Teaching Philosophy

I am committed to creating an engaging and supportive learning environment that enables students to grow intellectually and gain confidence in their abilities. My research which is rooted in programming languages and targets emerging applications in the fields of machine learning, natural language processing, and computer vision also shapes my teaching philosophy: to inspire curiosity, build strong foundations, bridge academia and industry, and foster a collaborative learning community. As someone who frequently ventures into unfamiliar domains and collaborates with experts, I understand the challenges of navigating new material. This perspective allows me to empathize with students as they tackle complex topics and motivates me to foster a learning environment that values curiosity, perseverance, and growth.

During my undergraduate and graduate studies, I have served as a teaching assistant for a variety of courses, ranging from theoretical to hands-on, experiment-heavy courses. In Discrete Math (CSE 20 at UCSD, CIS 511 at UPenn), I guided students to explore the role of logic in computational systems, covering topics such as proof techniques, graph theory, and computational complexity. In Cryptography (Math 187 at UCSD), I helped students understand the evolution from classical cryptosystems like the Caesar cipher to modern encryption systems such as RSA. In Large Language Models (CIS 700 at UPenn), I supported students in grasping the high-level intuition behind transformer architectures and provided hands-on guidance in debugging and implementing transformer-based models. These experiences strengthened my ability to teach complex material effectively and support diverse student learning needs.

Extending beyond classroom teaching, I am passionate about integrating my research into education. In particular, I have experience creating course materials on a new programming language Scallop which I co-developed in my dissertation research. I have delivered tutorials on Scallop at prominent summer schools, such as the Summer School of Formal Techniques (SSFT) in 2022 and the Summer School of Neurosymbolic Programming (SSNP) in 2024, as well as at conferences, such as Learning on Graphs (LOG) in 2022 and Programming Language Design and Implementation (PLDI) in 2023.

I believe that as educators, we have a responsibility to bridge the gap between academic material and industry practices. During my research journey, I had the opportunity to collaborate with Meta AI as a visiting student researcher where I focused on the integration of logical reasoning into neural models. While many existing machine learning courses are theory- and math-intensive, the rapid development of new neural models makes it challenging for academic curricula to keep pace with industry advancements. I am passionate about designing courses that expose students to cutting-edge techniques and tools currently used in the field. To this end, I contributed to the development of CIS 700: Large Language Models, a course designed to bridge industry and academia. It features guest speakers from Google Brain, OpenAI, Meta, and researchers from MIT and Stanford, offering students invaluable insights into real-world practices and the latest advancements in the field.

Teaching Experience

Einstein once said, "Interest is the best teacher." My goal as an educator is to inspire students' curiosity and foster their passion for learning and research. To achieve this, I focus on helping students build a strong foundation of technical expertise, set ambitious yet achievable goals to boost their confidence, and cultivate a supportive and collaborative community. I strive to realize these principles through interactive teaching, personalized mentoring, and creating an environment where students feel confident and safe to explore and grow.

In CIS 511, many Masters students come from diverse academic backgrounds. Some students did not hold an undergraduate degree in computer science but instead came from other disciplines, such as mathematics, engineering, physics, biology, or even social sciences. To effectively address this diversity, I implemented a feedback-driven mechanism to adjust the class pace, review key concepts from the previous class at the beginning of each session, and assess the extent to which students grasp the material. This approach ensured that students with varied levels of prior exposure could progress cohesively, fostering a more inclusive and effective learning environment.

In contrast, Eric was a Masters student in CIS 511 who had a strong computer science foundation. He was one of the most active students, and I thoroughly enjoyed our engaging discussions during office hours and after class. We often explored topics beyond the course material, such as computational complexity theory, set theory, and functional programming. Now a third-year PhD student at the University of Chicago, Eric writes on his webpage, "More broadly, I am also interested in theoretical areas of computer science as a whole, including Theory A topics (e.g., computational complexity theory)." I have had the privilege of mentoring Eric, helping him deepen his interests in theoretical computer science and refine his research aspirations through discussions and tailored guidance, ultimately supporting him as he advanced into a successful research career.

In CIS 700: Large Language Models, I conducted recitations to provide students with high-level overviews and practical guidance on implementing, fine-tuning, and applying large language models, including advanced techniques like LoRA and quantization. During weekly office hours, I offered hands-on support, addressing everything from conceptual design to low-level debugging, such as environment setup and hardware-related issues on Google Colab, ensuring students could effectively navigate technical challenges.

Mentoring Experience

My teaching extends beyond the classroom through mentoring undergraduate and Masters students, helping them develop their technical expertise and cultivating their interest in research. I have mentored five undergraduate and two Masters students on research topics, guiding them to explore their research passions and build strong technical skills. Our collaboration has resulted in one published research paper, *Relational Programming with Foundation Models* (AAAI 2024), and two additional papers currently under submission.

Throughout the mentoring process, I held weekly meetings with all my mentees, remained highly responsive to their questions on Slack, and promptly joined meetings whenever they required hands-on assistance. These tasks ranged from addressing high-level theoretical questions and algorithm design to low-level environment setup and code debugging. Additionally, I fostered a collaborative environment where my mentees could ask each other questions, document challenges, and share resources and materials within the group. Beyond providing technical guidance, I also supported my mentees' professional growth. For instance, one of the Masters

students I mentored, Siyang Zhang, who was at Brown University at the time, successfully transitioned to a PhD program at the University of Central Florida. Another mentee, Liam Dodds, a sophomore at UPenn in mathematics, developed such a strong interest in computer science that he added it as a second major and is now preparing to apply to PhD programs in the upcoming admissions cycle. Additionally, Felix Zhu, an undergraduate at UC Berkeley during our collaboration, is currently conducting research in Ion Stoica's group and plans to pursue a career in research.

The impact of my mentorship is perhaps best described in the words of my mentees themselves. Here are some quotes from them: Siyang Zhang reflects, "*I had a wonderful experience conducting research with Jiani. She is incredibly instructive, insightful, and innovative, making her an exceptional mentor. Jiani has a remarkable ability to break down complex concepts and ideas into easily understandable components, which allowed me to have more confidence towards challenges in research.*" Matthew Kuo, a sophomore at UPenn majoring in computer science who I am currently mentoring on building a neurosymbolic model for video understanding shares, "*Collaborating with Jiani has been an enriching and transformative experience. Her ability to break down complex concepts and tailor explanations to my perspective has deepened my understanding of each major component of our research project. Through her prompt responses, consistent delivery of results, and detailed guidance, I have experienced significant growth over the past few months. Jiani's expertise, coupled with her ability to foster a welcoming and collaborative environment, has made my time working with her rewarding.*"