Teaching Statement

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Mathematics is a creative endeavor, full of beauty and mystery. Students deserve the opportunity to explore this wonderful subject guided by their own curiosity, growing through active participation, constructive feedback, and collaboration with others. However, it is also important to acknowledge that students face a variety of barriers to learning. My approach to teaching has grown out of the tension between my vision of the ideal learning environment and the reality of my students' and my own human limitations. This plays out in the content I choose to emphasize, the skills I aim to impart to my students, and the practices I use to ensure that each student feels they belong in my classroom. The sum of all these is a teaching philosophy that centers on providing an experience of the authentic practice of mathematics which actively includes each and every student.

These beliefs and practices have been shaped by a broad range of teaching experience. I have taught six different courses as instructor of record: college algebra, multivariable calculus, three courses for future educators at the elementary, middle, and secondary levels, and a topics course for students who do not require calculus. I have also led recitations for pre-calculus, Calculus I, and Calculus II, including two semesters with a program called MathExcel, where students spend extra time in recitation each week, working on problems in small groups with assistance from the TA and undergraduate assistants. I received the University of Kentucky College of Arts & Sciences Certificate for Outstanding Teaching in 2021 and the University of Kentucky Provost's Award for Outstanding Teaching in 2022. Most recently I am leading recitations for pre-calculus, which is currently undergoing major structural changes to more equitably meet the needs of students from varied backgrounds and prepare them to succeed in calculus.

I help students develop skills—problem solving, creativity, persistence, communication, self-evaluation—that are integral to the practice of mathematics. When I taught Mathematical Problem Solving for Teachers online in Spring 2021, I devoted the majority of class time to small-group problem solving sessions in Zoom breakout rooms. Students applied problem-solving techniques they had read about to challenging new problems, testing out ideas on virtual whiteboards and jumping between breakout rooms to share insights. This format proved successful; students were consistently present and engaged with the problems and each other.

For homework, students sometimes wrote complete solutions to problems (to practice their written communication skills) but other times wrote *investigations*, describing everything they tried while working on the problem, regardless of whether it worked or even whether they ended up with a solution. In a self-evaluation near the end of the semester, one student wrote, "I like that the investigations put the emphasis on the thought process and steps toward solving a problem instead of just the final product. Since the investigations asked us to document all of the strategies we tried and why they did or did not work, I found myself trying out more different strategies and being more creative in my problem solving." The same student, who had previously described feeling "really anxious about assignments in other math classes sometimes because I feel like I'm not capable of doing well," wrote one investigation so thorough that she ended up with a solution far more general than the one I had worked out myself.

I make sure to equip students with tools to manage their emotional responses to the learning process, which can include anxiety or stress when confronting unfamiliar ideas and challenging problems. My students read about "growth mindset" and write about their own mindset toward learning math. I promote a culture of accepting and even celebrating mistakes, reminding my students frequently that mistakes are instrumental in the learning process, and modeling this attitude when I make mistakes of my own during class. I also design my assessment and grading practices to

encourage productive mathematical behaviors and recognize that not all students' learning will conform to the same timeline. These include frequent, low-stakes assessments, abundant opportunities to revise work in response to feedback, and growth-focused grading schemes such as specifications or standards-based grading.

I adapt course content to engage students through interesting real-world problems. Both semesters last year, I taught Introduction to Contemporary Mathematics, which covers topics with significant practical applications: voting theory, probability, fair division, and graph theory. Whenever possible, I used these applications to introduce new topics ("internet company X wants to connect cities ABC as cheaply as possible") instead of starting from abstract, unmotivated definitions ("a graph is a set of vertices and a set of edges"). I found that my students were more interested when they could see the usefulness of what they were learning, even if not to them personally.

A second goal of my curriculum design is to expose students to the realities of how mathematical tools impact peoples' lives—often in ways that cause harm to historically marginalized groups. Mathematical models are used for credit scores, hiring, school rankings, insurance pricing, criminal sentencing, advertising, electoral redistricting, and much more. As we covered the relevant material in MA 111, my students read and wrote about the ethical ramifications of these applications of math. Math also supports responsible personal decision-making; for example, a solid understanding of probability is needed in order to correctly interpret figures pertaining to vaccine efficacy and medical test results. One student wrote, "learning more about false-positives and false-negatives and how there still is a probability that test results can be wrong in these ways made me more conscious, as I felt more obligated to follow COVID guidelines more than before." The student further described how they found the material interesting because they could see its relevance to the COVID-19 pandemic and to their day-to-day decision-making.

All of this rests on the foundation of a welcoming, inclusive, and respectful classroom environment. The work of establishing this begins even before the semester starts; I carefully craft my syllabus, avoiding abbreviations and academic jargon that might be unfamiliar to first-generation college students, and communicating that I value my students as people, not just as practitioners of mathematics. In the first week of class I typically give a writing assignment asking students to tell me about themselves, both inside and outside of the math classroom. When I have had the autonomy to do so, I have implemented grading practices that are simple and transparent and empower students to make informed decisions about balancing my class with their other course load and non-academic responsibilities. The work of building partnerships with students continues throughout the semester. When I help students during class, I patiently remind them that it is normal to struggle with new concepts and to make mistakes. When I notice students missing class, performing poorly on assessments, or not turning in homework, I reach out to them individually and invite them to attend my office hours so that I can help them understand the material and, just as importantly, learn to navigate the intellectual and emotional obstacles to learning challenging new things.

If we can provide students opportunities to experience the genuine and rewarding practice of mathematics—to be an active participant in a journey of exploration and discovery—our students will come to view mathematics as an important part of their future and develop the creativity, problem solving, critical thinking, and self-evaluation skills that will serve them wherever they go in life. I look forward to the continued opportunity to help students learn and grow, and to further develop my teaching practices and my ability to create supportive classroom environments that welcome all students.