STATEMENT OF TEACHING PHILOSOPHY

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The ability to think mathematically is one of the most valuable skills I teach my students. Course material is very important, of course, but in many of my classes there are engineers, biologists, philosophers, and philologists, as well as math majors, all who will end up using the subject differently. It is my experience that students will not learn to think mathematically (nor learn the material) unless they engage themselves. Thus one of my chief goals when teaching is to encourage them to take an active role in the learning process.

I have found that such encouragement requires a deliberate effort. Some students, of course, take an active role automatically, but to many the extent of their responsibilities in this regard is not intuitively obvious. The methods I use to engender participation tend to vary by circumstance. Mathematical discussions outside of class can be very effective (especially for high level courses), and I have especially enjoyed leading undergraduate research groups. Assigning students to teach the course for a day, asking questions of the class, or dialoging on practice problems can also be helpful in certain contexts. Sometimes group work or class worksheets are appropriate. In lower level courses, I have found that suggesting to the class that they should think something over, pausing the lecture to give them opportunity to do so, and then asking them to contribute from their musings works very well.

Another motivational tactic is the careful use of examples. Mathematics, after all, can be difficult to grasp in its most axiomatic form, and I have found some students to be uninspired by completely intangible constructions. Giving examples, of course, takes on a more nuanced meaning as the mathematical abilities of the students progress—the examples given in a high level analysis class will have an entirely different flavor than those in a first course on probability. In lower courses, I find that the most effective examples are those that bear on the real world as much as they demonstrate mathematical structure.

I have also found that incorporating technology, when available and appropriate, is a good way to keep students interested. For instance, when properly used, a scientific calculator can have great instructional value, both as a teaching device, and as a motivator. Examples of this in calculus are ubiquitous, but it remains true in other courses. In my linear algebra sections, for example, the students had no problem row reducing by hand, so using the TI-83 to do some of this work allowed us to focus on the concepts one row reduces to elucidate, such as linear independence or invertibility. In my modern algebra course, computing devices allowed us to explore the RSA algorithm—we often resorted to Mathematica when the numbers got large. Even in high level courses, computer algebra systems such as Macaulay 2 can contribute to students’ understanding. In fact, I would argue that the ability to compute is itself beneficial and interesting to students. Thus I try to help them help develop this ability while effectively presenting important mathematical concepts.

Finally, I find that students respond well when I effectively express my genuine concern for their learning. A friendly demeanor, a comfortable classroom setting (where questions and comments are welcome), and flexible office hours have worked well to this end. My students tend to appreciate the time, thought, and energy I invest in my courses, and I, not surprisingly, have found their appreciation very rewarding.