Teaching Statement

I view teaching and mentoring as complementary to research and have made both a priority throughout my undergraduate and graduate studies as well as my professional work. Collectively, these experiences have shaped my teaching and mentoring philosophy, which centers on recognizing challenges to student learning and iteratively adapting my style and approach to be sensitive to these challenges to ensure the best student learning outcomes.

One of the key challenges in teaching is to present the course material in a format that is engaging and understandable. This challenge was particularly evident when I was teaching business calculus—a class designed for non-math majors that I taught for seven semesters while an undergraduate. My students often found it difficult to engage with the course material because of their lack of mathematical training. To make the material more accessible to these students, I learned to use real-world applications to contextualize the concepts I was teaching. By doing this, my students were better able to relate to the concepts being learned, and I found that as a result they were more engaged than when I relied solely on textbook examples.

During this time, I also discovered that it can be challenging to get students to actively participate in classroom discussions. A major component of my calculus instruction was discussing example problems with the class and working through them collaboratively on the board. In these situations, there was a tendency for many students to remain quiet and disengage while a subset of the students (usually those that already understood the material) dominated the discussion. To promote participation and make my classes more inclusive, I would often use the Think-Pair-Share technique, where I prompted students to think about the examples I had presented and to share their thinking with a partner before coming together as a class to work through the problems. I found that this approach immediately improved the number of students that engaged—students seemed to feel much more comfortable participating in class discussions after they had first discussed their thinking with a partner, and my teaching evaluations reflected these sentiments. One student said, "*Chris' interaction with students during class created an inviting environment*" and another stated that, "*We use class time well to cover questions and to make sure that everyone understands the material.*" These early teaching experiences shaped my general approach to interacting with students in the classroom and helped me to develop approaches for engaging students and making class discussions more inclusive.

While teaching in graduate school, I took on a greater role in organizing and structuring course material. During this time, I found that organizing course material so that the learning goals are well-aligned with the assessments and instruction is a big challenge. For example, in my Software Structures for User Interfaces class, the previous TA's course evaluations suggested that students were struggling to see the alignment between class concepts (e.g., interactor hierarchies) and the homework assignments (e.g., building a javascript library for drawing interfaces). To learn how to improve course alignment, I took a class on instructional design through the Program for Interdisciplinary Education Research (PIER), and I participated in over 80 hours of classroom observation and teacher shadowing. From these experiences, I learned that backwards course design, i.e., defining clear learning goals and then working backwards to develop assessments and then instruction, is an effective technique for improving the alignment of course materials. To apply this technique to my user interfaces class, I outlined clear learning goals for each of the course topics, and then revised each of the homework assignments to explicitly align with these goals. I also restructured the lecture materials to cover the skills students would need for each assignments and included in-class activities for students to practice these skills. After making these changes students' learning outcomes improved and they reported that they better understood the connection between the

course concepts and assignments. For example, in my course evaluations one student stated, "*The examples in class really clarified a lot of concepts for me, and it was helpful to see how the examples directly correlated with the homeworks.*" As I move forward, I plan on continuing to develop my course design framework—trying out new techniques and adapting my existing techniques in response to course feedback.

While in graduate school, I also had the opportunity to mentor students in their independent research. From my experiences mentoring ten students, I have learned that adapting to each student's individual differences—in their prior knowledge, motivation, behavior, and goals—is a big hurdle to being a successful mentor. One rewarding experience was working with an international high-school student, who did a summer internship with me to study machine learning. Unlike some of my more experienced mentees, this student had no prior machine learning or mathematical training. To be flexible, but supportive, of this student I learned to adopt an apprentice-style approach, where he initially co-worked with me, then transitioned into a more independent role while I continued to provide regular guidance and support. By having close interactions with this student at the onset I familiarized myself with his individual needs, built collaborative rapport, and scaffolded his initial learning process. After transitioning the students into a more independent role, I helped him to define research and learning goals, set deadlines to scaffold his progress, and provided him with advice about how to overcome barriers and achieve successful outcomes. By the end of the summer, he was formulating his own research questions and conducting his own investigations. Last year, he was admitted into a Computer Science program at the University of Waterloo, and we entertained the idea that he might one day be my first graduate student. This adaptive approach has been successful with my other mentees as well, many of whom have moved on to either industry jobs or to conduct their own graduate studies. Although mentoring students demands a great deal of time, the gratification I feel from helping shape and support student learning has been immense, and in the next phase of my career, I am particularly looking forward to mentoring PhD students.

Together with my research and coursework, these experiences have prepared me to teach classes in educational technology design, human-computer interaction, artificial intelligence, and educational data mining. Additionally, as an educational technologist, I have found that technology can support teachers in providing personalized support for every student in the class. Thus, I have worked to incorporate technology into the classes I have taught, and in the future, I intend to integrate (and help others integrate) state-of-the-art learning technologies into the classroom.