

TEACHING STATEMENT

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As a teacher I see my primary role as a facilitator of learning. It is my responsibility to create a world within our classroom where students can grow not only in their knowledge of particular mathematical content, but also their critical thinking, writing, and speaking skills. Throughout my time at Rutgers I have had the opportunity to serve as a teaching assistant or an instructor for a wide range of courses from first semester Calculus through Graph Theory. In every course I begin with three overarching goals for the term. The first is for the students to learn the content of the course and to gain an understanding of the fundamental concepts. The second is to enhance their critical thinking and communication skills. Finally, I wish for my students to leave my class with enriched confidence in their ability to tackle new material and an appreciation for the broader field of mathematics. While these three goals may come into play differently depending on the course and student body, they always guide my teaching. Below I will outline four philosophies and practices that are instrumental in attaining my goals.

STUDENT'S MOTIVATION FOR THE COURSE

In order to effectively teach the content of the course, I believe it is important to emphasize to students the role of the particular class and its content in relation to their other studies and future endeavours. Many of our early classes serve as service courses for a multitude of departments, while the upper level courses primarily serve math majors. I always begin my course with a short "homework 0" or diagnostic quiz where, among other questions, I ask students why they are taking this course. This informs what I emphasize in the course, and, in upper level courses, can cause me to adjust the content I cover. To keep the motivation high and combine content learning with an appreciation for mathematics, I include recent mathematical advancements or fun historical facts to emphasize to students that mathematics does not just exist in a textbook, but is rather a constantly evolving story of which they are a part.

CONCEPTUAL UNDERSTANDING

I believe deeper conceptual understanding will stay with students far after their memory of how to execute particular algorithms has faded. Thus, throughout my courses I consistently emphasize the underlying concepts and quick checks one can do to ensure an answer is reasonable if not correct. While particular skills, such as finding a cumulative distribution function, are important, just being able to carry out algorithms is not. Thus I emphasize to students not only the steps to find a c.d.f., but more importantly what it is and how it relates to other concepts in the course. Hence if they computed the c.d.f. and got, for example, a decreasing function they are immediately aware something has gone wrong. If a student writes down a nonsensical answer on a timed exam and knows it is wrong, but does not have time to go back and find the calculation error they are told to quickly write down why it is wrong in order to not lose as many points.

ACTIVE LEARNING

As an instructor it is my constant goal to create an environment where the students are excited to grapple with the material and motivated to work together towards a deeper understanding. One component of getting students to engage with the material is the active group work that I intersperse throughout my lectures. This is a vital component for not only improving students understanding of the content but also their critical thinking and communication skills. I write a few questions on the board and instruct students to work in groups to solve them. This forces students to interact with the material shortly after it is introduced and explore it with their classmates. Students work together explaining, correcting, and sometimes debating with each other until they reach a consensus on the solutions. When the majority of

the class has tackled all of the problems I bring everyone back together and invite a student up to the board to explain each problem. I ensure that no student comes to the board more than a few times throughout the course and try to make it a friendly and inviting experience. By regularly having these sessions (multiple times per week) I have seen students, who at the start of the course were reticent to talk even within their groups, present at the board by the final week. It is my hope that the critical thinking, communication, and confidence that students gain during these sessions will stay with them regardless of their path.

I encourage office hours to be another time of group work. While students may ask me specific questions they are encouraged to come to office hours just to work on the material with their classmates. They may ask me many questions or none at all. This was most successful when I taught Probability in Summer 2018; I would regularly have around 10 students in my office hours (held three times per week in a classroom with large tables) collaborating and helping each other as I rotated around the room. I believe these students left each day with a better understanding of the material, greater confidence in their ability to tackle problems, and increased camaraderie with their classmates.

MATHEMATICAL WRITING

I believe it is important to force students to work on their mathematical writing as part of their regular assignments. To this end I split graded homework assignments into two parts. The first section of the homework is more straightforward, and I require only basic explanations. The second section is more challenging and must be written with complete explanations/proofs in full sentences. The level of the writing should be clear enough that the assignment could be handed to a confused classmate, who knows the background but not how to do a specific problem, and they could read it and understand the answers without asking any additional questions. Part 2 is graded not only on the mathematical correctness, but also the clarity of the writing. I separate the math and writing scores, and for the first few assignments I provide many comments on the writing, but take off few points. I slowly increase the rigor as the term continues. I also do my best to distinguish between clarity of writing and English language skills as there are many students for whom English is not their first, or even second, language. Small grammar mistakes are corrected but points are not deducted. In order to maximize the benefits of homework I always return the graded assignments the class after the assignment was due so students can adjust quickly to my feedback.

Outside of the classroom I was pleased to serve as a mentor in my department's directed reading program. I was paired with an undergraduate student for a semester and we explored a topic of his choosing: game theory. I researched various books and topics for us to work through, and developed a plan for the semester. We met weekly to discuss what he read and the problems he worked through. At the end of the semester he gave a presentation to his fellow students in the program and some of the mentors. I look forward to building on this mentoring experience, whether through guiding students in my classes to explore their own interests or supervising an undergraduate research project. Since my area of research, combinatorics, is such an accessible field I have the ability to choose projects close to my own work.

Whether I am in the classroom, mentoring a student, teaching excited high school students at a math camp, or observing a fellow graduate student in my role as head TA, my teaching experience has been a critical component of my time at Rutgers. As one of the founding members of the Teaching Seminar in our department I have enjoyed the opportunity to discuss a wide range of topics with members of my own department, our counterparts in the Math Education program, and graduate students at other institutions via a MAA webinar. Regardless of the particular forum nothing motivates me more than being able to teach and learn with my students and colleagues.

Remark: Further information is available on my website including all of my student reviews, a sample syllabus and exam from my Introduction to Linear Algebra course, a sample homework from my Probability course, and a sample worksheet from a Probability course at a summer math camp for high school students.