My desire to pursue an academic career has largely been inspired from my interactions with the professors at my graduate and undergraduate schools. Besides being good teachers, my professors have also been very successful mentors to people around them. I have had the privilege of teaching a diverse set of courses and mentoring junior students at UIUC and IIT Bombay. These experiences, together with what I have learned from my professors and instructors, have shaped my philosophies for teaching and advising and have helped me prepare for an academic career. I am interested in teaching several core and elective CS courses as well as in designing new courses based on my research and existing trends in Formal Methods, Programming Languages and Software Engineering.

Teaching Experience. I have had the fortunate experience of teaching students at various levels, having diverse backgrounds, training and learning objectives. I was a teaching assistant for three mandatory undergraduate CS courses at UIUC and a total of six offerings of four mandatory undergraduate CS and Physics courses at IIT Bombay. Some of these courses were focused on theoretical foundations, where my role was centered around lecturing and conducting problem-solving sessions for a class of 20 to 60 students. Other courses were more focused on coding exercises where my role was to provide interactive guidance and feedback to both individual students or larger teams of 3 to 12 students. In each of these courses, I was centrally involved in designing exercises, exams, projects and evaluation methods. Outside of university settings, I have also taught focused groups of high-school students in training camps organized by the Government of India to prepare them for international science Olympiads.

Teaching Philosophy and Methods. Although teaching is invariably a gratifying activity, professors are also in a position of immense responsibility. A thoughtful approach to teaching is, therefore, essential to being effective. The following are some of the philosophies that have guided my teaching methods.

Strong motivation goes a long way. Introductory CS courses can be particularly challenging for students with little or no background in formal reasoning. Insufficient motivation behind the topics covered in such classes can thus hinder their interests. In the very first lecture of my undergraduate Theory of Computation class, our professor asked us to design an algorithm that determines if a given program on a given input, outputs ‘H-E-L-L-O’ as its first 5 characters. After letting us brainstorm for a while, he showed us that such an algorithm can, in fact, not exist! For my sophomore self, this was an Aha! moment; I could not wait to learn more about the limits and possibilities of computation. In fact, I continued to pursue research in this direction in my PhD. Intriguing motivations like these can be really helpful, and, in fact, are a necessary first step before introducing technical details, especially in introductory CS courses, heavy on mathematical rigor. I have put this philosophy in practice in all the courses I have taught as a teaching assistant, and plan to continue doing so in all the future courses I teach as a professor.

Building intuition using a bottom-up approach. Effective problem solving involves starting small. As a teaching assistant in several theoretical courses, my key focus has been to organize problem-solving tutorial sessions where students can put their classroom learning into practice. A particularly powerful strategy that I have used is to insist that students tackle problems starting with small instances or special cases. Students find it easier to grasp the underlying principles when solving smaller instances. They can then gradually generalize their ideas and relate these principles to the materials covered in the class. I intend to continue using such approaches in my teaching.

Focused evaluation. Evaluations are central to determining students’ progress towards the learning objectives of the course. Evaluations also provide necessary feedback on teaching effectiveness of instructors. Evaluation methods, therefore, need to be carefully designed based on the requirements and objectives of the course. In core undergraduate courses with large enrollments, traditional evaluation methods based on periodic homework assignments, midterm and final exams can help meet the objectives of the course. On the other hand, more holistic evaluations work well for small classes focusing on research-oriented topics. In such courses, a balance of programming projects, interactive discussions, periodic assignments and literature reviews can bring out the best in students.

My teaching methods are and will always be evolving. I intend to learn new and effective teaching techniques by learning from my peers and feedback from my students.
Teaching Interests. I am excited to teach a broad range of mandatory and elective CS courses in programming languages and theoretical computer science. My experiences as a student and teaching assistant for many courses in UIUC and IIT Bombay have prepared me for teaching foundational undergraduate courses like Discrete Mathematics, Probability and Statistics, Theory of Computation, Algorithms and Design and Implementation of Programming Languages, as well as advanced courses in Mathematical Logic, Verification, Program Analysis, Program Synthesis and Software Engineering. I am also interested in designing new research-oriented courses for students inclined to explore or pursue research in Formal Methods, Programming Languages and Software Engineering. These courses can be organized as research seminars or as a dedicated lecture series, with a focus on special topics and recent trends from academic and industry research. Teaching research-oriented courses is a particularly exciting prospect, for several reasons. First, it will help improve my own research skills, with fresh perspectives from interactions with students. Further, elective courses are a great means to motivate graduate and undergraduate students to pursue research, and offer the possibility of establishing long term collaborations with them.

Mentoring Experience and Philosophy. As a senior graduate student in UIUC, I have formally advised six undergraduate and graduate students and informally mentored several other students. Three of these students have successfully published, or are in the process of publishing, conference papers based on research collaborations with me. Differences in the skill sets, aptitudes, experiences, interests and personal career goals of different mentees warrant customized mentoring and advice. Nevertheless, the following broad ideas outline my overall approach as a research advisor.

Freedom to choose problems and directions. The best research is carried out when students are motivated and like their work. Freedom to choose both specific problems as well as broader research directions of their liking, goes a long way in ensuring their productivity. My research interests are fairly broad and diverse, and offer a good mix of both theory and engineering of large systems. This will help me be flexible in my future research and allow my advisees to choose research problems to work on from a large and diverse set of interesting problems.

Adaptability in research styles. It is important to recognize the diversity in the backgrounds, experiences, training and aptitudes of students. Some students are inclined towards a more hands-on and collaborative advising, while others prefer a more hands-off approach. I respect the needs of students and adapt my advising style to strike the right balance in research compatibility.

Compassion and work-life balance. Graduate school can be stressful and graduate students often find it hard to balance strenuous courses and demanding research with household chores, finances and personal lives. It is important to demonstrate, by example, the importance of work-life balance. I further believe that it is essential to be compassionate towards the struggles of graduate students, and discuss with them strategies to balance their workload, while being flexible with research expectations.

I have been fortunate to be surrounded by amazing advisors and mentors and have picked up important mentoring and advising lessons from them. As with teaching, my mentoring skills will also be evolving, based on feedback and advice from my peers, mentors, mentees and advisees.