grade homework assignments and projects. Both my lab section and office hours taught me to be flexible in my teaching format. For example, if students were struggling to remember the basic organization of a stack while I was presenting a buffer overflow example in lab, I would pause and diagram a simpler example on a whiteboard, asking questions until students understood the concept. If the questions were instead about how to translate a diagram into practice, I would open gdb and show the same example in real memory. My weekly office hours would draw between 5 to over 30 students. Depending on attendance, I would spend the time giving students 1:1 support or running an on-the-fly discussion section to review the concepts that many students needed help with. I wanted to make sure my office hours were a space where any type of question could be asked and taken seriously, so I made sure to save time for 1:1 questions even when the office was full. I received very positive feedback from students during lab and in course evaluations. One student wrote: *"Allison was a great lab instructor and was super helpful during office hours as well! She explained things very clearly and understood that some topics were very difficult and made sure to spend extra time on them to help us."*

EECS 388 also gave me the tools to lead a course. As a graduate instructor on a team of mostly undergrads, I was often in a supervisory role to ensure that work was done well and on time. I also co-wrote and graded the exams, and met students with course grade concerns. After I taught the course as a TA, I was invited back to teach the two lectures on control hijacking for the full section of over 350 students. In teaching a complex topic like buffer overflows, I believe it's critical for students to understand *why* the information is worth learning before diving into the nuts and bolts. For example, when introducing buffer overread attacks, I talked about the heartbleed bug, which allowed attackers to read protected memory from as many as half of the most popular sites using TLS. Examples like this keep lectures interesting, but more importantly they demonstrate that the content is relevant: within 90 minutes, students have the knowledge to implement one of the biggest (patched!) security attacks of the last decade. I also find pausing for small in-class exercises effective for assessing student understanding of material. If students struggled to get or explain the answer, I would jump back and review concepts before building on the knowledge. In course evaluations, multiple students remarked on the quality of these lectures. One students said: *"She was an enthusiastic lecturer, and described the material very well for the amount of time she had available to do so."* Because my control flow lectures were so successful, I was invited to teach them again the following semester. My performance as an instructor also led the department to invite me to teach the graduate security course (EECS 588) as the instructor of record in Fall 2021, which is usually taught by core security faculty. Although I am excited to teach a similar course in the future, I declined to keep to my timeline for finishing my dissertation research.

Community outreach. I have enjoyed teaching in the wider community as well as in an academic environment. Specifically, I have significant experience designing and leading digital security workshops. The year before I began my PhD, I studied in an international human rights law program. Recognizing that human rights lawyers would need to keep information secure, I designed a workshop on the basics of secure communication and device security and presented it to my cohort. Since then, I have designed and given over a dozen digital security workshops for law students, Latinx community groups, and several cohorts of investigative journalists participating in the Knight-Wallace Fellowship. During Fall 2020, I also co-taught a seven week study group on online self-defense for older adults at the Michigan Osher Lifelong Learning Institute. In addition to being a new audience with unique challenges, the program was run completely

over Zoom, giving me experience teaching and leading interactive discussions remotely. In these workshops, participants often have a range of prior knowledge about security and technology. I have learned to identify core concepts and find the fastest way to get all participants on an equal playing field—without losing critical nuance or overwhelming them with details. I have also seen that peer knowledge is a valuable resource for addressing questions because the participants are often working through similar challenges. I plan to leverage this insight in my teaching in the future, for example, by giving students the responsibility of answering some of their peers' questions in online class spaces.

Future teaching. As an assistant professor, I would be especially excited to teach courses on systems security and privacy at all levels. The undergraduate security course that I TAed was the course that ultimately led me to security research, and I look forward to sparking that excitement in the next generation of security researchers and practitioners. I am also qualified and would enjoy teaching any foundational computer science course such as programming fundamentals and data structures courses, computer science ethics courses, and foundational qualitative research methods courses. I am also excited to design upper-level undergrad and grad special topics courses based on my research. For example:

- **Privacy & Security at the Margins:** This course would cover the diverse privacy needs and risks for a selection of high-risk communities (e.g., communities I've worked with in my research and teaching: survivors of intimate partner violence, journalists, sex workers). Through readings, guest lectures, and semester-long case studies, students would explore the technical assumptions about security and privacy that fail to meet holistic safety needs and learn strategies for incorporating the needs of high-risk users into research and design (e.g., based on *Design Justice* by Sasha Costanza-Chock).
- **Surveillance & Privacy Tech:** This survey course would introduce students to the technical and legal battle between surveillance and privacy technologies. Weekly seminars and a contained, novel research project will teach students about topics like network censorship techniques, circumvention technology, surveillance risks like browser tracking and metadata collection, decentralized anonymity networks, and secure communication tools.

Mentorship

I have been supported by a network of wonderful mentors, and it is important to me to be that support for others. I have served as a mentor to nine undergraduate and junior graduate students on multiple research and teaching projects, most of whom (7) are women. As a research mentor, I believe my role is to provide guidance on how to define and investigate questions, watch for and preempt common research pitfalls (e.g., not asking for help), and instill confidence. One way I do this, especially for new researchers, is to ensure they are a partner in project decision-making. I believe this gives students real buy-in and ownership over a project and helps demonstrate that there are no "right answers" in research—there are multiple ways to answer a question, each with benefits and limitations. Finding a path to answering a question can be an iterative and collaborative process, and one that can, and often will, include mistakes. For example, I was mentoring an undergrad on a project when I realized we needed to change our main question. She was as familiar with the data as I was, so I included her and trusted her opinion in deciding what alternate questions would be most interesting and/or how we might get the data to answer a different, related question that excited her. Our work led to her presenting a poster at a U-M research colloquium and she is now a graduate student at the University of Michigan.

I have also been an informal mentor to many students considering grad school. As someone who had no family or friends with postgraduate degrees, I started grad school totally unfamiliar with how academia works and a narrow idea of what doors a PhD opens. I really value talking to other students who do not have other sources of support and insider knowledge to help them decide whether research is a career they want to pursue, as well as how to navigate the application and decision process. Independently and as part of the "Explore Graduate Studies" workshop the CS department hosts, I have given feedback on dozens of statements of purpose for prospective grad students and have been delighted to later encounter some of them as peers in other departments.