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Teaching Statement

1. Teaching Philosophy

Good teaching is the result of years of practice and hard work as an educator and as a learner. In the years that I have been a practicing teacher both at UConn and at Yale, I have learned a lot about what it takes to be effective in the classroom. The keys to successful teaching are creating connections and community, making active learning the focus, being innovative with technology in the classroom, and being a reflective practitioner.

Connections and Community. I believe one of the most positive aspects of my teaching is my ability to make personal connections with students. Both before and after class, in office hours, or just in the hallway, I enjoy engaging with students and getting to know them both mathematically and on a personal level. Forming a positive relationship, and being a positive force in a student's career, especially when it comes to mathematics, is very rewarding.

This is one aspect of teaching that I thought would be particularly difficult when moving to remote instruction. With everything online, students frequently get to class exactly on time, and we unfortunately miss the small interactions that happen before the lesson begins. To mitigate this, I offered a survey at the beginning of the semester which asked students about their background, including interests of theirs, their most recent math course, and their comfort level on key prerequisite topics. I then scheduled individual meetings with all my students, particularly focusing on those who indicated they were uncomfortable with one or more topics. This opened up communication with my students for the rest of the semester. They know that they can engage with me whenever and about whatever they want to, and they often have.

Along with individual connections, I try to make our classroom a community. Coming to class early and leaving late gives great opportunities to get students to engage with each other. Because I make personal connections with each student, they feel comfortable speaking up in class, even to vet answers they are unsure about. Our time in class is a discussion. I often try to emphasize the importance of community in the classroom by asking students to group up and discuss different approaches to a complex problem. Designing problems that have many different approaches forces communication and shows the importance of having diverse thinkers in a group.

Our community persists outside of class, too. At Yale, I have held a weekly "class lunch" with students in the dining halls, where math speak is forbidden, to build relationships with them. I also encourage students to engage with each other asynchronously through Piazza, and online message board that allows students to ask questions and collaborate on answers. The key feature is that they can do so anonymously. The forum has become absolutely essential for those students who are less comfortable asking questions publicly or in class, and is perfect for today's online generation.

Active learning. A successful classroom is one in which students are actively involved in their own learning. In addition to working in groups or pairs, I encourage frequent student participation using polls, "spot the mistake" questions, and matching games. My favorite activity is to present mistakes and ask them to discuss in groups where the error is and how to fix it. More importantly, I ask them to talk about how our *answer* informs us we may have made a mistake. This is usually a simple mistake, like using the Fundamental Theorem of Calculus on an improper integral:

$$\int_{-1}^{1} \frac{1}{x^2} dx = -\frac{1}{x} \Big]_{-1}^{1} = -2.$$

I give this example before I introduce improper integrals. Students who have seen the topic are quick to spot the mistake in my work, but often don't see that we can be alerted to it by my answer: getting a negative number from evaluating the integral of a positive function. Teaching my students to make "reality checks" and ask "does my answer make sense?" is vastly more important than teaching them how to solve problems by pattern matching.

With remote instruction, a primary concern of mine has been maintaining an active classroom over Zoom. I found particular success by using a combination of breakout rooms and Google Jamboard, a live shareable whiteboard that the whole class can annotate. Before class, I prepared several slideshows for the students to work through. During each breakout session, the entire class worked the same problem, copied onto different pages of the same slideshow, with each breakout room working on a different page. If they got stuck, students were able to swipe back and forth to see what their classmates were doing, simulating the experience of the whole class working on a large blackboard. I watched the slideshow live to see students work and know which breakout rooms to jump into to help students and when to bring them back to the main room if almost all students were finished or stuck. Students enjoyed this even more than I anticipated. I received overwhelmingly positive feedback on the use of Jamboard and breakout rooms, so much so that over the course of the semester I began scaffolding questions we would have formerly done in the main session in order to let them tackle those in breakout sessions. When we return to in-person instruction, I plan to hold a portion of my office hours online, where I will use Jamboard. Though the utility won't make sense in the classroom, I have learned a lot about active learning, and how to design problems in such a way that most in-class learning can be done in groups.

Integrating technology. One of my favorite parts about teaching is that it is always changing. An effective educator has to be willing to evolve with the technology available. In class, I teach from my tablet by projecting slides to the board, and annotating them digitally. The best part about this teaching style is that it allows me to make use of technology live and seamlessly in the classroom. This experience has also helped ease the transition to remote instruction.

I often use graphing utilities, like GeoGebra, to give my students a geometric intuition for what we are learning. This is often something as simple as making a tangent/secant slider to show the limit definition of the tangent line. However, where this utility has really shined is in using it to graph in three dimensions. I project the graphs from my tablet, and zoom in on, rotate, and animate them in real time. This is an incredibly effective way of presenting material in a class like linear algebra, where I am able to show students the geometry of solutions to systems of equations. Using this in class has become absolutely essential to my teaching. I show the students how they can use GeoGebra, and save class examples for my students to play with at home. GeoGebra even has an "augmented reality" feature that allows you to put a surface in the room and walk around and inside it. My students download this feature to their phones, and use it in class in groups.

Being a reflective practitioner. Teaching is something I am highly passionate about. I spend time outside of class thinking of new ways to provide my students with the best possible learning experience, and I often seek out the advice of more experienced colleagues to share and improve my pedagogy. In addition to reflecting on my own teaching, I try to recall my experiences as a learner. I remember what it was like to be a student seeing things for the first time. I try to show my students that math belongs to everyone. I humanize myself by warning my students about common misconceptions, and I am open about my own past challenges.

Shaped by my past instruction, I recognize the responsibility to provide students with a positive mathematical experience. This is especially important in service courses, which are often terminal courses, where students may have developed a negative attitude toward mathematics. I remember the teachers who were successful in fostering my interest in the material they taught. I incorporate

my favorite memories into my own teaching. In my experience, successful teachers made learning enjoyable by doing special examples and applications that were relevant and stimulating. They told stories about their own experiences with mathematics. They showed a genuine love for the craft. In the same spirit, I try to impart a love for mathematics in my students by sharing my joy for teaching, the way my favorite teachers did for me.

2. Teaching Related Service

I have a passion for sharing my teaching and supporting other instructors. That is why I joined the graduate student peer mentor program in my department at UConn in the fall of 2014. The program pairs incoming first year graduate students with an experienced TA in the department to provide teaching support and resources. Unfortunately, when I arrived at UConn, the peer mentor program was nearly nonexistent, with no interested graduate student to coordinate it. As a result many in my cohort had a challenging adjustment to graduate life. Determined to fix this, in the summer of 2015, I took over the program as TA Network Coordinator, and held the position for the rest of my graduate career. Moreover, I was able to secure department funding to host game and pizza nights to share our teaching and help develop a support network for each student.

At Yale, I have enjoyed continuing this work by mentoring new teaching faculty, postdocs, and graduate students. I attend classes a few times throughout the semester and provide teaching feedback. I have also been given the responsibility of hiring and training undergraduate learning assistants and tutors, and was asked to coordinate a course this semester with a team of four undergraduate learning assistants.

3. Advising Experience

I am devoted to offering undergraduate support, especially to students who may be unsure about the direction of their mathematical career. At Yale, I have had the pleasure of being a placement advisor for calculus advising in the fall semesters of 2019 and 2020. After being assigned a course by the placement exam, incoming freshmen come to calculus advising to learn more about their placement, and discuss whether moving up or down a level would be appropriate. As a placement advisor, I spoke with students about their experience and trajectory, explained their options, and made the final decision in their placement. A common concern of students was falling behind in the calculus sequence due to low placement. I was able to share my own experiences as a freshman math major starting in differential calculus to comfort these students.

At the University of Connecticut, I participated in the Directed Reading Program, where I was able to connect with an undergraduate math major and read through a graduate-level text in number theory. The student and I met once a week to discuss readings and problems, and work through these together on the board. Typically, the program ends with a presentation, but when the student decided to apply for graduate school, our focus shifted to GREs and applications. This became another opportunity to offer support by sharing my own mathematical journey.

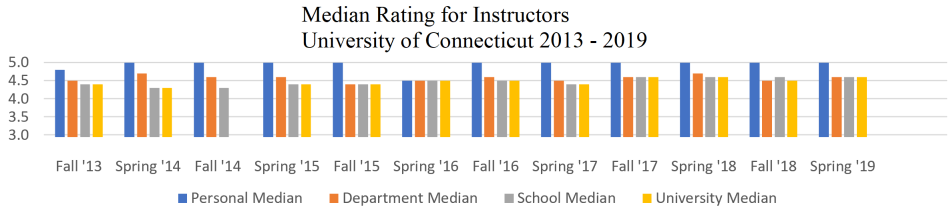
As a graduate student, I also participated twice as a graduate student mentor in the Connecticut School of Number Theory summer school at UConn. This summer school is aimed at undergraduates with an interest in doing research, some who may even be thinking of a graduate career. Students spend a week in mini-courses and collaborate on challenging problem sets. I had the responsibility of mentoring students throughout the program and overseeing problem sessions.

Though I have not had any formal involvement in academic advising, I believe my related experience in providing support to undergraduates will translate well to advising a diverse student body. Because I love speaking with and working with a undergraduates, it is a responsibility that I truly look forward to becoming involved in at whatever institution I find myself next.

4. Teaching Recognition

For a full set of course evaluations from the most recent semester in which I was teaching, please visit my website at https://mathrjsm.com/teachingportfolio/f2020evals.pdf.

At UConn, in Spring 2019 I was awarded the DeLuca Outstanding Teaching Assistant Award. I was also nominated by my department for the 2017 University Outstanding Graduate Teaching Award, from the Center for Excellence in Teaching and Learning. For six semesters, I was one of a few math graduate students allowed to be the instructor of record for their own courses. Each semester, students rated their experience out of 5 in thirteen categories about my teaching, and provide comments. Categories included stimulation of interest, investment in student learning, accessibility, feedback, treating students with respect, and promotion of learning. Students are encouraged to provide written comments. My median scores across all categories for each semester are below along with department, school, and university medians.



As a reflective practitioner, I was concerned when Yale decided not to have students evaluate their instructors during the recent move to remote teaching. Seeking my own feedback, throughout the spring and fall semesters of 2020, I created several Qualtrics surveys asking students to comment and rate their experience out of 5 in the same thirteen categories above. I received a median scores of 4 and 5 across all categories on each survey. Of particular note, the most recent survey indicated a total of 71% of students strongly agreed that I show genuine interest in helping students learn, 67% strongly agreed I am accessible, and 83% strongly agreed that I treat students with respect.

Comments from Student Surveys.

- "Strengths would be passion for teaching, understandable way of explaining concepts to students, making himself available for help at any time. But most of all I would say the personal connection that he strives to have with each student (even when this year was virtual!) An improvement would be going a little slower in lessons, but this might be specic to my learning style. " (Yale, F20)
- "You put so much effort into the class and the instruction, from the modules to the office hours in grading that you made the class as easy as it possibly could. I really appreciate how kind and hard-working you are, and I'll really miss you next semester!" (Yale, F20)
- "I really appreciated that you were understanding of the struggles of transitioning from in-person to online classes and made that shift a lot less stressful than it could have been." (Yale, S20)
- "He was a phenomenal instructor one-on-one in office hours and really cared about his students, taking the time to get to know us and checking in on us when we seemed to be going through a rough time and I really appreciated that about Bobby." (Yale, F19)
- "Bobby is very enthusiastic. He seems to love math, and I appreciate that. He tried to give us an intuition and understanding of what the numbers are doing, often through GeoGebra." (UConn, S19)
- "By just being the absolutely delightful person that you are, the students feel comfortable enough to approach you and to want to learn more about the subject material. You keep the class fun, exciting, and engaging with your wit, humor, and personability. You're so passionate about this subject." (Uconn, F18)
- "Bobby is very positive and always upbeat and in a good mood, so he makes it interesting to be in class and makes you pay attention." (Fall '17)
- "Some people have an innate knack for teaching, and Bobby has this gift. His lectures are always easy to follow, things built from step to the next logical step, and his method of using a Surface tablet and real handwriting made the information easy to keep organized in my notes. Fantastic instructor." (UConn, S16)