Teaching Statement

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Teaching is an unalienable and fulfilling part of my role as a mathematician. I was intrigued by my first college math class, not only by the rigor and conciseness of calculus itself, but the way the professor motivated us with his presentation and willingness to help too. That is what I aim to bring to my students. That is why I view myself as someone who excites the students about mathematics and encourages them to think, ask, and explore. Mathematics is much more than tons of symbols and formulas or a thick textbook; it is a discipline of effective thinking patterns to understand natural phenomena with its own vibrant culture and history. In this statement, I will focus on my teaching philosophy and what I do in practice to achieve my goals. I will also briefly talk about my experience.

Philosophy & Practice

The two things I want my students to take away are practical problem-solving skills and a solid understanding of abstract concepts with examples. I make great efforts to balance them.

Preparation

I carefully prepare a clear and concise syllabus before the semester starts. Especially important is the course policy, where I tend to be as lenient as possible, so long as it complies with the department policies. In general, my mindset is to provide students with an easy policy but execute it with as few expectations as possible.

Regarding lecture notes, I take it as my responsibility to release them in advance so that my students have a chance to preview. All the materials are uploaded to my personal teaching page, or the platform we are required to use. Depending on the format of teaching, I have two different ways to make notes.

1. For an in-person lecture, I typeset the absolute essence of the lecture, e.g., definitions, theorems, and important examples. I print them out, work out the examples step by step as my own guide for lecturing. The notes are projected on the screen, and I elaborate concepts and examples using blackboards.
2. For problem-solving oriented sessions, say, a workshop or recitation, I write down the problems with enough white space on the notes. Students find it convenient to take notes and it is also easy for me to present when I share my screen or project the notes.

Regarding the course content, I try my best to create “cross-references”, that is, to discuss examples on what the students will encounter later, and center various topics around them. A very typical instance is the integral $\int \frac{dx}{x^p}$ which does not only show up in finding anti-derivatives, but also in improper integrals, and the convergence of series and so on.

In the classroom

Engage the students actively Students ask questions, but I notice it is better to *prompt* questions at key moments. For example, right after I present a definition/theorem, which gives me another chance to reiterate. I also initiate back-and-forth interactions. For instance, a student might ask “how do I know the limits of this triple integral?” I would reply “which variable comes the first?” and after we agree on that, I would proceed to computations. Such “Socratic” interactions are essential to their growth in quantitative reasoning.

Give concrete examples For any new concept introduced, I try to give three examples: a trivial one, a typical one, and a general one. For example, I give 1) the zero space, 2) an Euclidean space, and 3) the space of polynomials, as examples of vector spaces. They really help my students to consolidate the idea of vector spaces. I also show them animations and plots using Mathematica whenever possible; visualization of examples makes

it even more accessible, and my students find them far more intuitive than chalk and blackboard sketches, which is particularly true for multivariable calculus classes.

Present problem-solving skills I give typical example problems, especially those that may show up on tests. I often ask, "Which topics are related to this particular problem?" and "What is in our toolbox?" Such questions let the students have a mindset of realizing what the inputs are, which topics are involved, and which methods are available. It is crucial for them to have a "*big picture*" before heading to formulas. Some students could point out which method or theorem to apply even if they forgot a specific formula.

Give short digressions Talking about applications in other fields or the word-origin serves as a nice interlude and help to build a friendly and relaxing atmosphere. For example, in Multivariable Calculus, I always bring up the relation between various Stokes Theorems and electromagnetism. In Linear Algebra, the prefix *Eigen-* is often said or spelled wrong. I let them know that this is a loanword from German, meaning "self" and a cognate with *own* in English. This sheds light on the origin of this concept and hints the mathematical idea.

Build a more inclusive classroom As a non-native speaker and a foreign student myself, I am overtly aware of the struggle of students with different backgrounds. I never hesitate to pause for clarification; I would also walk to them and listen to them carefully. In short, I believe individualized attention motivates them to participate much more. As for those with special needs, I would reach out to them in person after class to see what I could do to best fit their needs. My diversity statement elaborates these points.

After the lecture

My ***office hours*** are friendly, supportive, and professional. I relate to their difficulties by telling them what I experienced in the past and in my own research. Students feel more welcome if they realize that I also struggle with math! I often specify that they should feel free to do their homework during my office hours, as some students learn more effectively in this way.

I always ***ask for feedback*** from the students in various stages of the semester. I give a rough assessment of their level at the very beginning by sending out a questionnaire, and as the course unfolds, I continue the assessment with their performance in class/quizzes in mind. I like to keep my teaching dynamic, open to suggestions, and adjust the difficulty accordingly.

Experience

Over the years, I have had the opportunity to be both teaching assistant and instructor for most of the standard courses including the calculus series, linear algebra, differential equations, etc. Please see my CV for a detailed description. I am also extremely honored to receive the *TA Teaching Excellence Awards* issued by the Department of Mathematics, Rutgers.

The three main aspects I consider when I design my class are *size*, *level,* and *format*. The size matters a lot in my pedagogy: smaller classes are often more intimate than the larger ones. For instance, I find it effortless to talk with students almost one-by-one in a leisurely way when the class has fewer students (for some recitations and upper-level classes). For a workshop of a larger size, I will try to split them up into different groups in almost every lecture which makes a relaxing atmosphere more achievable. The level usually determines what I assume about my students. What often benefits me is to look at the pre-requisite of the class.

I also ran the *Directed Reading Program* in our department with my fellow graduates. This is an invaluable experience to help design questionnaires and look at responses. The main responsibility is to pair the undergraduate mentees with suitable graduate mentors. It makes me aware of how the students think in a different way than us, which is vital in every aspect of teaching. This truly gives me an opportunity to see what undergraduates are interested in mathematics and how different academic backgrounds of these students might work differently in our program.

I was also a program coordinator of Rutgers Overseas Semester Experience Initiative from 2020 to 2021. This program helped students who could not come to the US to enroll in equivalent classes in local universities. We assisted local faculty members in organizing courses and made sure that they satisfy the requirements of Rutgers University.

Conclusion

What I will teach in the future may be different from what I have done at Rutgers, but I still believe in my philosophy as I treat all students equal in their potential. I will strive to help all my students understand mathematics, overcome difficulties, and become better at quantitative reasoning. This means I will always make every effort to build an effective and inclusive classroom, provide sufficient support, both written and verbal, outside my classroom, and I will use different techniques I mentioned above to achieve this. There is nothing more joyous and rewarding than noting students' progress over time and their genuine interest in the pursuit of knowledge.