

Teaching Statement

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It is a common misconception among students that mathematics is boring, and it is my job to show them that it is not. I enjoy teaching and take it seriously - I often reflect on what does and does not work in the classroom, and I am constantly working to improve the quality of my teaching.

All teaching evaluations available at: <http://sites.math.rutgers.edu/~jp1535/evaluations>.

Teaching and mentoring experience: From teaching my high school's Calculus I course when the teacher was away to leading review sessions for abstract algebra as an undergraduate, I have enjoyed teaching for as long as I can remember. As a graduate student, I was the TA for seven courses and the primary instructor for two courses. As a postdoc at Rutgers, I have taught nine courses (and will have taught 11 by the end of the 2018-19 academic year). My time at Rutgers has been a great opportunity for me to gain experience teaching a variety of courses, from multivariable calculus, a class mostly comprised of engineering students, to advanced linear algebra, which includes several students that are currently applying to graduate school for math.

In 2013 I had the opportunity to participate in the *Math Circle* program at Washington University in St. Louis (WUSTL), where I led an interactive discussion with middle school students about Conway's game of life. In 2014 I was fortunate to have the chance to mentor undergraduate students through the Advanced Research Training for Undergraduates (ARTU) program also at WUSTL. The eight undergraduates in the program worked on research projects with faculty mentors and met twice a week with me. My job was to give them feedback on their presentations and advice about presenting math, performing mathematics research, and their personal research projects. Additionally, in 2014 I was awarded the *Robert McDowell Teaching Award* from WUSTL.

I enjoy talking to undergraduates about math in many contexts, and many of my past students often come by my office to ask general questions about math or excitedly show me the results of a research project or summer REU. In 2017 I was invited to give a talk about my work aimed at undergraduates with the *Rutgers Undergraduate Mathematics Association lecture series*, and in 2017-18 I was invited by students several times to join the *Rutgers Engineers Assessing Literature (REAL)* program to discuss books and give advice about how to succeed as an undergraduate.

Personal teaching guidelines: I developed the following general teaching guidelines for myself that I acquired from both my experiences as a teacher and as a student.

1. Remember that math is exciting. Math taught right is exciting and interesting, while math taught wrong can be incredibly dry and boring. Students often comment that my excitement about mathematics is contagious, which is exactly my goal. I try to always bring energy into the class, both to make the class a more enjoyable experience and because I believe that math is much easier to learn once it piques a student's interest. When teaching, I explain why we use the techniques we do, or why the trick at hand always works. I am careful not to overwhelm students with a barrage of proofs but a little motivation always increases understanding and interest.

2. Class should be engaging. A professor simply working out problems on the board does not offer much more than what the students could learn by staying at home with their textbooks. I always put a lot of effort into getting the students involved with class, especially during the first few class meetings. I found that if I can engage students early in the course then they tend to remain engaged for the rest of the semester. As a rule of thumb, I try to make sure that I am teaching in

such a way that I could lead the class through an example problem without knowing how to solve the problem myself; that is, the students should be doing most of the substantial steps. This forces the students to achieve a deeper and more thorough understanding of the problem.

3. Empathize with the students. One of the difficulties of teaching is trying to approach the subject from the point of view of the students. When explaining a subject that comes as second nature, it is easy for an instructor to forget what aspects are difficult for someone new to the subject. For this reason I try to keep a close rapport with the class so I can tell if they are getting confused, and they feel comfortable enough to let me know if they are lost.

4. Be organized and clear. I always work hard to make my expectations of the students, and especially the grading procedure, as transparent as possible. I frequently return homework and exams by the following class, along with solutions. This increases the likelihood that the students will immediately check the problems they missed and understand their mistakes. Being extremely clear about class goals and grading techniques not only minimizes complaints from the students, but also allows them to focus on learning the material; the only complicated part of a math course should be the math.

Personal teaching goals: Undergraduate education has many purposes. Following are several of the goals that I keep in mind while teaching my courses and planning my lectures.

1. Teach both technical skills and intuition. Of course, the main goal of a math class is for the students to learn the mathematical techniques. On the other hand, a math class should also instill flexibility in its students allowing them to approach a variety of problems. For this the student needs to understand the intuition and reasoning behind the formulas and techniques, not to mention the fact that understanding the reasoning makes it easier to remember the methods. I often express to my students that a big part of mathematics is being able to move easily between the two worlds of formality and intuition.

2. Reach both accelerated and struggling students. One of the challenges of teaching is keeping the accelerated students engaged while not losing the students who are struggling. To keep the advanced students interested, I often ask open ended questions while presenting new topics, or try to get the class to guess the hypotheses of important theorems (such as the fact that a region has to be connected if they want to apply the mean value theorem). At the same time, I also include plenty of concrete examples in my lecture, showing all the steps, to keep give the students who are struggling something to latch on to.

3. Empower students. Teaching is a chance to help the students develop skills which are useful beyond the scope of the course (for instance, critical thinking and logical reasoning). Also, sometimes all it takes is one good math course to reduce math anxiety for a given student, to teach them that math is not so scary after all, which can lead to many new opportunities for them.

4. Promote math. In some sense teaching a lower division course is a type of outreach. There are always many students in class for which this will be their last formal exposure to pure math; thus, the last chance to help them understand and appreciate the power and beauty of mathematics.

Conclusion: I am excited about math, and I enjoy sharing interesting mathematical ideas with undergraduates through teaching and other mentoring activities. In short, my teaching philosophy is that the best undergraduate math teacher makes class feel like an adventure exploring an unknown land, while explaining concepts clearly (once discovered), and making sure class organization and grading are clear enough that the students can focus on the mathematics.