

TEACHING STATEMENT

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As a student at Harvey Mudd College, I learned linear algebra from Professor Mike Orrison, who liked to make an analogy: a change of basis, in a vector space, is a *change of perspective*. By applying a change of basis, we are able to see the same vector space from a new vantage point, exposing information (say, the eigenvalues of a given matrix) that was previously opaque. It is an analogy that Prof. Orrison would return to in later classes on abstract algebra and representation theory, and it is an analogy that I frequently employ in my own teaching. So many beautiful pieces of mathematics—the fundamental theorem of calculus, the Galois correspondence between field extensions and subgroups, the many “cryptomorphic” definitions of matroids—tell us that if we can only *change our perspective* in the right way, then a problem which was previously impenetrable can become suddenly approachable.

In every course I teach, whether it is analysis or algebra, a large calculus lecture or a small graduate seminar, I strive to cultivate the sort of insights that have led me and so many others to fall in love with the practice of mathematics. Of course, I have more specific aims—skills must be learned, details understood, learning objective met—but these are both necessary for and reinforced by the emphasis on transformative changes of perspective.

With this goal in mind, I ground my teaching philosophy on three principles.

The student-teacher relationship is paramount. The study of mathematics is inseparable from the communication of mathematics, and effective communication is facilitated by strong interpersonal relationships. I work to build and maintain a classroom environment which is relaxed, friendly, and mutually respectful. Fundamentally, this comes from being fully present with my students: listening to their concerns, seeing the material from their perspective, and giving enthusiastic encouragement and generous praise.

Mathematics is learned through productive struggle. The act of learning mathematics is a messy process of deep thought, free experimentation with novel ideas, and willful struggle to overcome the confusion and misunderstanding that inevitably will arise. As a teacher, I am responsible for properly curating this learning process for my students. They must be challenged without being discouraged, provided with assistance as necessary, and repeatedly reassured that they will be rewarded with a fair grade for their efforts.

Mathematics is a source of joy and wisdom that is accessible to everyone. The rewards of a mathematical struggle are knowledge and insight, a glimpse of some higher truth and beauty. I firmly believe that such rewards are available to mathematics students of all backgrounds and at every level.

In twelve years of teaching, I have taught a wide spectrum of courses. While my specific teaching practices vary depending on the level and format of a course, I invest a considerable amount of time and effort in designing and executing my lesson plans so that they adhere to the principles above.

I carefully plan each class period to serve specific learning objectives, and I continually emphasize how these objectives fit into the broader narrative arc of the semester. At the same time, I am flexible and will incorporate spontaneous examples or focused digressions in response to student questions. I take care to highlight beautiful ideas, surprising examples, and clever applications, which I use as moments to joyously celebrate our evolving understanding of the material.

I provide my students with ample resources, support, and feedback. I hold frequent office hours, produce supplementary handouts and digitized lecture notes, and ensure students receive detailed comments on their coursework. I regularly incorporate elements of active and inquiry-based learning, like warm-up problems and group work, to facilitate in-class discussions and identify areas of confusion. I am honest and transparent with my students about the process of assigning grades, and I design my grading scheme to reward effort and perseverance.

Through hundreds of small interactions, I show my students that I genuinely enjoy discussing mathematics with them and that I am invested in their success. I learn their names early in the semester. I enthusiastically respond to questions by saying “I’m so glad you asked that!” or “I see where you are coming from—I’m sure some of your classmates have the same question.” In any given math class, some subset of the students will find themselves challenged like never before. I take care to identify these students, encourage them to come to office hours, and give them the individual attention they need.

Finally, I view my own role as a teacher as an ongoing work in progress. I compare strategies and course materials with like-minded colleagues, and I look for opportunities to experiment with the structure of my courses to see what works best. One of my favorite techniques is to give an anonymous survey halfway through the semester, asking my students for input on how they feel the course is going. When I make adjustments based on their comments (for example, by going over some of the homework problems in class or assigning more group work), the students feel heard and respected, and their learning improves as a result.

It is a profound privilege and a tremendous responsibility to teach mathematics. Each semester offers the opportunity to share some of humanity’s most beautiful and durable intellectual discoveries with curious and bright students who are just beginning to understand their place in the world. Of course, the vast majority of these students are not going to become mathematicians, or even math majors, but this only underscores how precious my time with them is. Mathematics is as indispensable a component of a good liberal education as history, literature, or art. Most of the specific facts and skills that I teach will be forgotten over time. But I have faith that the act of learning a few pieces of mathematics, particularly those that induce a transformational *change of perspective*, will have a lasting effect that will reverberate throughout their future intellectual pursuits.