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Statement of Teaching Philosophy

I love my job as a professor of chemistry, a wonderful career that gives me freedom not only to pursue my own research ideas but also to educate young minds. Discovering new science and observing student's development are just wonderful rewards that motivate me to strive for better performance, and for setting very high standards for my research and teaching.

My teaching philosophy pretty much follows the path of my research philosophy. My research is driven by curiosity, involving challenging problems such as design and synthesis of the first organic polymer magnet. Successful research is a culmination of great ideas, insightful questions, dedication, hard work, perseverance, and the ability to analyze and solve complex problems, often through collaborations. As failures are quite frequent, and thus the ability to learn from negative outcome and to turn it into positive contribution is crucial in the pursuit of novelty.

In teaching science, curiosity is the seed to sow to induce students to learn, as it is with my own experience as a scientist. I believe curiosity is a powerful driving force that will motivate students to work hard to find their own answers to the problems. Instead of memorizing the material, students should first ask why and try to grasp the concept. Problem solving exercises are effective in encouraging students to work together as teams, so they can learn how to solve problems interactively, through effective collaboration and leadership. Like a failure in a research project, a wrong answer by a student can teach others to understand better the subject. More importantly, teamwork helps students build up confidence. All these positive aspects could help transform the attitudes of just getting through the class materials to be fearless, confident and to have fun solving problems and learning science. However, such pursuit will not be productive without sense of directions and positive environment for students to focus on striving toward specific goals in the class. Above all, these skills and experiences will prepare students to face the real world.

The sophomore organic chemistry has a long-standing label of a "very difficult" class covering a tremendous volume of diverse and complex knowledge. This class is taken by 20–40 exceptionally bright students majoring in chemistry, biological sciences, and chemical engineering. I will use this class to illustrate my undergraduate teaching philosophy at UNL.

Purpose of learning. The primary goal in this class is to develop student's ability to analyze and solve problems of increasing complexity. At the same time, students will learn to master complicated language of organic chemistry, which allows them to recall very large volume of highly inter-dependent information without extensive memorization. In the first few classes, I explain to the class that shortly after we finish the course, much of the factual knowledge will be forgotten, gone forever... Invariably, blunt statements of this type are met with disbelief -- how an instructor could say such things? -- though the disbelief melts away as the semester progresses.

Teaching style. In an undergraduate classroom, I find that the chalk and blackboard are most effective, but with few important twists! Instead of extensive lecturing, I get the class directly involved for much of the lecture time, with one or multiple students going to the board to show alternative solutions to various problems covering a new topic. This leads to mine or, more frequently, students' follow up questions clarifying the solutions shown on the board or posing a new, even more challenging problem. For this to work, clear definition of objectives for each class, as well as supportive and friendly atmosphere in the classroom, are essential. Everyone can follow point-by-point objectives of the day on the blackboard. Helpful hints and other support from their peers, as well as on the guidance from me, are plentiful.

This approach builds up not only everyone's confidence in solving increasingly challenging problems, but most importantly it teaches the students how to explain difficult topics to their peers, until almost everyone in the class understands the material. The emphasis is on learning and working with the concepts, as opposed to memorization. As a by-product of this approach, the students develop their communication skills, something that will serve them well beyond their studies at UNL.

I strongly encourage students to study and to do the assigned homework with multiple partners. This provides additional amplification of their interactive classroom experience. That is, either in classroom or at home, the students are finding that a great way to ensure that they know the material is to explain it to their partners or to the class. This leads to deeper understanding of the topic and greater motivation to excel, i.e., if you do something

well, you may start liking it or become enthusiastic about it. As a by-product, the students develop their teamwork skills, and especially the ability to ask for help and to help others.

Evaluation. Evaluation is an essential component of any successful endeavor. I give challenging exams, with plenty of time provided. Exams reinforce problem solving skills and working with concepts.

Teaching this class has been highly rewarding experience to me. Indeed, curiosity is the seed of learning and my job is to cultivate the right environment for the growth. I am delighted to have this wonderful opportunity to take part in teaching and training such gifted and dedicated students, preparing them to be successful both personally and professionally.