Teaching Statement

Kenneth Mai
Stanford University

My teaching interests are in computer architecture and digital VLSI design. I feel comfortable teaching undergraduate and graduate courses in both areas. Additionally, I could teach electrical and computer engineering foundation classes to undergraduates.

One of the reasons I look forward to a faculty position is that I really enjoy teaching. While at Stanford, I have been fortunate to have been the primary instructor for two courses and to have been a teaching assistant numerous times. For my work as a teaching assistant in the Introduction to VLSI Design, I was awarded the Stanford Centennial Teaching Assistant Award for Outstanding Teaching. As the primary instructor, I have taught a graduate course in logic design and a graduate course in VLSI design projects. In the latter course, teams of 2-3 students designed a small IC from scratch in a 0.5µm technology. I met with each team weekly and gave 1-2 lectures per week on design methodology, CAD tools, verification, and related VLSI topics. Teaching this course and leading a team of five graduate students to design a reconfigurable memory testchip has given me a taste of how to supervise graduate students in research.

During my time as an instructor and as a student, I have observed that effective professors in Computer and Electrical Engineering place emphasis on teaching not only the "computer" or "electrical" part of the course, but also on the "engineering" portion. While the foundations of the field are important, it is also important for students to learn good design practices and methodology. Students need to know how to decompose a problem into workable pieces, make design trade-offs, optimize the individual pieces, and integrate them together. Finally, they must learn to verify and debug their designs when they invariably do not behave as students think they should.

An indispensable skill for my research, and one that I feel students should be taught, is tool building using scripting languages such as Perl or Matlab. Tools can act as effort multipliers, speed tedious portions of the design process, eliminate careless mistakes, and force students to think about the design process in a structured manner. To know when, how, and with what to build a tool is essential to producing effective, efficient engineers.

While problem sets and exams serve a purpose, I have noticed that students learn a topic most deeply when they are immersed in it and feel some personal involvement. This has happened most often during projects, where students invest a great deal of time and effort working on a design. I intend to have at least one project in each of my classes where students will be led through a structured design methodology and encouraged to build tools to enhance the design process.

Teaching has been a learning experience for me as well as the students. The fresh perspective of the students, having to explain topics from multiple angles, and preparing course materials made me rethink long-held assumptions and deepened my understanding of the material. I have found teaching to be both personally and professionally rewarding and look forward to my next teaching opportunity.