Robert J.S. McDonald – Teaching Statement

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1. Philosophy

It is my goal to give my students the best possible educational experience. It is for this reason that I am constantly trying to improve my teaching. 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, and in my one-and-a-half years as an instructor at Yale University, I have learned that a successful educator is one that is adaptable and innovative. I have come to believe that the keys to a successful learning environment are creating connections with students, maintaining an inclusive community, making active learning the focus of time spent in class, and being a reflective practitioner.

Connections with students. I believe one of the most positive aspects of my teaching is my ability to make personal connections with students. Above all, it is the thing I love most about teaching. 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. I have maintained relationships with many former students, received cards for the holidays from some, and even still get coffee regularly with a few. Being a positive force in a students 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 one-on-one meetings with all my students, particularly focusing on those who indicated they were uncomfortable with one or more topics. In the end, I filled two days with ten or fifteen minute individual meetings with each of my students, which has opened up communication for the rest of the semester. All of my students know that they can engage with me whenever and about whatever they want to, and they often have.

An inclusive and diverse community. I care deeply about making sure that my students feel included and represented in my class. On the first day of class, while discussing course policies, I ask students to get in groups and reflect on questions such as: Whose input matters in this community? How can we make others feel safe and listened to? How should we validate ideas? Why is diversity important in problem solving? I ask the students to collect their ideas, and post what they come up with on our course website. This is an important opportunity for an open discussion about inclusivity and ensures every voice is heard.

Every semester, I offer a project in which I ask the students to find and research a minority mathematician. I get papers ranging from Katherine Johnson, one of the first African-American women to work as a NASA scientist, to Euphemia Lofton Haynes, the first African American woman to earn a Ph.D. in 1925. Asking them to reflect on the accomplishments of under-represented individuals shows them the importance of having a diverse team in problem solving. I also try to demonstrate this 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.

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 very common mistakes to students and ask them to think about where the error is and how to fix it. More importantly, I ask them 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. Instead, I get a lot of "because that's not how we solve an integral that looks like this." I believe 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 was 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 took to this even more than I anticipated. I received overwhelmingly positive feedback from students 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, too.

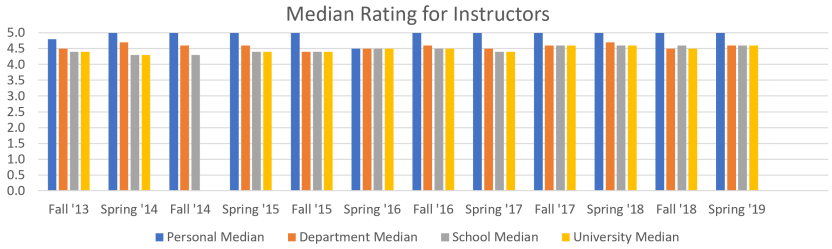
Being a reflective practitioner. Teaching is something I am highly passionate about. I spend extra time outside of the classroom thinking of new ways to provide my students with the best possible learning experience. To this end, I often seek out the advice of more experienced educators. I try to remember what it was like to be a student learning things for the first time. This is what drives me to be a better teacher. I warn my students about common misconceptions, and humanize myself by being open about my own 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.

2. Teaching Recognition

At UConn, I was frequently recognized by my department for my teaching ability. 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. I was also tasked with being the director of the Peer Mentoring Program from Fall 2015 to Spring 2019. The program helped first-year graduates get teaching materials and support, to improve their experience and that of their students.

Each semester, the University of Connecticut asks students to complete an evaluation of teaching survey. Students are asked to rate their experience out of 5 for thirteen categories about the instructor's teaching. Categories include stimulation of interest, investment in student learning, accessibility, feedback, treating students with respect, and promotion of learning. Students are also encouraged to provide written comments. My median scores in all categories for each semester are included below along with department, school, and university medians. In Spring 2016, 2018, and 2019, and Fall 2016 and 2017, I was the instructor of record.



As an instructor at Yale, I have also received praise for my teaching ability. Due to the move to online instruction, Yale chose not to ask students to rate instructor experience in Spring 2020, only to provide comments. Because of this, in a series of Qualtics surveys at the end of Spring 2020, and at the middle and end of the Fall 2020 semester, when the synchronous portion of my course had ended, I asked students to rate and comment on the same thirteen categories outlined above. Again, 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.

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)
- "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)
- "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)

3. Courses Taught

I have spent most of my time teaching calculus courses for physics and biology majors, and for business and economics majors. The full

Yale University **New Haven, CT**
Lecturer Fall 2019 – Present
Fall 2019: Integral Calculus
Fall 2019: Multivariable Calculus
Spring 2020: Introduction to Functions of Several Variables
Spring 2020: Introduction to Functions and Calculus II
Summer 2020: Approximation and Prediction 1
Fall 2020: Introduction to Functions and Calculus I (Coordinator)

University of Connecticut **Storrs, CT**
Instructor & Teaching Assistant 2013 – Present

Instructor
Summer 2015: BRIDGE Calculus
Spring 2016: Calculus for Business
Fall 2016: Calculus for Business
Fall 2017: Calculus for Business
Spring 2018: Calculus for Business
Fall 2018: Applied Linear Algebra

Teaching Assistant
Fall 2013: Calculus II
Spring 2014: Calculus II
Fall 2014: Calculus II
Spring 2015: Calculus I
Fall 2015: Calculus II
Summer 2016: CTNT Summer School GA
Summer 2016: Calculus for Business
Spring 2017: Calculus II
Summer 2018: CTNT Summer School GA

4. Teaching Preferences

Most of my career has been spent teaching 100-level service courses. I have taught every level of calculus, and even 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 courses such as these.

I have also taught a 200-level course, *Applied Linear Algebra*, where I found that I really enjoy teaching more advanced students as well. This course was an introduction to more conceptual mathematics, and was really fun to teach. I have not taught anything above a 200-level course, but at some point in my career 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 about linear algebra, as far as 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 as well.