

Statement of Teaching Philosophy

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My past experiences in teaching, at both UC Berkeley and UCLA, are one of my primary reasons for pursuing an academic career. I have found interacting and mentoring students to be a very rewarding and enjoyable experience. My background makes me well-suited for teaching courses on circuit analysis, digital logic design, electromagnetics, embedded systems, computing architectures, and neural engineering. At both the graduate and advanced undergraduate level, I am interested in developing courses that explore implantable biomedical circuit design, emerging computing architectures for spintronic and other post-CMOS devices, and robust energy-efficient VLSI architectures in mobile environments.

As an undergraduate at UC Berkeley, I was a teaching assistant for EE140, an advanced upper-division design course in analog circuit design, typically taken by graduating seniors and first-year graduate students. The course had approximately 60 students with three TAs. In addition to teaching a discussion and laboratory section each week, I was asked to help update the course curriculum by designing and testing a new set of labs and course projects. These labs demonstrate one of the core components of my teaching philosophy: engaging students with **real-word problems** and **hands-on experience**.

It is my belief that great teachers do more than simply convey information in an easy to understand and relatable way. They try to **actively spark the curiosity of students** and inspire them to explore the material beyond the classroom. The series of labs I designed for EE140 focused primarily on the implementation (using discrete resistors, capacitors, and transistors) of a folded cascode amplifier, with a temperature-independent voltage reference, which the students were studying in class. I encouraged my students to take their projects home and stick them in their freezers and ovens to verify that they did indeed work. It is in my experience that this kind of a practical demonstration is an excellent way to introduce and make seemingly boring theoretical topics not only tangible, but also exciting for students.

As a graduate student at UCLA, I have been a teaching assistant for both EE216A, a graduate-level design course in VLSI circuit design, and EE215B, a graduate-level course in digital IC design, for multiple quarters. As core courses for the Circuits and Embedded Systems track, both EE216A and EE215B typically have more than 80 graduate students. As the sole TA for both classes, I was responsible for helping write, proctor, and grade the midterm and final exams; design and grade class projects; and deliver several lectures on HDL coding, CAD tools for synthesis and place & route, and physical verification. My interactive lecture style and dedication to my students earned me the **2013-2014 Henry Samueli Excellence in Teaching Award** for my teaching of EE216A during the 2014 winter quarter.

One of the biggest challenges an instructor faces is getting students to think independently and to articulate exactly what it is that they don't understand when they have a question. Students are often concerned with only the answer and not the process involved in solving the problem. I have two approaches that I like to use to address this issue. First, in a one-on-one setting, like office hours, I have the student work the problem out on a whiteboard while describing their thought process. With guiding questions, the student is often able to catch their own mistakes or pinpoint the exact issue they are having trouble with. Similarly, in group settings, like a lecture, I like to give out example problems for the class to solve together.

Furthermore, it is not enough that the student reach the right answer. I like to have the student explain *how* he or she reached the answer, so everyone can share and learn from their thought process.

The principles of group collaboration, characteristic of students working together to solve an in-class example, are fundamental to my own teaching and research style. **Group collaboration** is an essential component of the learning process and the **key to future success of students outside the classroom**. Each student has their own set of strengths and weaknesses, interests and disinterests. Group projects are an effective learning and motivational tool to encourage students to communicate and discover overlap between related research areas. Group projects instill a sense of pride and accomplishment in students, allowing them to display their individual strengths while contributing jointly to the overall effort. This goes against the natural instinct of most students, who, due to the competitive nature of college admissions and academics, typically prefer to work alone. However, in industry and academia, the best products and research are often the byproduct of diverse groups collaborating together. This is why learning effective collaboration skills is so critical for students' future careers.

Furthermore, these class projects often turn into actual academic research. In addition to mentoring four undergraduate students, I have also had the pleasure of mentoring fourteen graduate students who chose the project option for completion of their master's degree at UCLA. These projects are typically only one to two academic quarters in length. As such, they are focused on the implementation of smaller components in larger systems, with no expectation of publication. Nevertheless, portions of my mentees' work have been included in one conference proceeding and three journal publications.

As a mentor and a mentee, I have found that the most valuable lessons tend to come from "failure." A "failure" is actually just an unexpected result that produces another data point that assists researchers in finding a better solution. As such, I have encouraged my students to delve into their experiments by scrutinizing every detail and questioning every result. I have also tried to emphasize the importance of being able to communicate their ideas and findings to a broad audience. As a Ph.D. advisor, I would bring these same principles of self-learning and effective communication to my research group.