

TEACHING STATEMENT

MATTHEW KROESCHE

1. INTRODUCTION

The pursuit of teaching mathematics has long been very close to my heart. In the time since my undergraduate years, I've had the opportunity to share my mathematical knowledge with many different audiences. These audiences have ranged from middle and high school students in the College Station area (via the Spider Smart learning center), to university students in both STEM and non-STEM fields in a classroom setting (via instructor of record and teaching assistant positions at Texas A&M University), and to more personalized settings such as REU programs and various high school math teams I have coached. As a consequence of this, I've had experiences teaching students who are as passionate about mathematics as I am; and at the other extreme I've also had plenty of experiences teaching students who have never liked math and are likely only in my classroom because their degree plan requires it. In both of these extreme cases, and everywhere in between as well, I view my time in the classroom as a chance to present something new and meaningful to my audience. I strive to create an environment in which students have at their disposal all the tools they need to understand the material, and in which discussion, elaboration, and questions are welcomed and encouraged.

2. TEACHING PHILOSOPHY

Why do so many students dislike math? This simple question is the core motivation behind my methods and philosophy of teaching. Often, in my experience, the problem goes back to grade school, and to negative experiences with subjects such as algebra, geometry, and trigonometry. Sometimes these negative experiences may be due to a specific teacher or a specific textbook, but based on conversations I've had with students, many times the problem traces to more broad issues in the treatment of the subject. The focus on being taught to blindly memorize and apply is widespread, from the quadratic formula in algebra to the logarithm identities in precalculus. Proofs are often only studied rigorously in geometry, where they are presented in a two-column format that leads many students to believe that the justification of mathematical results is a joyless, pedestrian task. This is not to say that every high school classroom is like this – since there are many excellent teachers out there – but the problem is a common one. This is also not to say that the subjects being taught in high school are unimportant or unhelpful, since quite the opposite is true; this is just a statement about how certain ways of thinking can be emphasized over others in the teaching of these subjects, sometimes to ill effect.

Because of this, in whatever area of math I happen to be teaching, I believe it's all the more important to make sure the material is motivated in whatever ways are reasonable. If a new theorem or formula is learned, emphasis is given to understanding why it is true, why we should expect it to be true, and how it fits into the bigger picture of the course subject material. Depending on the course and the audience, this may involve presenting a proof (for example, explaining how the quadratic formula is a result of completing the square), showing some relevant special cases or direct applications, and/or talking briefly about why the

thing we're learning is important and what we'll use it for.

The next core ingredient to my teaching style is examples. My classes generally have a very heavy component of solving example problems throughout the learning process. After a new theorem, concept, or technique is presented, whenever reasonable I'll follow it up immediately with multiple problems that illustrate how the new idea can be used in a variety of ways. There are many ways this can be beneficial. First, it can make the concepts learned seem less confusing, and help students to understand them in new and concrete ways. Second, it gives the students more time to recognize if there's something they're not understanding, allowing them to ask questions or seek additional help. Third, it can play a major role in creating a classroom environment where students feel comfortable discussing the subject with each other and going through the problem solving process as a group. Often, I'll ask a question and let the students discuss amongst themselves for a bit before starting to go through the solution process. I may also ask students what they think the answer is after they've discussed it. While there will always be students who refuse to engage in the process, I do my best to ensure that everyone has every opportunity to contribute to the discussion.

This brings me to another important ingredient in my teaching philosophy, which is creating and maintaining a rapport with the students which ensures that they have multiple avenues to better their understanding of the subject. One key aim is making sure students do not feel afraid to ask questions in the classroom which they may perceive as "stupid questions". Another is being accessible outside of the classroom, by encouraging students to come to office hours and by responding promptly to emails. And often, this also includes making sure students are aware of other resources to help them learn the material better: perhaps external help sessions or supplemental lists of practice problems.

Unfortunately, in any class, there will always be students who do not do well because they are unwilling to put in the effort to seek knowledge using any of these avenues. I make it a goal to personally encourage as many students as possible to engage with the learning process. Many students can engage better in a one-on-one setting, which is why I specifically emphasize the importance of office hours and strongly encourage students to come. When possible, I seek out students who seem to be struggling with the material to help them understand it better. I do not want any student to fail, and from the beginning I make it clear that I am here to help them learn. Some may still slip through the cracks, but everyone will have ample opportunities to learn the material, however much or little they choose to take advantage of these opportunities.

In summary, I've come to appreciate how teaching is a multifaceted process, and how there are many different types of students coming from many different backgrounds in every classroom. My approach to teaching is designed to give each one all the tools they need to excel in the class, and prepare them to use the material they are learning in the future.

3. FUTURE PLANS

I hope for a future academic career that includes many opportunities for teaching. Based on my past teaching experience, I would feel comfortable teaching any course at the undergraduate level, and many graduate courses as well. As an instructor and a teaching assistant, I have extensive amounts of experience teaching freshman-level courses such as calculus, precalculus, and also various survey classes, many of which are especially geared toward students who do not consider math to be one of their strong subjects. I would also be very willing and able to teach higher-level courses at the undergraduate level, such as multivariable

calculus, differential equations, linear algebra, statistics and probability, and whatever else may need to be taught. Finally, my work in analytic number theory has also given me the necessary knowledge to teach subjects such as complex analysis, Fourier analysis, cryptography, and abstract algebra at both an undergraduate and graduate level.

4. EXPERIENCE

Teaching Experience

August 2023 - December 2023	Instructor of Record, MATH 167 - Explorations in Math
June 2023 - August 2023	TA for Texas A&M Number Theory REU Program
January 2023 - May 2023	Instructor of Record, MATH 168 - Finite Mathematics
June 2022 - August 2022	Recitation/Python Lab TA, MATH 151 - Engineering Calculus I
January 2022 - May 2022	Recitation/Python Lab TA, MATH 151 - Engineering Calculus I
August 2021 - December 2021	Recitation/Python Lab TA, MATH 151 - Engineering Calculus I
June 2021 - August 2021	Recitation/Python Lab TA, MATH 152 - Engineering Calculus II
January 2021 - May 2021	Recitation/Python Lab TA, MATH 152 - Engineering Calculus II
August 2020 - December 2020	Recitation/Python Lab TA, MATH 150 - Precalculus
August 2017 - present	Instructor, Spider Smart/E ³ Learning Center, College Station

Email address: mdkroesche@tamu.edu

TEXAS A&M UNIVERSITY, COLLEGE STATION, TEXAS, UNITED STATES OF AMERICA