Teaching Statement

Dr. William J. Gannon

The education of all students and their intellectual development lies at the heart of any university. I will enthusiastically contribute to the educational mission of the Department of Physics at Texas Tech University and be an active participant in community outreach efforts. At the University of Michigan, Northwestern University, Stony Brook University, Brookhaven National Laboratory, Texas A&M University, and now the University of British Columbia, I have actively been involved in undergraduate education, graduate education, and outreach. Science education plays a key role in developing critical thinking skills for both future scientists and non scientists alike, and is an important contributor to a scientifically literate society. I will happily continue to play a part in these missions.

As a graduate student at Northwestern University I was a teaching assistant for two years, totaling six academic quarters. During this time, I was responsible for both classroom and laboratory instruction of undergraduates. Classroom-based sections held typically between 75 and 125 students and covered both calculus and non calculus based curriculums. The subjects covered included mechanics, electricity and magnetism, waves, thermodynamics, and relativity at a level of *Fundamentals of Physics* by Halliday, Resnick and Walker, or the texts authored by Giancoli. During these classes, it was my responsibility to present a short lecture about the key points from the class lectures of the previous week, to answer questions about the material, and demonstrate how to correctly set up the problems that had been assigned as homework. I was required to keep office hours to meet with students twice per week and I always held exam preparation sessions outside of my required duties. Laboratory based classes held no more than 20 students – I was typically responsible for two classes – and met weekly for several hours. I was required to give a short lecture at the beginning of each class discussing the measurements that students needed to make and to interact with students as they struggled through the course, in the process increasing their understanding of the material. The material covered kept pace with the classroom discussion.

Through these experiences, I quickly came to understand the importance of flexibility in teaching style. All of my students were intelligent and nearly all were motivated, but they came from a diverse set of academic backgrounds and those with questions had an equally diverse set of issues that were impeding their understanding of the material. Listening and communicating with the students – both at the front of a class and individually – and approaching topics from multiple directions proved to be a critical part of instruction. As an expert in the course material, it is my job to adapt my explanations so that students can come to an understanding, rather than hammering on a point in the same fashion that is not making sense to a student. I will actively work to help students through all means available to me in order to improve their understanding and teach the curriculum, both to undergraduate and graduate students alike.

An interesting place where I believe that I could make a contribution is in the development of undergraduate laboratories and classroom demonstrations. One of the shortcomings of the laboratory classes that I taught were in the experiments themselves. The background and procedures were frequently poorly written and the experiments were performed using badly outdated equipment. These particular labs failed to engage students and they seemed to struggle inordinately. All classes need to be continually updated, none more so than hands on labs, which must be engaging to be effective. I look forward to the work needed to develop my own classroom skills at all levels of instruction, as well as the opportunity to develop labs and demonstrations that are continually evolving to stay relevant.

One of the most important areas to which I have contributed to student mentorship is in the extensive use of undergraduate help in the laboratories that I have been a part of. I began working in a physics laboratory as an undergraduate myself. As a graduate student and as a post doc, the crystal growth labs in which I have worked all employed a large number of undergraduates, many of whom have gone on to pursue careers in physics and related fields. The skills needed to participate in a meaningful way in the scientific process in a crystal growth lab are well within the capabilities of a motivated undergraduate student. Undergraduates will absolutely make important contributions not only in the labor intensive process of crystal growth, but also in characterization and more advanced measurements. As an example of the types of contributions a motivated student could potentially make, as a graduate student I made several trips Europe for neutron scattering experiments with undergraduates in tow. These excellent students were able to play a helpful role in my research and gain valuable scientific experience. I will absolutely continue this trend of teaching experimental skills to young scientists at every opportunity. I will continue to provide opportunities for undergraduates to contribute and play an important role in the work in my laboratory. Of course, graduate students will play the most important role in the intellectual discoveries of my laboratory. The wide range of physics that can be pursued in a crystal growth laboratory that makes its own samples leaves room for a large group. I envision having a dynamic research group that is continually evolving to study new and interesting directions, lead by the efforts of a motivated team of graduate students.

Throughout my career, I have been actively involved in community out reach, starting during my days in the Society of Physics Students at the University of Michigan. I have worked hard to develop demonstrations aimed at middle and high school students and have done many outreach demonstrations over the years. Engaging the community is vitally important for both getting young people excited about science and improving scientific literacy in general. I will continue to pursue these worthy goals throughout my career.