As an instructor, I know that I have the potential to influence a student's intellectual and career trajectory. I take the role of teaching seriously because I want to have a positive impact by stimulating interest and counteracting societal pressures and stigmas.

**Formative Experiences.** At undergraduate freshman orientation, I asked a professor about taking CS 101, but he suggested that I shouldn't, as that class was "only for people who thought they might major in computer science." But prior to taking a class in the subject, I had no idea what computer science *was*. He didn't ask anything else about me, or perhaps it would have come up that I was already taking upper level math courses my first semester. As a result, I wound up not majoring in CS. Two years later, when I finally *did* take CS 101, I was not convinced that I would take any subsequent computer science classes. Yet my instructor pulled me aside after the midterm and told me, "I'm teaching algorithms in a year. You're going to love it. Take all the pre-requisites you need by then." I'm lucky she did—she was absolutely right. These experiences, among many others, are why I'm so passionate about mentoring, teaching, and encouraging students.

I have been passionate about teaching my whole life. Even before college, I spent three days a week from age 13-18 teaching 6th graders to read a foreign language and developing curriculum for 7th graders. At 18, I tutored high school math through the National Honor Society. During undergrad at a small teaching-focused college, I observed how my professors made information easily digestible with clear explanations, examples, and exercises. I tutored or held office hours for math and CS courses nearly every semester. I also served in my college's pilot teaching assistant program, teaching recitation workshops. In 2013, I interned at an inner-city Chicago public school where I taught 5th graders math. During graduate school, I served as a TA for both an undergraduate and a professional masters theory class, leading recitations and office hours. I also practice my communication skills when presenting my research in talks and tutorials, and was awarded the EC 2020 Best Presentation Award by a Student or Postdoctoral Researcher. These experiences—presenting, teaching, and observing my own teachers—have deeply shaped my educational philosophy.

## Teaching Philosophy

**Differentiated instruction.** When facing a classroom ranging from Math Olympiad medalists to struggling students, I set the lecture pace for those who have taken only the pre-requisite classes. To this population, the course should be challenging but fully possible to ace with sufficient effort. For students with gaps in their backgrounds, I make abundant resources available on my website. Struggling students have ample opportunities for help via office hours, recitation, group work, and forums like piazza where students can answer one another's questions. Opportunities for additional challenges are available in the form of optional harder exercises, readings where the course's material is being applied in research, and incentives to help other students in the class.

**Engage the *entire* classroom.** A common phenomenon is when only a small fixed group of students volunteers to answer every question. To ensure that all students, independent of technical or personal background, are engaged, it is crucial to disrupt this. From my experiences, I've learned that implementing strategies—such as hand-raising, waiting longer before calling on students, soliciting a different student's answer for each sub-question—can all increase participation and help engage the whole classroom.

**Encouraging academic risk-taking.** Working through an incomplete solution is an excellent learning exercise. When students share their first approaches to a problem, it offers the opportunity to do this. In order to create an environment where students feel comfortable sharing, instructor reactions must be driven by the idea that all shared thoughts, independent of correctness, have value in the learning process. This is why I am careful to praise students for participation and improvement, not for correctness.

**Balancing collaborative and independent work.** Collaborating on exercises is an experience that can allow students to really learn from one another. Individual problem sets can lead to students simply never understanding how to solve a question, as they have no one else to work it

out with. Yet some of my own greatest learning experiences came from wrestling with take-home midterms alone and proving to myself that I really understood the concepts. For this reason, I think the correct balance is collaborative homework, individual review problem sets before tests, and individual tests.

**Teaching students to teach themselves.** Something I learned in graduate school was how valuable a skill it is to be able to teach oneself, and I wish I had learned it earlier. Whether one is a graduate student diving into a new research area, or a software engineer looking to implement an unfamiliar algorithm, it is imperative that one be able to find resources and teach oneself. While it is of course my job as a teacher to teach the course content, I believe it is also my job to teach this skill and to have confidence in it—something that is particularly important for those who were not previously exposed to as many opportunities. I will integrate learning such skills into appropriate classes by including an exercise that step-by-step walks students through finding resources, reading about a topic, and then applying the skills learned.

## Course Plans

I am interested in teaching core undergraduate theory courses, e.g. Discrete Math, Probability, Algorithms, and Theory of Computation. I would also be interested in teaching graduate algorithms courses, such as Advanced Algorithms, Randomized Algorithms, Algorithmic Game Theory and Mechanism Design. I would love to teach an undergraduate Economics and Computation course if there is a place for such a class as well. The following are topics courses that I would love to teach:

**Theoretical CS and Social Good.** Many areas of theoretical CS have made great contributions to social good recently. I would begin by teaching introductory differential privacy and fairness in machine learning. Then, we would examine recent formalizations of the GDPR, e.g. the formalization of "singling out" [CN19] and "the right to be forgotten" [GGV20]. Finally, we would explore work in algorithms and for social good, including touching on some of my own research.

**Improving Access to Opportunity via Algorithms and Optimization.** This course is inspired by the research of the Mechanism Design for Social Good (MD4SG) community that I co-founded. The course would be open to a broad audience with varying methodologies and would cover interdisciplinary material. I would follow similar topics to the reading group I ran in 2016-18: housing, healthcare, economic inequality, online labor markets, education, bias and discrimination, civic participation, the developing world, environment and the climate, and data economies.

**Advanced Mechanism Design Toolkit.** This course would teach tools used in the biggest breakthroughs in algorithmic mechanism design in the last five years. The class would start with building extreme familiarity with Myerson's revenue maximization theory. From there, we would learn the CDW16 duality framework to obtain benchmarks. Here, we would learn the basics of probabilistic analysis needed for near-optimal guarantees. Next, we would use duality for optimal auctions. Further topics include posted prices, the single-sample approach, and random sampling.

**Algorithms and Uncertainty.** This course is inspired by the 2016 Simons Institute semester by the same name. We would cover an introduction to many topics useful for optimizing under uncertain conditions: approaches to both the Prophet Inequality and the Secretary problem, the primal-dual approach, learning from samples, sketching, Follow the Regularized Leader, an introduction to the Multi-Armed Bandit problem and the Gittins index, etc.

## Mentoring and Advising

One of the aspects of the faculty job that I am *most* excited about is the privilege of advising and mentoring students. During my postdoc, I have been working with several junior PhD students, and it has been an absolute joy; I have also mentored over 15 students since 2014.

For undergraduates in particular, my advising philosophy is 100% student-focused. The student's only job is to try their hand at research and see how they like it. My job is to give the student the support and encouragement they need to develop an interest despite any social stigmas

they may have grown up with. In addition, my job is to provide a project and guidance so that they get a real taste of the research experience.

For graduate students, I believe that I should accommodate a student's advising preferences (within reason) regarding how often we meet and how hands-on I am. I want students to be engaged with their project, and I want to create an atmosphere in which if they are truly no longer interested in a direction, they feel it's okay to tell me. Finally, I hope to start students off by offering them a choice of research questions, progressing over time to jointly posing questions, and by the end of their PhDs, having them pose their own questions.

## Conclusion

I am eager to mentor, advise, and teach students as part of my faculty job. My approach to teaching and mentoring is grounded in core principles that I have identified over the course of my extensive teaching and mentoring experience as an undergraduate, graduate student, and postdoc.