Teaching Statement

Gengrui Zhang
https://gengruizhang.github.io

Teaching is an immensely rewarding experience that I find both fulfilling and invigorating. As teaching assistantships are an integral part of doctoral education at the University of Toronto, I have had the privilege of serving as a teaching assistant for a diverse range of courses at the undergraduate and graduate levels for the past four years. My commitment to teaching excellence is reflected in my teaching philosophy, which emphasizes the importance of fostering critical thinking and problem-solving skills in my students.

Teaching Philosophy

Central to my approach is a focus on creating a coherent flow of learning, in which each new topic builds upon the previous one in a logical and meaningful way. By setting clear learning objectives at the outset of each lecture and linking them to prior material, I aim to help my students understand not just what they are learning, but why it matters. Ultimately, I believe that this approach can give students a more comprehensive understanding of the subject matter, while also helping them develop the skills they need to succeed both academically and beyond.

Teaching Experience

During my Ph.D., my enthusiasm for teaching has grown through my experiences as a guest lecturer and teaching assistant for various computer science and engineering courses. These opportunities have allowed me to share my knowledge and expertise with students while also gaining valuable insights into the challenges and rewards of teaching at the university level. As a result, I am deeply committed to pursuing a career in academia, where I can continue to inspire and guide students as they explore the exciting and rapidly evolving fields of computer science and engineering.

Guest lectures: I have had the opportunity to give guest lectures to graduate courses: *Introduction to Consensus Algorithms* in ECE1779 Introduction to Cloud Computing and *Blockchains and Consensus Protocols* in ECE1770 Trends in Middleware: Blockchain Technologies. Lecture materials can be found on (my webpage).

- In the guest lecture on *Introduction to Consensus Algorithms: A Case Study of Raft*, I first presented the reason why consensus and fault tolerance are important in distributed systems and what properties consensus algorithms must satisfy. Then, I explained how the Raft consensus algorithm achieves consensus in replication and leader election with intuitive examples. Finally, I concluded the pros and cons of Raft and introduced future work that could improve Raft's performance.

  This lecture received a rating of 4.75 out of 5 on the overall quality through anonymous feedback (Recordings available here). Some students expressed their enjoyment of lecture materials and the teaching style; selected comments are shown below:

  > "The lecture was very smooth, starting from the foundations of Raft (ideas, aim, etc) and explaining step by step how Raft works. In general, I enjoyed the lecture and understand completely how Raft works."
  >
  > "Clear explanation and speed of it."
  >
  > "He tried to [explain] deeper while answering questions"

- In the guest lecture on *Blockchains and Consensus Protocols* (as a seminar talk), I introduced different types of blockchain systems and quintessential consensus mechanisms. I further discussed applicable scenarios of different blockchain systems and their pros and cons.

Teaching assistantships: I have been serving as a teaching assistant for four years for both undergraduate and graduate courses.

- Undergraduate-level courses. I have been the head TA of `ECE419 Distributed Systems` for four years (2019-2022). During these years, I co-designed midterm and final exam questions, held office hours, prepared lab materials, and coordinated lab demos and markings with other TAs. Below listed the courses I have TAed in both the ECE and Computer Science departments:
  - ECE419 Distributed Systems (Winter, 2019-2023)
  - ECE345 Algorithms and Data Structures (Fall, 2019-2022)
  - CSC343 Introduction to databases (Winter, 2023)
  - ECE244 Programming Fundamentals (Fall, 2019-2022)
  - CSC263 Data Structures and Analysis (Winter, 2021-2022)
  - CSC148 Introduction to Computer Science (Winter, 2022)
- Graduate-level courses. I have also TAed graduate-level courses where I co-designed the course syllabus, reading list, and course project (course information can be found here).
  - ECE1770 Trends in Middleware (Blockchain Technologies)
  - ECE 1762 Algorithms and Data Structures.

Courses that I can teach: I feel confident teaching courses in the system track, including but not limited to Distributed Systems, Blockchain Technologies, Operating Systems, Computer Networks, Algorithms and Data Structures, Databases, and Programming Languages.

Mentoring Experience

In addition to my classroom teaching experience, I have had the privilege of mentoring several talented students through their research projects. For example, I worked closely with Sofia Tijanic, an M.S. student, on a project focused on reputation-based consensus algorithms. Under my guidance, Sofia made impressive strides in her research and even began writing her first research paper. Additionally, I had the opportunity to mentor several junior Ph.D. students, including Yunhao Mao, Shashank Motepalli, and Shiquan Zhang, on a project in collaboration with industry partners. In this capacity, I provided guidance on everything from algorithm design and system architecture to related work surveys and system evaluations. These experiences have taught me how to adapt my mentoring and communication styles to meet the unique needs and abilities of each student, while also helping them cultivate successful academic careers.

Graduate Student Training Philosophy

My approach to graduate student training is rooted in the belief that cultivating critical thinking and independent research skills is essential for success in academia and beyond. To this end, I will work closely with each student to help them explore a broad range of topics and find their unique interests, particularly during their junior years. Throughout this process, I will encourage students to think critically about existing approaches and to identify compelling research questions that drive their intellectual curiosity.

I recognize that each student comes to graduate school with different backgrounds and experiences, and I will tailor my approach accordingly. For students who may need to strengthen their foundational knowledge, I will provide guidance on essential concepts and technologies while also helping them identify emerging trends in their field. For those who are already well-versed in their subject matter, I will focus on honing their skills as clear communicators, compelling writers, and innovative researchers.

Ultimately, my goal as a graduate student mentor is to help each student develop a personalized plan for success, one that takes into account their unique strengths, interests, and goals. By providing tailored guidance and support, I believe that I can help students achieve their full potential as scholars and professionals.