TEACHING STATEMENT
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Teaching and advising students are *noble pursuits* unique to academia. Effective teaching and advising perpetuate a *virtuous cycle* where professors continuously refine their teaching and advising approaches to serve students better and students develop strong technical skills and expertise, setting them up to become effective teachers and advisors. Teaching students provides a medium to share my enthusiasm, knowledge, and expertise, which then helps foster and develop research interests in students. Advising students gives me the opportunity to guide students to explore and research their areas of interest and advise them on appropriate mediums to execute and disseminate their research work.

Teaching Approach

The main goal of my teaching approach is to help students understand and develop an appreciation for fundamental concepts in computer engineering subjects. In my teaching approach, I encourage students to exercise their creativity and build critical thinking skills through a combination of teaching tools as listed below:

Using multiple levels of abstraction: When teaching, I employ multiple levels of abstraction to explain concepts where higher abstraction levels establish the main purpose behind the design and the key design intuition. Progressively lowering the abstraction level down to the implementation details ties the central intuition and concepts to the actual implementation. This helps students develop appreciation for the implementation and their intended purpose. At higher abstraction levels, students exercise their creativity and critical thinking skills to reason about potential designs that address the high-level purpose. This exercise increases their interest and enthusiasm in the concepts. Furthermore, this creativity and critical thinking is refined over the duration over the course as they understand and appreciate concepts and their low-level implementation details. As a teaching assistant, I applied this tool when discussing topics related to cache coherence mechanisms, an advanced concept in computer micro-architecture. Starting from simple high-level read/write semantics, I guided students to progressively build complete cache coherence mechanisms by engaging them to think of different scenarios wherein the scenarios progressively lowered the abstraction level down to the implementation.

Course projects and assignments: Course projects and assignments are important to supplement and reinforce theoretical concepts taught in lectures. For upper-year undergraduate and graduate students, I favor course projects with fixed milestones and expectations. Course projects in the form of building and validating concrete implementations help students develop key computer engineering skills. The fixed milestones and expectations are designed such that project progress goes in tandem with the concepts taught in lectures. In addition to course projects, I also provide students with recommended reading guides in the form of technical articles and research manuscripts to supplement their interests and provide them with information on current areas of innovation and research. For lower-year undergraduate students, I favor assignments in the form of problem sets that focus on the application of theory concepts. The problem sets consist of traditional questions where the emphasis is on developing systematic problem-solving approaches and open-ended questions that engage students' creativity and cultivate interest in the course.

Historical context and real-world implementations: When teaching, I like to precede discussions on a concept by providing some historical context where possible and close with some notes on current implementation in existing real-world implementations. Anchoring concepts both in historical and current contexts enhances students' learning experience and cultivates deep appreciation for the concept. When discussing the historical context for a concept, I focus on the motivation and rationale behind the initial need for the design concept. Discussing real-world implementations highlights the validity and importance of the concepts.

Teaching Experience

As a graduate student at UWaterloo, I worked as a teaching assistant (TA) for a second-year undergraduate fundamental course on digital computers (ECE 222) and upper-year undergraduate course on computer micro-architecture and organization (ECE 427). As a TA, I organized tutorial sessions, assisted instructors in setting course content, and assisted in setting problem sets and examination questions. In tutorial sessions, I discussed solutions to problem sets and resolved doubts related to course project milestones. For ECE 427, I assisted upper-year undergraduate students implement an in-order core micro-architecture and validate the correctness of their implementation using hardware simulation and application execution. Since this project involved elements of programming, I also advised students to follow good programming practices and commented on their code quality. For ECE 222, I organized tutorial hours where I discussed problem sets and worked through solutions with students. While working through the solutions, I paid special attention to students who had difficulty with the problem sets and worked with them closely to assist their understanding of the problem sets and their solutions. For both these courses, I received good feedback and appreciation from the students commenting on my teaching quality and dedication. In summary, I enjoy working with students, and the fulfilment and

joy that comes from exchanging knowledge and enthusiasm with students pushes me to constantly evolve and improve my teaching approach.

Teaching interests

My research and industrial experience has covered a variety of subjects in computer system design such as *computer micro-architecture, compiler construction, and programming languages*. I will happily and readily commit to putting in the effort to prepare course material and teach these subjects at the undergraduate level. At the graduate level, I am interested in teaching advanced topics in computer systems such as *cyber-physical systems, high-performance multi-core micro-architecture, theory and implementation of compiler optimizations, and real-time embedded system design and organization.*

Advising Approach

My advising approach puts *student training and development at the forefront.* The main goal of my advising approach is to help students reach their maximum potential and guide their development into independent researchers and engineering professionals. It is important to me that as an advisor, I guide students to adhere to a proper *code of conduct* when doing research and foster good character development. In my advising approach, I help create an environment where students feel encouraged to discuss their observations and research proposals with me. I work towards being prompt in giving comprehensive feedback to students and removing any barriers to their progress. Furthermore, I encourage my students to be mindful of their *mental and physical well-being*, and I make myself available to them for any discussions wherein their academic progress affects their well-being.

During my graduate studies in UWaterloo, I helped mentor two graduate students with their research thesis. I worked closely with the students to find research topics and helped them conceive design solutions. A key takeaway from this mentoring experience was that students benefit from different mentoring styles and have different motivations that drive them to do well and succeed. As a result, I calibrate my advising approach based on the students and work towards establishing an advising style that works well both for me and the student.

Summary

Computer systems engineering is a critical and pervasive engineering discipline. Knowledge of the theory and concepts in computer systems engineering is crucial for developing future computing ecosystems that will help solve the big challenges to human life and society. Effective teaching and advising are noble pursuits that help propagate this knowledge. I am excited about the opportunity to be a professor as it enables me to pursue teaching and advising, and in the process contribute to shaping a better world.