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Teaching Statement

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Teaching philosophy

My teaching philosophy focuses on incorporating physics concepts and real-world phenomena in the classroom and research. I strongly believe what an ancient Chinese philosopher Lao Tzu said, "Give a man a fish and you feed him for a day; teach a man to fish and you feed him for a lifetime". The goal of my teaching is to help students gain the ability to explore real-world phenomena deeper, not only to know what they are but also to dig into the underlying physics and to solve real-world problems of interest.

Starting lectures from daily-life phenomena helps stimulate students' critical thinking. I was taught by my physics teacher that "Our world is beautiful because it is governed by the laws of physics." To make it clear for students, I try to build a direct connection between the real world and the underlying physics through teaching. I usually start my lectures by showing pictures from our daily life and asking physics related questions, such as why some glasses are transparent while others are not and why the sun can emit energy. Students knew what the pictures were of, but most of them took the phenomena for granted and hadn't wondered what caused them. In my class, they start to think about the underlying physics. As an example, when teaching Wien's displacement law in thermal radiation, I show pictures of fires and stars and ask the students why the two have different colors. When the students leave the classroom, they might not have remembered the formula of Wien's law, but they have built a permanent connection between the temperature and the frequency (color) of electromagnetic waves.

Computer programs help students understand underlying physics for many phenomena. I encourage my students to translate physics problems into computer programs from which they are able to visualize them. With the rapid development of computer science, simulation of physics processes with computer programs becomes increasingly important in both physics research and teaching. It helps students understand how the formula governs the phenomena. In other words, computer program makes physics alive. I still remember when I gave a lecture on classic mechanics, I asked students which ball goes faster when two balls roll down along two arcs with the same starting and ending points but with different curvature. Most students thought the ball going along a shorter distance arrives earlier. Later, I asked the students to figure it out with a simple computer program as a homework. By changing the parameters of the curvatures for the two arcs in their codes, they are able to visualize the process in many different situations and gain deeper insight into this process.

Difference in abilities and working collaboratively is very important for students. Considering the fact that students have different backgrounds of culture and experience. For example, some students have strong ability in coding, others are good at mathematics. These diversities provide good opportunities for learning to learn from each other and work collaboratively. To help my students gain

the abilities to learn and work collaboratively to solve real-world physics problems, I propose students work as small groups on semester-long projects. In the beginning of the semester, I provide some selected topics related to the course from which students are free to choose. They form groups based on the topic of their interest. I encourage them to make use of online resources for finding relevant references. For the last weeks of semester, I reserve time for organizing a mini-workshop to provide an opportunity to introduce their projects. The students have a strong desire to make an achievement on the projects. My experience tells me that working collaboratively on a project is a fast way to gain hands-on experience and students are proud of what they have achieved. Meanwhile, they learn how to make a presentation.

Interaction with students is the best way to give and receive feedback. Before the first class, I prefer to write an email to my students to introduce my teaching goal and ask students to share their professional goals. They are always welcome to visit my office or to discuss with my graduate students, or contact me via email. It provides me a good opportunity to know more about my students. In particular, I encourage students with different culture background to share their knowledge and concerns (if any) with us. To assess my students' comprehension, I informally quiz them at the beginning of a class period to see how much of the homework material they have grasped and what I can build on or what I have to clarify. that I have given to them before the lecture as homework. The pre-quiz will not affect their scores. Midterm and final exams are required to test how well the students are processing and understanding concepts. In the exams, I provide some basic formulas for them. In other words, as long as my students know how to use the formulas to solve problems in a correct way, they will get a high score. It turns out that in this way the students are more focused on understanding physics concepts and problem-solving skills, instead of memorizing formulas.

————— My commitments

I commit to teaching physics courses at both the undergraduate and graduate level and participating in the academic life of the department. So far, I have one-year of teaching assistant experience and two-years of teaching experience. I taught university physics and modern physics to undergraduates and gave lectures on selected topics in nuclear physics to graduate students. I have a strong desire to learn more about research-based methods, attend teacher-training programs, practice and continually refine my teaching methods. I believe that universities have an important social responsibility of training and mentoring students to have “open minds” and to think rationally. My interactions with junior colleagues and students, and my personal positive experiences with mentoring, demonstrate that I am qualified to do so. Teaching and researching physics are important to me, and I hope to spend the rest of my working life doing both and instilling life-long learning in my students.