This year, I am teaching two introductory calculus-based introductory physics precepts at Princeton University each semester. Previously, I have taught eight courses at Baylor University and seven courses at the University of Tennessee, and I also served as an instructor for eight laboratory sections at the University of Tennessee. This includes both physics and astronomy courses, and courses for both science and engineering and non-science students. I have generally found the experience of teaching to be challenging and enjoyable. I believe technology can play an important role in enhancing the educational experience, and have taken an active role in developing and using educational tools.

I am committed to constantly improving my teaching and building an understanding of how to better communicate the concepts of physics to students at all levels. Each new course is a learning opportunity. Good teaching requires two-way communication and a willingness to treat each interaction as a learning experience. I am not interested in teaching a static course, but one that grows and improves with each semester as I learn from the students how to best teach them.

In November, 2004, I attended the American Institute of Physics New Faculty Workshop, where many leading teachers provided insight into effective teaching tools. In each course, I try to implement more of the ideas which have been found through research and experience to be effective in teaching physics. Physics demands a high level of involvement from the students, who must be encouraged to think deeply about the concepts they are studying, so that they learn more than just a shallow understanding of how to put numbers into equations. There is wide agreement in the physics community that concept-based instruction is the most effective approach to teaching physics. This was one of the key themes stressed in the New Faculty Workshop.

A concept-based course requires students to put a lot of effort into the initial modeling phase of physical problem solving. Students who are accustomed to the common "cookbook" approach of having a clear set of equations provided so that they can just plug in numbers often find this type of course difficult. Effective problems are ones that promote deep processing, not ones that reward rote techniques. Struggling with the concepts at a deep level provides a foundation for the kind of creative thought that is needed in the sciences and engineering. A concept-based approach is helpful in helping students from diverse backgrounds see the relevance of physics, which may not always be evident in the mathematics, but can be linked to the students' experiences and ideas through thoughtfully chosen examples.

As part of the Undergraduate Curriculum Committee in the Baylor physics department, I helped introduce a new concept-based physics course for science and engineering students who are concurrently studying calculus and taught the course until this spring. The engineering department adapted it as their required physics course, and enrollment grew rapidly in the spring semesters. I found that combining two textbooks, A.P. French's *Newtonian Mechanics* and Giancoli's *Physics for Scientists and Engineers* provides a good balance for teaching physical insight in parallel with the mechanics of solving problems. Last year, we also added a weekly problem session based on the University of Washington *Tutorials in Introductory Physics* by McDermott and Shaffer.

Princeton uses a precept system, where there is only one lecture per week, but the students meet three times a week in smaller groups led by faculty members. These small groups give an opportunity for more interactive instruction, including one day a week when students solve problems in groups and present solutions in class. In the discussions, I frequently use problems from French's text and some of E. Mazur's Concept Tests (from the New Faculty Workshop) to complement the material students read in their text, Knight's *Physics for Scientists and Engineers.* This approach has proven popular with the students, and I believe it will help to bridge the gap between on-line WebAssign homework and the deeper problems encountered on the exams.

I have found a number of technologies to be useful in teaching. In Tennessee, I developed an instructor's interface for the CAPA system, based on an extension of a web interface called CAPASet. I have also implemented this interface at Baylor, where it has been used in many courses. I also taught an Online Astronomy course using an on-line text, web-based labs, and CAPA homework and quizzes. I am now the WebAssign administrator for Physics 103 at Princeton. I expect to continue exploring new ideas for using technology in education whenever they are found to be useful.

I believe teaching and research enhance each other. Being involved in the physics of the upcoming LHC will make it possible to convey the sense of excitement this will generate to students at all levels. My work, which is theoretical and computational in nature, but closely tied to experiment, willalso be a good source of student research products, providing an accessible introduction to some of the methods and ideas of elementary particle physics.

I am taking advantage of the expertise at Princeton's McGraw Center to further improve my teaching further. For example, I will be having a class videotaped this semester in order to get constructive feedback. Developing effective teaching strategies requires a willingness to learn from those who have researched student learning, and I hope to incorporate new ideas to enhance my teaching throughout my career.