

A professor is in the position to be one of the most significant influences in the life of a student and therefore has significant responsibilities in being an educator, a role model, and a sounding board to the maturing student. In performing these roles, a student is guided through some of the most formative experiences of his/her life. My advisors and mentors at Union, Penn State, and the University of Pittsburgh have skillfully executed these roles on my behalf, and I enjoy doing so with my students.

### **A Professors Role**

Collegiate studies expose students to new ideas, experiences, and often an entirely independent atmosphere. A professor thus needs to be a role model, a professional contact, and a guide through a student's experiences and studies. This mentor has experience solving problems and practical experience in the field of study. Thus, a professor teaches students to think in a different way, navigate through course material and problem solving, not just serving as repositories of knowledge tapped to dispense aliquots to each student. I use this guided approach by presenting course material in at least two contexts including a link back to previously learned concepts and a link to a more global, broader, view. I have found that this approach reaches students that learn differently and also integrates a student's working knowledge base. This enables me to achieve my goals in teaching: to excite students to ask what is possible, to think critically about problems and logically solve them while building a solid foundation of fundamental knowledge.

### **Fundamentals Count**

All knowledge is soundly grounded and has a common base. Coursework in chemistry adds onto the previously established knowledge foundation and builds upon it with each successive class. I aim to solidify the fundamental knowledge base and build upon it, thus forming an interlinked-layered pyramid with a solid foundation. In preparation for each class, I learn something new, leading me to understand a topic to a better degree and I am then able to tie it back to previously learned material. I find that through this preparation, I am able explain concepts and answer questions effectively, and I become more able to anticipate areas where students will have difficulty acquiring concepts. For example, last year during my preparations to teach a water chemistry course, I initially assumed that "I KNEW" how to solve solubility problems and skipped immediately to equilibria and other topics that I thought I should refresh. However, I quickly found that topics such as solubility are taught later in the semester for a reason -- there are nuances and knowledge based on earlier material that when presented in order make problem solving easier. For this reason, I stress understanding fundamental principles that form the foundation for latter more applied concepts in the classes that I teach.

### **Integrating Research and Teaching**

Students learn best by doing. By integrating research into teaching, students learn chemistry that is current and learn about topics that lead to an acquisition knowledge they will find valuable as they progress in their careers after graduation. For example, in my water chemistry class, I am using acid rock drainage as an extension of two main topics, corrosion and reduction/oxidation reactions to emphasize the importance of understanding these concepts. This particular extension allows me to present an

environmental challenge that is currently a \$5 Billion problem in PA alone, as well as incorporate research that I conduct. Integrating current topics with core course content in this fashion allows me to offer students new primary knowledge, provide them with the knowledge base to participate in projects, and expose them to problems they may encounter after graduation.

### **Experience, Interests, and Expertise**

I have the broad experience, interests, and expertise in teaching that enables me to be an impactful professor. My teaching experience includes three months serving as a 5<sup>th</sup> grade sabbatical replacement in Barbados, as well as teaching undergraduate and graduate level courses in chemistry and environmental engineering. The interdisciplinary nature of my research and education has provided me the opportunity to be exposed to many sub-disciplines of chemistry. To solve my research problems, I use many different analytical tools which provide me the expertise needed to instruct courses laboratory instrumentation and/or analytical methods. The substantive portion of my work has been in creating active materials giving me practical and topical knowledge of inorganic chemistry and materials sciences. The areas of nano-science and environmental science are the areas that my research has focused on and I would look forward to developing specific courses involving each, such as “Surface Chemistry”, “Directed Assembled of Functional Materials”, and “Pollution Control, Remediation and Prevention”. I would also like to teach courses similar to that I currently teach including “Environmental Chemistry” and “Advanced Environmental Analysis”.

### **Measuring Success**

Metrics for teaching effectiveness are difficult to employ since testing and surveys often evaluate the performance of both instructor and learner at that particular moment in time. For this reason, I evaluate my success in teaching using methods involving different time parameters. The most immediate measure is daily, in observing the number and nature of questions asked. This lets me gauge the level of understand, aid in pacing of the course, and determine how to make classes more engaging. Student ratings of my teaching, my post class evaluations of how well students learned materials, overall student grades, and the extent that the course goals were met are used as intermediate measures of success. The combination of these two shorter term measures provides feedback alerting me to what approaches did and did not work for that set of students, suggests changes, and allows me to become a better instructor. Longer term measures are more important and telling in that they let me know how well I achieved my goal to affect a student’s ability to think critically, to logically solve problems, and to succeed in every endeavor they participate in. Unlike student evaluation and grades, this type of evaluation is less formal and more difficult to quantify, but is related to how the students that I worked with faces challenges in their lives. For me, the ultimate measure of success in teaching is to see my students overcome roadblocks and to apply problem solving and critical thinking skills throughout their life. Long term success means that I have achieved my top professional goal: *to encourage curiosity, instill the confidence to tackle any problem, and attain excellence in every endeavor.*