Teaching Statement

Teaching abilities: I have a passion for teaching. I am an experienced teacher and I like to use a conceptual approach in the classroom. I have attended several courses to improve my educational skills. Due to my expertise in different fields in physics and also due to my long experience in teaching, I have learned how to best approach students with different abilities and skills and teach them the essence of the subject. I believe once the students get a picture of the subject in their mind, it would be much easier to teach them the more complicated, mathematical description of the subject. By introducing such visualization, which does not need to be very complicated computerized graphics, the students should be able to digest the subject and would not be scared of the complexity. The students will then realize that the mathematics, even the most complicated part, is just an available tool for describing the phenomena.

Due to the diversity of students in classrooms, they have different backgrounds; study cultures as well as knowledge capacities. I have realized the first step in teaching is to understand how much the student knows, and start from that point. An important example is the case where the students don't have strong mathematic knowledge, where I as the instructor do have patience to describe the basic of mathematics.

I believe students should have the opportunity in the classroom to try to understand the topics by discussing them with their classmates and then performing the experiments to justify their understanding. Theory and experiments together is the most powerful approach to deeply understand the topics. Furthermore, the students need all available resources, experiments, videos, etc., as well as time to be able to digest the new concepts. There are a large number of misconceptions in Physics, which are very obvious for the physicists but very difficult for students to accept. Newton's third law is an example where students have difficulty understanding the equality of forces between a large car and a small car, when they collide. I ask them to use the avaibale tool to setup cases, where the forces are not equal. Obviously, they can not. After that, I ask them to prove it using calculating examples. Furthermore, I always make sure that numerous demos, slow motion cameras, etc. are availbe to the students during the lecture.

I believe in a student-centered picture, the students play the main role to improve their ability to understand science. They are supposed to be guided in this direction by having them working out problems in the classroom as well as outside the classroom. In my classes, the students have the opportunity to work out whiteboard problems in groups. In this way, they find out their mistakes and are able to understand the problem solving in a better way. During my lectures, the students get several "clicker questions", that they have to discuss in details in groups. By assigning online as well as traditional homeworks and quizzes, the students will extend their studies outside the classroom. The student They should know, that I am always there to help them, whenever they need it.

I strongly believe, while the atomistic approach, i.e. adding new knowledge to already learned, is important, the students should have a bigger picture in their thought, so the new knowledge will not only be added to the big picture, but also it can modify the existing picture. It is why they need a deep understanding in contrast to memorizing the information. In the former approach, which is formed by conceptual teaching and practicing via solving problems over and over, they will be able to solve completely different problems. I believe, in this way, the personality of the students will be changed to handle various problems in their life and career.

Surely, students in the classes with traditional structures, where they just learn how to solve a problem without discussing the possible applications, are not sufficiently motivated to be deeply involved in the course. In my classes, I put effort to disscuss applications of the discussed topics. I have experienced that many of my students have tried to study more thouroughly due to being familiar with the applications of the subject. Some of these student get so interested that they choose the topic as their major.

For engaging students in a research field, the students should initially have rather small but interesting projects to work on. These projects should be designed to generate results quickly. In this way, the students will be motivated and ready to work on more complicated and substantive projects. In addition, this approach has the benefit of training students to be familiar with research environments before they start their main projects. Even for students who will not proceed to a higher degree, learning to think and organize their thoughts like a professional physicist is a valuable asset in life and career. I like to work with some of the outstanding students, who aim to continue as Ph.D. students, in the last year of their undergraduate studies to work on the research projects that I am performing. First of all, they already know how to perform a research once they start their Ph.D. studies. Furthermore, they may already get some publications.

Web-Based Courses: I have been working with the techniques to teach online via the Internet and also using "smart classes". It will be wonderful, because we can have part-time students in the whole state. The number of such students could increase drastically.

Educational Learning Platforms: Due to the nature of various courses I have been teaching, especially ITV-based courses and Flipped classes/Studio learning, I have been using different educational learning platforms such as Desire2Lern (D2L), Blackboard, Expert TA, and MasteringPhysics.

Courses: Besides the Department curriculum courses, I am able and interested to develop more specialized courses, in connection with Chemistry Department, in spectroscopy such as Mössbauer, Raman, and infrared spectroscopy, as well as in synchrotron area such as Nuclear Resonant Scattering, Nuclear Resonant Vibrational spectroscopy, X-ray Magnetic Circular Dichroism, Magnetic Compton Scattering, and Extended X-ray Absorption Fine Structure spectroscopy.

Education

Educational Outreach for High School Students: I have already established connection with teachers and students at high schools. With a more permanent position at TTU, I will be able to strengthen the connection of the high schools and the University with the goal of stimulation of the high school students for higher education with emphasis on the latent talents of the children especially from neglected neighborhood. During the academic year, I meet the students at the campus regularly, interact with them to comprehend their notion on science and technology, and help them in transition decisions from high school to college level. I also form a book-reading circle to read one appropriate book every two months on scientific matters (such as biography of great scientists, recent progresses on science and technology, future of scientific undertaking etc.) and have a book-discussion session every month. They can write reports on their scientific experience at the school webpage.

In order to familiarize the students with scientific investigation methods, we will conduct uncomplicated experiments in our labs in the teaching section. The experiments will include patterning wafers with photolithography; coating samples with thin dielectric, conducting or insulating films, performing film characterization and understanding the origin of film color variation; etching patterned wafers with RIE, SEM imaging or sensing nanowires. The students will also attend our research group meetings and present their scientific experience every quarter.

Scientific Seminars at High Schools: An important aspect of the outreach program is a monthly seminar on exciting scientific and technological developments at the high schools to facilitate the interest of the students in science and engineering. I will invite faculty members from neighboring Universities or scientists from the technology companies to give talks. In addition, we plan to routinely give talks in different high schools as well as junior high schools on important topics such as **"***Nuts & Bolts of Building a Successful Scientific Career*". I am sure we will experience tremendous achievements in high school students by encouraging and stimulating them to attain "higher goals" with proper infusion of self-confidence. Consequently, the students will go through a tough internal competition to get an opportunity to work with us at the campus.