

Teaching Statement

Teaching science is an art. I find it absolutely amazing that to a substantial extent nature can be understood in a very simple manner. I want to share this amazement and inspire my students, helping them to realize how science can inform our understanding. I truly believe in the joy of learning something new and want to instill that in my students. I love to teach because it allows me to be involved in shaping the future through the students and their contributions; also, I greatly enjoy my interactions with students and other faculty members. Many students are intimidated by physics and the first task of a physics professor is to make them feel at ease; that is my first goal. My second goal is to teach students independent thinking and analytical reasoning to augment their problem-solving ability. These skills will help students as they investigate various problems in physics, and it will help to prepare them for life beyond college. I believe that the best approach to achieve these goals is to establish a student-centered interactive and cooperative environment in the classroom in which the students actively participate in their own learning process. I have applied this in my seven years of teaching experience teaching undergraduate physics for 20 hours per week.

Each student is unique with distinctive talents and experiences. It is part of the teacher's job to help students discover and enhance their individual capabilities. I identify two different types of students who would benefit from different teaching techniques. The first type of student includes non-science majors who usually take an introductory algebra-based physics course; the second type includes science or engineering majors taking a calculus-based physics course. Student centered approaches with the generous use of demonstrations and group discussions provides the first group of students with the best learning environment. The same approach is also extremely helpful to the second group of students as long as it does not diminish the intellectual rigor of the course material.

The vast majority of students are capable of reaching high academic standards; but, unfortunately, they are not often motivated to achieve their potential. It is a challenging and important responsibility for a teacher to demonstrate to students that physics is an exciting subject. One of the methods I have used to spark the students' interest is to remind them, using examples, that physics is a basic subject that underlies all of the engineering and most sciences.

The most important thing I have learned as a teaching assistant at the University of Cincinnati is that teaching is most effective when the teacher uses strategies that have been proven to be effective and follows research-based instructional strategies. In my classroom, I start lessons with a brief review of previous learning and present new material in small steps. I ask many questions of my students followed by a group discussion and check all the students' responses using personal response systems. I always set goals and an objective for myself and my students for each class.

Inspiring elevated expectations from my students and providing clear and effective learning feedback is a major component of my teaching. I provide models and create practice problems for every topic I teach in my class. The PhET Interactive Simulations project at the University of Colorado is one of my favorite tools to use in my classroom. I expect that my students will generate and test hypotheses and also develop and monitor independent learning. I engage my students in weekly, biweekly and monthly reviews. As a teacher, my goals are to achieve a high student success rate but I never hesitate to assign difficult tasks to my students and provide them with a platform to handle such difficult tasks.

I have more than seven years of experience teaching recitation classes, grading, and interacting with a wide range of students. I have enjoyed teaching many laboratory classes. All these experiences have allowed me to use the essential tools of an effective teacher. Understanding both the strengths and limitations of different teaching strategies and knowing how individuals learn has aided and inspired me to be a better teacher. Creating a collaborative and active learning process has been one of the most effective and enjoyable experiences in my classroom. This occurred while I was teaching calculus-based classes in Introductory Physics at the University of Cincinnati and underscored the importance of learning through practice and group discussions. Including day-to-day life analogies helped me to make difficult physics concepts accessible and to help the students relate to the subject matter. I have also taught several laboratory courses with a special emphasis is on using Internet-based learning techniques. The structured and open laboratory experiences gave students access to basic and advanced learning technologies to integrate physical science concepts and develop their critical thinking skills to solve real-world problems.

My philosophy of teaching and my preparation for teaching has been shaped by my participation in the Preparing Future Faculty certificate program at the University of Cincinnati. This two-year program included classes, workshops, and reading groups as well as practical work with Professor David Mast. Working closely with Professor Mast, I participated in his interactive learning classes and benefitted from frequent discussions about pedagogy followed by delivering successful lectures to a large class of more than 100 students. This program taught me modern teaching methods and offered me the benefit of the Professor's mentoring, experiences that strengthened my teaching skills. Through this program, I learned various effective teaching practices and methods. These included how to modernize teaching methods in freshman physics labs by applying active learning using microcomputer-based tools, and how to incorporate and uses PRS to engage students in large classes. I have learned how to use Just in Time Teaching to maximize the efficiency of classroom session. Experience has taught me to use the variety of intuitive and visual explanations while presenting innovative ideas and draws students into group discussions whenever possible.

I taught an online Statistical Analysis System/Software course for more than a year. This was a unique experience, and it provided me with an opportunity to work with students throughout the world. I enjoyed learning how to work with a diverse group of students; differences in language and culture were not only the barriers as everyone brought his/her own differences in background, understanding and perspectives to the class. This experience taught me to adopt different teaching preparation for a diverse class.

I expect my students to understand the course material and not just remember the right mathematical expression for the examinations. Yes, it is important to know and to be able to use Newton's equations of motion. It is equally important to understand that the textbooks do not specify whether a falling ball is painted red or green because it does not matter. That the color of a falling ball is immaterial in determining the time of fall from rest seems trivial; that the weight does not matter either is a profound fact. Our knowledge of physics stems from observations. It is condensed into elegant equations only after many false starts and repeated experiments. For students to appreciate this, I believe the role of the laboratory sessions is crucial. If I can make mathematical equations a little less mysterious for my students, I will partly achieve my goals as a teacher. I strive to get students to think about the "physics" of a problem rather than looking for a formula to use while looking at a problem. Different students will achieve different levels of understanding, but I try to get each student to make a genuine attempt at understanding rather than blindly applying formulae. The methods I want to use are practical.

I arrive a few minutes early for each class. This valuable practice lets me engage students in informal discussions, find out what is on their minds, and to get some impromptu feedback from them. Some students are shy or lack the confidence to ask questions in class. Making use of my office hours for one-on-one discussions really helps them. My students' evaluations of me have always commended me on my command of the subject material and my willingness to help students inside and outside the class I want to experiment with giving out partial class notes to which the students must add during the lecture. The idea is to keep students active and engaged during the lecture while supplying the overall structure of the lesson through the partial lecture notes.

Information learned in the classroom is more clearly understood and more easily remembered when it has been put into practice. Showing students that they can perform research with the knowledge they have already acquired in the classroom and allowing them to build and work with the equipment and samples is an effective way to get them excited about physics. As a teacher, I always encourage my students to participate in research projects, and I have directed many undergraduate and graduate students on their research projects.

I firmly believe that the best way to learn is to teach, and that one continues to learn throughout one's life.