TEACHING STATEMENT

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My teaching goals are derived from the understanding that I am educating the future mathematicians, scientists, engineers, and leaders of society. I strive to provide rigorous academic instruction with general high-level understanding of a topic, while simultaneously adapting classroom techniques in response to evaluations of ongoing student learning. I adopt the following strategies in my classroom: (i) a reflective and adaptive approach, (ii) instruction in conceptual understanding, (iii) an adherence and expectation of high academic standards, and (iv) development of an active learning environment.

Reflective teaching. Each cohort of students is different, and each individual class meeting has dynamics and expectations that evolve throughout each semester. I make reasonable attempts to address the fact that different people have different styles of learning by adjusting my teaching techniques accordingly. This may involve significant mid-semester corrections to adapt my teaching techniques to the current student group.

In order gauge student interest, I solicit formal mid-semester inquiries from students to evaluate how they perceive the material, my teaching style, and the class as a whole. I consistently do this with anonymous online surveys, and the results from such surveys have often led to my restructuring latter portions of the semester. Such restructuring can be as major as overhaul of lecture style: During a MATH 3150 course in Spring 2017, I replaced a direct lecture-style delivery with a lecture-plus-group-work strategy in response to concerns that students voiced.

I also adjust my teaching strategies based on my evaluations of how well students understand the material. This is frequently done with short, easy weekly quizzes. The goal of these quizzes is to probe students’ understanding of recently taught material, and to ascertain which (if any) parts still evoke confusion. This also encourages students to keep up with the material instead of cramming several weeks worth of curriculum into a single night’s study session before an exam. The short quizzes often enable me to identify a problematic class-wide misunderstanding of concepts.

Broad conceptual understanding. Compared to other disciplines, mathematics enjoys an unusual distinction that a large portion of the general population espouses the opinion, “I am not good at math”. I believe that part of this conclusion is not directly related to the difficulty of the subject, and instead is the partially result of instruction that emphasizes memorizing rote operations without understanding why these manipulations are being performed. I attempt to address this in my courses by communicating broad understanding instead of rote operations.

My techniques that address broad understanding do not come at the complete expense of knowledge of rote mechanics, which are necessary from a practical point of view. However, instruction on understanding of mathematical topics is important for all students, not just those who intend to pursue mathematical careers. My pedagogical goal is to make the reasoning behind the mathematics as important as the practical details.
As an example, in all my courses I spend 3-5 minutes at beginning of each class meeting to review (a) what we learned in the previous meeting, (b) what we will learn during this meeting, and (c) how all of these are important in the grand scheme of the semester-long course.

**Rigorous academic standards.** I do believe that experimentation with, and incorporation of novel pedagogical practices is an effective classroom technique. However, the quality of instruction and level of academic rigor expected from students must remain unchanged. I do find it important to practice experimentation within a reflective and adaptive teaching environment, but students learning curricular content is of paramount importance.

My experience is that if I expect a rigorous yet reasonable standard of performance, students will rise to the task. I have notable examples of former students in my classes who were initially performing at a level of course failure, frequently due to lack of preparation in prerequisites. I do my best to assist those students in catching up while simultaneously informing them that they must perform at a higher standard in order to pass. Many of these students gradually improved as the semester progressed, and, through their own efforts, earned comfortable “B” grades by the end of the semester. Through such experiences, teaching such students is amongst the most rewarding experiences in my professional career.

**An active learning environment.** There is much pedagogical research supporting the tenet that engaging students in active or hands-on learning improves academic performance and retention. Active learning enables students to get more out of pedagogical time than just a lecture. I frequently employ group or individual presentations, and problem solving sessions in my classes. I am particularly fond of student presentations as they allow students to practice communication skills and speaking mathematics, which is a refine-able skill that is uncommonly exercised in more traditional mathematics classrooms.

For example, in a past multivariable calculus course (MA 271 at Purdue, Fall 2011) I had arranged for every student to give a 5-minute presentation on an extracurricular topic. This had the effect of getting students engaged and active in learning mathematics; many students have even come to office hours to learn about extracurricular topics rather than the course curriculum. In another example, for differential equations courses the University of Massachusetts Dartmouth and the University of Utah, I tasked groups of students with the responsibility of organizing and leading periodic review sessions. I have found that this manageable sacrifice of lecture time yields the substantial payoff that students study material very well for these review sessions.

**Conclusion.** In summary, my pedagogical philosophy emphasizes core understanding, high academic expectations for students, and a consistently reflective teaching approach that employs active learning when appropriate. These philosophies require perennial attention to redesign in the classroom, and I believe such an approach is a necessity for a good instructor. I am hoping to refine and exercise these techniques in future courses at the University of Utah, in both a graduate and undergraduate course setting.