

Teaching Statement

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Over the past decade, I have had the privilege of working with students at nearly every stage of their mathematical development, from middle school to advanced undergraduate courses. My path as a teacher began long before graduate school, as a tutor helping high school and college students navigate precalculus, calculus, and related quantitative subjects such as econometrics, physics, and general chemistry. These experiences have shaped the foundation of my teaching philosophy: every student is capable of learning mathematics deeply when given clear structure, supportive feedback, and opportunities to connect new ideas to their own reasoning strengths. My goal as an educator is to create those opportunities in every class I teach.

A key tenet of my teaching philosophy is to support students aiming to master course material by using their individual strengths as thinkers. I have observed that successful students tend to employ a range of learning strategies: some rely primarily on memorization and systematic practice, while others construct flexible understanding through deeper conceptual engagement. As an instructor I aim to ensure that all students have the opportunity to succeed while encouraging students relying on memorization to engage with the material in a new way. To that end, I ensure that all essential formulas, techniques, and examples are presented clearly and systematically, so that students can reproduce key results with confidence. At the same time, I encourage those who seek deeper understanding to interpret these tools conceptually. My goal is for students to construct a framework for approaching unfamiliar problems with an open mind and a trusted toolkit rather than a list of procedures.

As a teaching assistant for a range of undergraduate math courses including calculus, linear algebra, and probability theory, my primary goal has been to help students develop confidence in applying core ideas of the course. My twice-weekly discussion sections are typically designed to prepare students directly for weekly quizzes and exams by reinforcing lecture material through targeted examples and problem-solving practice.

I emphasized clear and concise presentation of course material in discussion sections. Each session began with a short review of key concepts students had been introduced to previously in lecture, followed by worked examples that illustrated how definitions and theorems operate

in concrete settings. Often, I would solve one or two problems before inviting students to collaborate with their neighbors in small groups on the next few problems. I would set a time limit to work on a problem, usually 10-15 minutes, and make it clear that I expected students to present their solutions at the end of that time. I found that giving students time to work alone or in small groups allowed them to ascertain for themselves how well they had actually understood the material—it's a lot easier to follow along passively than it is to generate a solution. Students with courage enough to present their solutions to the class saw an additional benefit from the protégé effect, the observed phenomenon that teaching a concept to someone else improves understanding, recall, and retention of that information for the student-teacher. For my part as a presenter, I not only encouraged, but often required, student engagement. Whenever I lead an example at the board, I invite students to suggest the next step in a solution or to remind me why a particular step is justified. The collaborative but structured format of the discussion section helped maintain focus while keeping students actively engaged in the reasoning process.

Much of the ease and confidence I bring to the classroom comes from more than a decade of experience as an independent tutor. Over the years, I have worked with students ranging from middle school through the undergraduate level, in mathematics courses from precalculus through calculus II and in quantitative disciplines beyond mathematics such as econometrics, physics, and general chemistry. Tutoring has given me hundreds of hours of one-on-one instructional experience, during which I learned to recognize and respond to students' individual learning patterns. The key is to get students talking. If I find a student is shy talking about course material, I'll have them take a break and ask them about their interests. Having students explain their reasoning process as they work through problems allows me to see where their understanding is firm and where it might fall short. Seeing a student's reasoning process allows me to further adjust my instruction dynamically, usually to match their style, but occasionally to challenge them to re-frame a concept in a new way. I am well-practiced at identifying student tendencies and testing different approaches to build their understanding and confidence with course material, and I've always found that students respond to at least one approach.

One student I tutored was an undergraduate at Duke University taking a physics course

required for the pre-med track. She did not view herself as particularly strong in math or physics, and scored poorly on the first midterm exam, in the ‘C’ range. That low score served as a wake-up call for her, and she started working with me once or twice a week for the duration of the spring semester. I was able to identify that she had strong memorization skills, but was weak in calculus and had a tendency to rush into too-challenging examples before she had mastered the basics, leading to frustration. She also struggled to understand her instructor’s notes, which were sloppily handwritten. As I started to help her fill gaps in her understanding, I found that she had exceptional aptitude for applying concepts she had learned in new contexts. It was a pleasure to watch her grow in confidence over the 10 weeks we worked together. I helped direct her focus and build flexible understanding of the key concepts, but what really made the difference was her persistence and work ethic. Her scores on the remaining midterm and final exams were among the best in the class, and she easily earned an ‘A’ in the course despite her poor performance on the first exam.

Student feedback across all of my courses consistently noted that my explanations are clear, well-organized, and helped make difficult material approachable. A number of students commented that discussion section or office hours are the parts of the course where the material really sank in for them. This feedback aligns with what I learned as a tutor: students respond most positively when they feel their instructor understands how they think. My ability to adjust explanations and examples to align with (or to challenge, as the case may be) students’ reasoning patterns has been shaped by years of direct instructional experience and continues to guide how I design and deliver my lessons.

As the instructor of record for future courses I teach, I will continue to emphasize an examples-forward approach. Proof techniques for the most important results must be covered, but ideally each lecture will be motivated by engaging examples and applications of the course material whenever possible.

My confidence in generating such examples is bolstered by my four years of experience as an analytics consultant between my undergraduate and graduate studies. In that role, I implemented statistical models for small business lending and state and local tax applications, unearthing meaningful insights from large datasets for clients who were not always technically trained. This experience deepened my appreciation for how the mathematical

reasoning we teach in the classroom underpins real-world decision-making. It also shaped my conviction that mathematics instruction should prepare students for the analytical and interpretive challenges they will face beyond academia. Because I have applied ideas from calculus, probability, and statistics in professional settings, I bring to the classroom a repertoire of authentic examples that connect abstract theory to concrete applications. This bridge between my industry background and my teaching practice allows me to engage students with problems that are both mathematically rigorous and genuinely relevant to the world they will inhabit after their studies.

For assessing student understanding of course material, I plan to use weekly in-person assessments along with in-person midterm and final exams. In understanding the current reality that freely available AI tools can complete undergraduate homework assignments in math courses at a satisfactory level, homework assignments would not likely contribute to more than 5-10% of students' grades for my course. My primary focus in grading homework would be to give feedback on students' solutions rather than to separate them based on performance. Using low-stakes, formative assessments serves to keep students engaged, provides opportunities for feedback, and gives both instructor and student an honest picture of progress without the stress of high-stakes testing. I would consider using a mastery-based grading system to further reduce student anxiety during the few necessary summative assessments (midterm and final exam) and provide students with multiple opportunities to succeed and demonstrate their understanding.

To encourage student engagement with the course material outside of class and develop their "real-world" skills, I would emphasize assignments with a coding component in MATLAB, Python, or R whenever course material permits. For example, in a recent undergraduate probability course, students were given a project to complete in MATLAB wherein they computed the probabilities of obtaining different 5-card poker hands from a 52-card deck and investigated numerical sources of error and their magnitude. The project helped students become more comfortable using binomial coefficients to describe probabilities while also gaining familiarity with coding in MATLAB. Assignments like this demonstrate how computation can reinforce theoretical learning while equipping students with practical skills that will serve them in research or industry settings. By integrating similar projects, I aim

to give students opportunities to experiment with ideas, test their intuition, and visualize outcomes—activities that build both understanding and enthusiasm for the subject.

Student inquiry oriented learning in mathematics is one framework I am eager to experiment with in a future classroom. In all of my teaching, I strive to foster a classroom atmosphere that is both structured and collaborative. I view inquiry oriented learning approaches as a natural extension of this framework. When students are invited to make conjectures, test them in small groups, and discuss outcomes as a class, they begin to experience mathematics not as a subject that is dry and static, but as one they can question, extend, and make sense of on their own terms. I’ve recently reviewed, for example, the instructional materials developed by the Inquiry Oriented Linear Algebra (IOLA) team, and I’m excited about the potential to develop and implement similar materials in other undergraduate math courses.

The IOLA project included a materials for an inquiry oriented approach for students to conceptualize matrices as linear transformations. Students work to generate, compose, and invert matrices that correspond to geometric transformations specified within the problem context, ‘Italicizing N’. The goal is for students to construct a matrix that yields a desired transformation from a non-italicized to an italicized capital letter ‘N’ on a coordinate plane and to explore linear transformations through this example. This kind of approach fits well with my philosophy of introducing students to new material through examples before building out a conceptual framework together with their input. Exploring inquiry oriented materials like IOLA and IODE (Inquiry Oriented Differential Equations) is one way that I plan to continue to update my approach to classroom instruction as I enter a new role as Instructor of Record.

I believe that the best teachers are open to adjusting their instructional approach based on new evidence. In striving to be the best instructor I can be, I seek to learn continuously from observation and dialogue with experienced colleagues. I consult closely with more senior instructors who have taught similar courses, incorporate their insights, and reflect on what worked and what did not in my own sections.

Overall, my teaching philosophy is straightforward: focus on clear exposition, active problem-solving, and consistent support for the most common successful student learning

strategies I've observed. My role as a TA in math courses at USC has confirmed my belief that well-structured examples and open communication can make even abstract material accessible and rewarding to students. My industry experience reinforces this belief by showing that the reasoning skills students develop in my courses are the same ones they will need in their professional lives. As a future instructor of record, I would design my course materials thoughtfully to encourage productive student use of AI tools and discourage use of AI tools where their use would supplant student reasoning and engagement with the core concepts of the course. I view teaching as a professional practice in its own right, one that demands both rigor and creativity, and I am committed to continuing to refine that practice as I advance in my career.