

Robert J.S. McDonald – Teaching Statement

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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 that a successful educator is one that is adaptable. The keys to a successful learning environment 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 mathematical 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 try to emphasize the importance of having a diverse community in the classroom by asking students to discuss different approaches to a complex problem in groups. Purposefully designing problems to have many different approaches shows them the importance of having diverse thinkers in a group.

Our community persists outside of class, too. At Yale, I have also held a “class lunch” with students weekly in the dining halls to help build these relationships. I also encourage students to engage asynchronously through the use of an online forum called Piazza. The utility allows students to ask and answer each others' questions. 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 where the error is and how to fix it. More importantly, I ask them to think 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 an improper integral 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.

Innovation and adaptability. 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. I often seek out the advice of more experienced educators. I try to remember what it was like to be a student learning things for the first time. I warn my students about common misconceptions, and I am open about my own past challenges with the material.

I love teaching because I love learning. 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 this spirit, I run across the room emulating Achilles and the tortoise to teach about geometric series and make myself dizzy spinning in circles to teach polar coordinates. 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.

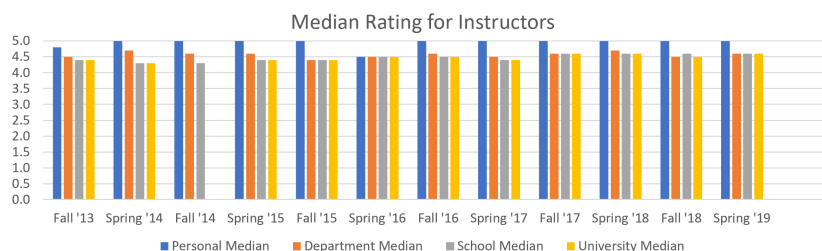
1. TEACHING RECOGNITION

At Yale, I have been recognized for my teaching ability by being given the responsibility of mentoring several graduate students and post docs in their teaching. I regularly sit in on my assigned new teacher's class, and meet outside of class to discuss teaching strategies. This program is very similar to the Peer Mentoring program I directed at UConn for four years, which helped first-year graduates find teaching materials and peer support. At Yale, 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.

The transition from my graduate career to post-graduate at Yale was not without its challenges. At a new institution, I tried to change too many things in my teaching, and as a result the Fall 2019 semester became a challenging one. Despite this, I still received positive feedback in my student evaluations, and scored above my department median. I learned what worked and what didn't, and had a much easier spring semester. Comments from this and other semesters are below.

Because Yale did not ask for student evaluations last semester, at the end of the Spring 2020 and Fall 2020 semesters, I created Qualtrics surveys asking students to rate their experience out of 5 for 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. I received a median score of 5 in all categories both semesters. Of particular note, the most recent survey indicated a total of 71% of students polled strongly agreed that I showed genuine interest in helping students learn, 67% strongly agreed that I was accessible, and 83% strongly agreed that I treat all students with respect.

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 few graduate students allowed to be the instructor of record for my own courses. Each semester, students rate their experience out of 5 in the thirteen categories I used in the Qualtrics survey above. Students are encouraged to provide written comments. My median score across all categories for each semester are included below along with department, school, and university medians.



Comments from Student Surveys

- “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 also love how encouraging you are for people to speak out and participate in class, and how kind you are even if they get the wrong answer.” (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)
- “No weaknesses, The class was very well organized and presented.” (Yale, F19)
- “Very organized and provided each student with the resources to do well.” (Yale, F19)
- “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)

2. COURSES TAUGHT

I have spent most of my time teaching calculus courses for students majoring in science or economics. The full list of courses I have taught follows.

Yale University

Lecturer

New Haven, CT

Fall 2019 – Present

Fall 2020: Introduction to Functions and Calculus I (Coordinator)

Summer 2020: Approximation and Prediction 1

Spring 2020: Introduction to Functions and Calculus II

Spring 2020: Introduction to Functions of Several Variables

Fall 2019: Multivariable Calculus

Fall 2019: Integral Calculus

University of Connecticut

Instructor & Teaching Assistant

Storrs, CT

2013 – Present

Instructor

Fall 2018: Applied Linear Algebra

Spring 2018: Calc for Business and Econ

Fall 2017: Calc for Business and Econ

Fall 2016: Calc for Business and Econ

Spring 2016: Calc for Business and Econ

Summer 2015: BRIDGE Calculus

Teaching Assistant

Summer 2018: CTNT Summer School GA

Spring 2017: Calculus II

Summer 2016: Calc for Business and Econ

Summer 2016: CTNT Summer School GA

Fall 2015: Calculus II

Spring 2015: Calculus I

Fall 2014: Calculus II

Spring 2014: Calculus II

Fall 2013: Calculus II

3. TEACHING PREFERENCES

Most of my teaching has been 100-level service courses. I have taught every level of calculus and coordinated a year-long differential calculus course, *Introduction to Functions and Calculus*. This course is designed to provide extra support for students who struggle with precalculus. I have also taught two summer bridge courses, both geared toward students with a weaker mathematical background. I find great reward in teaching students to whom math does not come easily, so I would love to continue to teach such courses, if they are offered.

I have taught a 200-level course, *Applied Linear Algebra*. Though the students are stronger, this course is very definition and theorem heavy, so they still need the support. I found that I really enjoyed teaching and offering that support to these students as well. I have not taught anything above a 200-level course, but I would love to teach *Abstract Algebra* and *Number Theory*, and I think it would be incredibly interesting to design a course on cryptography.

The class I enjoyed teaching the most was *Introduction to Functions of Several Variables*, in Spring 2020, a terminal course primarily for business and economics majors. For the first half of the semester, we covered linear algebra up to least squares, and in the second half we discussed multivariable differential calculus. Seeing the applications of multivariable mathematics to economics was very interesting. In fact, the majority of the courses I have taught have been geared toward economics majors, so this is a place I feel very comfortable.