Teaching Statement

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My foremost objective as an instructor is to drive my students to grasp the "big picture" behind each course that I teach. I strive to do this myself when learning new mathematics, and I hope to pass my own curiosity and passion on to my students. As auxiliary goals, I also encourage my students to actively engage with the material and explore mathematics on their own, and I aim to help students at all levels grow accustomed to clearly communicating mathematical ideas.

Urging students to view mathematics from a global perspective is something that I incorporate from top to bottom in the design of a course. This begins on the first day, when I try to motivate key ideas and relate them to the students' prior knowledge. For example, I foreshadow the concept of derivatives in Calculus I by computing average velocities of a car from a set of data points, then trying to estimate the car's instantaneous velocity. In subsequent lectures, I constantly return to this concept through interesting applications. Some examples are fanciful—I often give problems based on *Star Wars*, and I usually introduce exponential growth via the scenario of a zombie outbreak. Others are more realistic, albeit simplified, examples from physics, engineering, and economics.

I take a different approach in more advanced courses, often motivating the material with a historical discussion (e.g., the insolvability of the quintic in abstract algebra) or a particular problem that is closely related to the course material (e.g., the incompleteness of the rationals in analysis). When introducing new concepts, I always indicate how the individual topics are simply pieces of a much larger idea. The methods may vary greatly, but my goal is still to connect the material to the students' prior knowledge and remind them of where we are headed in the course.

1 | In the Classroom

Throughout most of my teaching career, I have favored a traditional lecture format, though in recent years I have reworked some of my lower-level classes to incorporate more active learning techniques. Even when I am lecturing, I aim to make the class as interactive as possible. In particular, I often introduce new material through a guided discussion, with the goal of making my students feel as though we are discovering new ideas *together*. I also constantly pose questions in class—both leading questions and ones that are meant to review and reinforce the material—and my students quickly learn that I expect answers to these questions. I also make it clear that I want my students to ask their own questions, and to otherwise contribute to the collective learning of the class. For example, I expect calculus students to walk *me* through certain examples, and I often ask upper-level students to provide certain details of proofs (or at least explain some of the steps back to me) and produce examples when needed.

I have always incorporated some degree of active learning in my lower-level classes, but I have begun to shift even further in that direction over the past few years. I have come to realize that calculus students need sufficient practice with the material in order to master

it, and watching me work through examples only helps so much. Students need to begin engaging with the material right away, and it is especially helpful if they have me available to nudge them along. Therefore, I regularly set aside time in class (or sometimes even an entire class period) for students to work on problems in groups after we've done a few instructive examples together as a class.

I went even further when I taught Calculus II in the Spring 2019 semester. This course is considered to be the most difficult in the calculus sequence at UT Tyler, so decided that a more robust approach was needed. I received a grant from the UT Tyler Center for Excellence in Teaching and Learning to implement a partially flipped classroom model for this course. Each time we started a new topic, I would devote one class period to an interactive lecture that focused mainly on new concepts, with a small number of carefully chosen examples to illustrate the new material. After class, students were expected to watch a video in which I worked through several more detailed examples. The students then spent the next class period working on problems of various types and difficulties, while I floated around and helped each group as needed.

I have adjusted my teaching style in other ways to better suit particular courses and student populations. For example, I taught Differential Equations online during the COVID-19 pandemic, and I shifted to an entirely project-based approach in that course. In place of traditional exams, the students completed projects on detailed real-world applications that aligned with the course material. As another example, I am currently teaching Foundations of Mathematics (our introductory course on logic and proof-writing), and I am again devoting a significant amount of class time to discussion and problems for the students to work on.

2 | Assignments and Assessment

In addition to the in-class environment, I expect my students to be actively engaged outside of class as well. I carefully plan all of my homework assignments and exams, making sure that every problem has a specific purpose. Homework problems should always reinforce old ideas and spark new ones, and exam problems should always assess a specific aspect of the students' knowledge. I also frequently assign homework or in-class problems that push the students to explore things beyond the topics covered in class. In my calculus classes, many assignments include problems that require the students to interpret mathematics in a physical situation. The assignments in my upper-level classes are interesting as well, often including some problems that require creativity or introduce new concepts. I also occasionally pose more challenging problems that relate the material to their other coursework, since students should begin to realize at an early stage that all branches of mathematics are interconnected.

3 | Outside the Classroom

I firmly believe that my responsibilities to mathematics students and my opportunities to impact their learning are not limited to my time in the classroom. As a result, I regularly involve myself in other activities that will help students grow as budding mathematicians. In particular, I helped run training sessions for the annual Putnam Competition for six years, and I have twice mentored teams for the COMAP Mathematical Contest in Modeling. I also recently coached a team for the SIMIODE Challenge Using Differential Equations Modeling,

for which I traveled with them to Texas A&M University-Commerce so they could present their work.

I have also been involved in multiple research projects with both undergraduate and graduate students over the last few years. I coauthored a paper with a UT Tyler REU student, and I have a continuing project with a former undergraduate student who I mentored as part of the Louis Stokes Alliance for Minority Participation. (Both students have since gone on to Ph.D. programs in mathematics.) I have also supervised a masters thesis student and served on thesis committees for several other students.

4 | Conclusion

In closing, I truly enjoy teaching mathematics at all levels, and I try to instill my own passion for the subject in my students. I keep them involved in every lecture, and I select examples and homework problems that are relevant and interesting. I also include historical anecdotes in my lectures to remind my students that mathematics is a living subject, and that many interesting people have contributed to its existence. Teaching is an important and personal endeavor for me, which I hope is evident to my students and colleagues.