

My goals as a teacher are to motivate and inspire students to pursue mathematics and to foster an interactive classroom environment that supports effective learning. My ultimate goal is for students to develop math skills that they can apply toward further study in mathematics, or carry those skills with them to successfully apply in other disciplines including the sciences and humanities. My teaching philosophy has developed over many years as a student and tutor at a small liberal arts school, and as an instructor at Boston University, and my love of teaching has played a fundamental role in my career choice.

**Know your students.** Students come from diverse backgrounds and recognizing this fact and the need to adjust to various student bodies has allowed me to draw out the best in different cohorts. While I was a calculus tutor simultaneously for Upward Bound and Harvey Mudd College (HMC) the stark difference between two diverse groups of students was made clear to me. The average student at HMC comes from an advantageous educational and socioeconomic background. During tutoring hours, it was clear these students possessed a great deal of self confidence and were assertive in asking questions. Recognizing this pattern, I reduced my level of intervention and let students drive the interaction and level of help during a session.

As a volunteer for Upward Bound, however, the same calculus lesson would require an entirely different mode of tutor-student interaction. The high schools we worked with were some of the worst-performing and under-funded schools in the greater Los Angeles area. Students enrolled in Upward Bound generally come from low-income households and underrepresented groups in higher education. While Upward Bound students were just as highly motivated as a typical HMC student, years of lackluster instruction and a paucity of basic educational resources in their school system such as textbooks had taken their toll on the self confidence of the Upward Bound students. In this environment I took a more active and direct approach, posing and soliciting questions and working through problems as a group.

Over time I learned to push both groups of students equally hard in mastering the course content, realizing that I must be flexible as an instructor and vary my teaching styles according to student need and background. This experience was a powerful lesson that identifying student needs and backgrounds can be the key to guiding students' success.

In the first days of my classes, I hand out note cards to my students and ask them to write down their name, major, interest in the course, and their last experience in a math class. This simple exercise gives me a resource to understand my students' backgrounds and academic interests so that I can adjust my teaching methods accordingly. For example, in my calculus course I discovered that nearly all of my students were business majors. I adjusted my lectures to this audience by focusing on business examples relevant to the material rather than biological examples. To my surprise, students also find these note cards to be a safe place for them to express their fears about studying mathematics and past negative experiences in the math classroom. In response to these fears, I set a tone of encouragement and support in my classes.

**The classroom is a place for dynamic and active learning.** I strive to organize a classroom that fosters active learning and student participation. In the math classroom, I have found that one of the most effective methods for instigating student participation is memorizing student names early each term. Instead of soliciting volunteers for my questions, I aim to call on individual students throughout the hour to work through answers. With the right level of instructor encouragement, students' initial fear of being singled out for questioning transforms into a consistent readiness for each class that allows for successful student-driven interaction in the classroom. I can identify students who have mastered the material and those who are struggling, rather than have the class dominated by only a few individuals. By intentionally calling on each

student, I begin to understand the different learning styles and personal background individual students bring with them and can adapt my teaching methods accordingly. Knowing each others' names also creates a personal, supportive atmosphere in the classroom through which students become aware that our goal working together is for everyone to successfully master the material.

I also introduce dynamic and active learning into the classroom through the use of technology. I work on the board intensively during class and often leave covered in chalk, but I have found that computers can complement traditional lecture and board work. I have taken cues from Bob Devaney and Paul Blanchard in the use of animations for phaselines, plots and multidimensional visualization in the classroom. Such examples enrich student understanding of the material by helping them to visualize the processes we discuss.

**Be accessible.** While attending Harvey Mudd College I learned that having access to faculty can make the difference between understanding and utter bewilderment. After struggling with a difficult abstract algebra assignment, I always felt welcome in Professor Michael Orrison's office for that small hint that would make all the difference. My welcoming approach with students usually results in office hours that are quite busy, but students learn early on that my office hours are not an "answer fest." In fact, students are the ones with chalk in their hand while I watch them work through their thought processes on the board. As students fill the office I encourage them to ask one another for help, and I am there as a resource to help guide them. I have found that students are far more motivated and excited by their mathematical prospects when they have solved their own problems instead of relying on instructor intervention.

**Mentoring.** I often find students seeking my advice on questions about graduate school and other topics not related to my course. Many students are seeking a mentor and I understand the importance of embracing such a role. From my experience as a research advisor at the Applied Mathematical Sciences Summer Institute (AMSSI), an REU summer program, I learned that some of my students' most inspired moments were not in the discovery of a proof but after the long discussions we engaged in about attending graduate school in mathematics. By illuminating the path that I took, students begin to envision themselves on their own journey of research and education. I have found that mentoring relationships can be just as effective as explaining math concepts in inspiring students to pursue and succeed in mathematics.

I find teaching mathematics extremely rewarding for the supportive mentoring relationships I develop with my students, and to observe each student's maturation and development of their mathematical skills over the course of a semester. By creating an environment for students to be successful, I am able to push my students to reach, explore, and sometimes move past what they thought were the limits of their mathematical capabilities. I understand my success as a teacher as ultimately defined by my ability to achieve this end.

I would like to conclude with some specific courses I would be excited and prepared to teach. At the undergraduate level I am interested in teaching calculus, linear algebra, differential equations, complex variables, PDEs, dynamical systems, and analysis. I would also like to develop topical courses in complex dynamics at the advanced undergraduate level and an interdisciplinary course in fluid dynamics. At the graduate level I would like to teach PDEs, ODEs, dynamical systems, and a topics course in invariant manifold theory for parabolic PDEs.