Teaching Statement

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As an abstract and beautiful subject, mathematics is an indispensable part of modern education. In my opinion, a qualified mathematics instructor should not only explain the definitions and theorems to the students in a clear way, but also inform the students how to think mathematics problems logically. The latter is much more important because critical thinking will be more useful than the abstract theory from the textbook in the students’ future career. I have been enchanted by the genius arguments and the mysterious intrinsic relationships between different branches of mathematics since I was a primary student. As studying mathematics is an enjoyable experience for me, it is my willingness to share my feeling with my students and to lead the students to appreciate the elegance of mathematics. I have served as a teaching assistant in the maths department of UCLA in the past five years and have the opportunity to contact with a lot of students with great curiosity and intelligence. In the career of teaching, I developed my own techniques which are quite useful to encourage the students to think independently, get involved in the classroom discussion and become interested in mathematics.

The mathematics courses in UCLA are divided into three categories: lower division, upper division and graduate courses. As the education backgrounds of the students vary drastically, it is very important to employ appropriate methods of instruction for different levels of courses.

The lower division courses are open to the whole university and most students are not from the maths department. It might be the first time for the students in my class to contact with the abstract notions in calculus and linear algebra. Therefore it will take some time for them to get accustomed to the way of thinking in advanced mathematics. For the teaching assistant, it is a big issue to help the students work through difficulties and cultivate their interests in the process of thinking transition. To cultivate the students’ curiosity, I find that presenting concrete examples and explaining the intuition behind the abstract notations usually do the job. For example, when I taught the dot product and cross product in multivariable calculus, I emphasized the geometric meaning of these operations and presented several examples about how to use the knowledge of vectors to attack problems in plane geometry. I am happy to see that the students can use the geometric intuition to give a much simpler argument than direct calculation in the exam. This means that for the students, solving mathematics problems is no longer a mechanized application of given formulas but an enjoyable process of finding intrinsic reasons behind the formal computations.

Another goal for the lower division courses is to cultivate the students’ confidence about mathematics. When students first learn advance mathematics, they might have some unexpected difficulties in understanding the abstract notion or the complicated tricks in solving problems, which are hard for teaching assistants to realize unless the students express their confusion. However, I find that students are more likely to ask their classmates for help instead of the teaching assistants when they get lost. I think the reason is the following: when the students discuss a problem together, they not only learn the solution from others but also share the experience of attacking the problem. They will get relaxed when they realize that they get stuck no because of their insufficient understanding of the material but due to the difficulty of the problem. To make the students willing to express themselves, I always try my best to foster a pleasant atmosphere in the classroom for an active class interaction among the students. For example, when a student raises a question, I do not give the answer directly and turn to the class for help. When some students give some
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suggestions, I will follow them even though their ideas may not be completely correct. I also give necessary 
hints to make the discussion progresses. In this way, all the students expressing their ideas have the feeling 
that they contribute to the final solution of the problem, which is a great encouragement for them to behave 
more actively in class. Sometimes I design a problem and give two solutions which lead to different answers. 
Then I ask the students in their opinions which solution is correct. In this way the class is divided into two 
groups and the students are involved into a serious debate as everyone wants to prove his/her standpoint. 
I believe that the students can learn the knowledge more effectively in this way as they reach the correct 
answer by communication and teamwork instead of passive reception from the teaching assistant.

The upper division courses are aimed for the undergraduates whose majors are mathematics or other 
natural science subjects closely related with mathematics. I think it is the teaching assistant’s obligation to 
build a solid foundation for the students, which is essential for their further study. Under this discipline, the 
importance of elementary definitions and fundamental theorems cannot be overemphasized. This does not 
mean to ask the students to recite the statements but to lead the students to understand the content in an 
appropriate perspective. For example, when I taught linear algebra for the junior and senior undergraduate 
students, I noticed that there are several true/false questions in each problem set in the textbook. As there 
are answers to these questions at the end of the textbook, few people would like to spend time on these 
problems. However, I found these questions are particularly useful to clarify important notion in this course. 
When explaining these questions in class, I gave the reasons behind the true/false answer. In particular, for 
a false statement, I gave several counterexamples to confirm the students. These concrete examples help the 
students understand the abstract notion such as vector spaces and subspaces, which contain several abstruse 
axioms in their definitions.

The graduate courses are relatively easy to teach. Most students in UCLA have a solid foundation in 
mathematics and are full of imagination. I was fortunate to be an teaching assistant for the graduate algebra 
course in the second year of my graduate life. There was little gap between the new graduates and me and 
the students were eager to share their opinions and solutions during the discussion session as well as the office 
hour. I enjoyed the communication with the students as they always brought me surprises by presenting 
creative ideas and innovative solutions. At the end of this course, I made friends with many students in 
my class and some of them became my important research collaborators later. From my experience, the 
key knack to organize a discussion for graduates is to be open-minded, listen carefully to the students, and 
keep the faith that both the teaching assistants and the students can benefit a lot from an interactive class 
communication.

Besides serving as a teaching assistant, I also had a precious opportunity to be an instructor for a lower 
division course under the supervision of Professor Olga in 2012 Fall. The workload of an instructor is 
completely different from that of a teaching assistant. As an instructor, I need to design everything of the 
course, including the schedule of the course, homework assignment, and the midterm and final exams. In 
the process of instruction, I received a lot of useful suggestions from Professor Olga, such as how to create 
a course webpage with precise and concise information, how to design an exam with clear statement and 
moderate difficulty, and how to make the grading policy which minimized the students’ loss when they missed 
a quiz or midterm due to accidents. Most importantly, she advised me to make anonymous surveys in class 
in the middle of the quarter. I learned a lot of my defects in my instruction from the students’ feedback. 
From the students’ teaching evaluation, my performance improved as the quarter went on. Needless to say, 
realizing the students’ true opinions in time is crucial to my progress. Making surveys is not just a method 
to refine instruction, but also a symbol to show that the instructor cares the students’ thoughts. It helps to 
build a bridge of trust between the students and the instructor, which is essential for a successful instruction.

I strongly believe that teaching has the same importance as research for mathematicians. In the past five 
years, I spare no effort to improve my performance in class as a teaching assistant as well as an instructor. 
The students’ progress in understand mathematics is the best recognition of my work and their appreciation 
about the beauty of mathematics is the greatest encouragement for me to be a better teacher.