Teaching Statement
Gunjae Koo

1. Teaching and Mentoring Experience
While at the University of Southern California, I served as the teaching assistant for two graduate courses and one senior undergraduate course during five semesters. I taught EE560: Digital System Design – Tools and Techniques course, which offered wide range of digital system design topics and RTL design practices using the EDA tools and the FPGA platforms. My responsibilities as a TA included lecturing lab sessions, designing lab materials, holding office hours and grading. I also guided students to accomplish the final projects to implement and verify the simple out-of-order processor on the FPGA boards. I taught EE557: Computer Systems Architecture, which covered advanced computer architecture topics such as power and cost estimation, out-of-order processors, speculative execution, parallel processors, memory systems, interconnections and modern multicore architecture. My role was instructing discussion sessions, guiding course projects, holding office hours and grading exams. I also designed assignments and course projects that hacks the computer architecture simulators. I taught EE354: Introduction to Digital Circuits, which provided digital circuit design knowledge and hardware description language practices. I was responsible for instructing lab sessions, grading assignments and guiding term projects. I also taught the hardware description language, control and data path logic, and digital hardware architecture in the course.

As a Ph.D student, I supervised several undergraduate and graduate students who participated in direct research courses. I guided them to engage in research work related to parallel processor architecture, memory controller design and storage systems. Most of them successfully continues studying and working in the related fields.

2. Teaching Philosophy
I believe that motivation, encouragement and learning is three important parts of teaching. From my own learning and teaching experiences I realized that highly motivated students can accomplish the class goals more effectively. However, I found lots of students have less motivations in their classes since they have difficulty in connecting the course objects to their future career goals. I believe only better grade cannot motivate students thoroughly. Thus while instructing lab sessions I made effort to motivate students by introducing how course topics can be employed to future working skills and industrial work flows. I could pick appropriate cases connected to the class topics from my industry experiences. I also took examples from my research work to show how the knowledge and the techniques obtained from the engineering classes can be connected to future research topics. In the teaching evaluation surveys students responded that my efforts for motivating them gave useful insights into class topics.

As teaching is an interactive activities between an instructor and students, I believe encouragement is an important part of teaching. From my teaching experiences I have found students in a class have diverged achievements and motivations. I have noted that part of students have difficulties in accomplishing the class goals under heavy workload from lots of assignments and term projects. I observed several students got frustrated especially for challenging term project assignments. For instance, in the undergraduate digital system design course, some student groups had difficulties in implementing their proposed design on the FPGA platform since the term project assignments required integrated knowledge and skills obtained from the entire lectures. As a teaching assistant, I focused on encouraging those student groups to accomplish term project goals by helping them to revisit the related topics and skills covered in the previous classes. I spent time helping them understand critical digital design techniques which are required to build custom hardware design on the FPGA platforms. Hence I was able to encouraged the student groups to figure out possible methods for implementing their ideas. It was big pleasure to help diverged levels of the students complete all their term projects. I also believe these experiences to complete challenging projects will be helpful for their future industry or academia careers. Through this experience, I have also reinforced my thought that encouragement is an important way to help students to accomplish their goals.

From my teaching experiences I have learned lots of valuable things, hence I believe learning is one of important benefits that both instructors and students can obtain from teaching. Interactions with students gave me chances to investigate subjects with more creative bases. Some students surprised me with adventurous and creative project themes and achievements. Through teaching preparation and instructing I have strengthen knowledge by revisiting topics required for research and work also. These experiences reminded me of the quote by Robert Heinlein – "When one teaches, two
learn.” My belief that I could learn from interactions with students motivates me to a passionate teacher.

3. Course Offerings

Throughout my studies and experiences in both academia and industry, I have worked on digital system design and computer architecture areas. First I am interested in teaching fundamental computer architecture courses for undergraduate and graduate levels. At the advanced level I want to offer modern computer architecture topics such as graphic processing units, accelerator architecture and intelligent storage systems. I have also interest in organizing advanced research seminars introducing cutting-edge research topics in computer architecture area.

I also have a plan to develop a project-based embedded system design course, which offers learning opportunities for embedded processor platform development skills and techniques such as system software design, hardware IP control, data acquisition and processing. I believe this course can provide valuable skills and experiences for the students aiming modern hardware design engineers. I believe this course can be expanded to design accelerators using the modern FPGA platforms which equip general-purpose embedded processors and programmable hardware logic.

Furthermore, I am interested in offering the memory system design course, where students can explore controller design for various types of memory such as DRAM and NAND flash memory. In this course I plan on exploring software memory simulators for volatile and non-volatile memory types. Students can investigate the performance and hardware cost of memory interfaces by applying different configurations. This course will provide strong understandings for memory interfaces as well as hardware design flows from software modeling to hardware architecture design.