

Teaching Portfolio

Michael Ruddy

Contents

1	Introduction	1
2	Experience	1
3	Awards	2
4	Evaluations	2
5	Professional Development and Service	3
5.1	Professional Development	3
5.2	Service	4
6	Sample In-class assignment	5

1 Introduction

The underlying framework for my teaching philosophy is the belief that exploration and failure are inherent to the learning process, and even more so in the context of a mathematics classroom. Towards this end, I strive to create a respectful and inclusive classroom environment where each student feels comfortable having discussions and making mistakes. This portfolio provides evidence of my work towards being an effective teacher of undergraduate mathematics.

2 Experience

I have been the instructor of record for the following courses:

- Calculus II Honors Class Size: 14
- Calculus II Class Size: 50
- Foundations of Euclidean Geometry Class Size: 34
- Calculus for Life and Management Sciences A Class Size: 61
- Calculus for Life and Management Sciences B Class Size: 137
- Calculus I Class Size: 65

In all of these courses I have had full instructor responsibilities. This includes designing syllabi, planning and delivering lectures, designing and implementing in-class activities, and writing exams. In the larger courses I also managed other teaching assistants in various roles such as graders and recitation leaders. In Foundations of Euclidean Geometry, I additionally designed and graded homework/quizzes.

3 Awards

Maltbie Award

May 2018

This award is given to one or two math graduate students each year, and the winner also receives a monetary prize. The winner is chosen based on observations by multiple faculty members.

Recognition for Excellence in Classroom Teaching

March 2016

This award is given by the Graduate Student Association to teaching assistants across all departments. The winners are chosen based on faculty and student evaluations.

4 Evaluations

After each course, students have the option of filling out an anonymous survey evaluating the course and the instructor. This consists of a multiple choice section, where students are asked to rate whether they agree or disagree with a statement on a scale from 1 (Strongly Disagree) to 5 (Strongly Agree), and a short answer section. Below is my average score for one of the statements compared with the departmental mean across all instructors in the Mathematics Department at North Carolina State University. My scores are listed in bold, and the departmental scores are listed in regular font.

“Overall, the instructor was an effective teacher.”

Semester	Spr. 18	Fall 17	Spr. 17	Fall 16	Spr. 16	Fall 15
Avg. Score	4.8	4.7	4.5	4.5	4.8	4.6
Dept. Mean	4.3	4.1	4.2	4.1	4.1	4.0

Below are a few excerpts from the short answer portion of the student evaluations:

- “The way he taught class was super effective, and he consistently told us it was ok to mess up and actually supported us when we did make mistakes because he viewed it as a learning opportunity. I really appreciate his teaching style, how passionate it was, and how much he cared about all of us.” - Calculus II Honors (*Spring 2018*).
- “His method of explaining some things to students and having them struggle for others worked extremely well.” - Calculus II Honors (*Spring 2018*)
- “I think he did a great job at teaching through the text and presenting things that were important for understanding. His in class notes and proofs were always easy to understand he was able to answer questions in class...I think Mr Ruddy made a lot of helpful improvements to the class and his teaching in the first month of the class in response to some suggestions from students. This solved my issues that I was having in the first few weeks.” - Foundations of Euclidean Geometry (*Spring 2017*)
- “Professor Ruddy is a very good math professor and does an excellent job at explaining concepts in math as well as illustrating examples. He and his TA’s are also very accommodating. I suffered a small accident mid-way through the semester that resulted

in a broken leg and multiple surgeries, Ruddy and his TA's did everything they could to make sure I was comfortable in the class and had a seat I could get to easily." - Calculus for Life Management Sciences B (*Spring 2016*)

- "I thought I was bad at Calculus, but after having Mr. Ruddy as a teacher, I feel like I really have a grasp on it. Thanks!" - Calculus for Life Management Sciences B (*Spring 2016*)
- "He was a great teacher plus made the class a fun and welcoming learning environment." - Calculus I (*Fall 2015*)

Each semester graduate instructors are also assigned a faculty mentor who observes the graduate student at least once that semester. Below is an excerpt from one of these observations:

- "In the fall of 2017, I was the faculty mentor for Mr. Michael Ruddy and I have also attended a lecture given by him in October, 2017. Michael clearly stands out among many teaching assistants that I have mentored and observed in the past. He had a genuine enthusiasm to make his students grasp the mathematical concepts better and to lead them to a deeper understanding. He even came up with a bold and innovative way of improving traditional ways of teaching mathematics by engaging his students in direct yet effective interaction and discussion among themselves during the lecture. His strength in teaching was obvious to me, not only in his creative use of his lecture hours but also in his kind and patient treatment of his students. " - Dr. Min Kang, Calculus II Honors (*Fall 2018*).

5 Professional Development and Service

It is important to me as an educator to continually seek professional development programs, collaborate with other instructors, and communicate my teaching methods. This has led me to participate in programs at various institutions and to help organize teaching-focused seminars and resources at North Carolina State University.

5.1 Professional Development

Geometry for Secondary Teachers Conference

University of Michigan

June 2018

This conference was centered around addressing issues in and developing a community around "GeT" university courses. This term is short for Geometry for Teachers and refers to the various geometry courses many secondary mathematics education majors are required to take across the country. The organizers presented the attendees with some of the problems they discovered surveying university instructors and secondary mathematics teachers. We then brainstormed to develop project ideas to improve "GeT" courses as a whole. I presented a poster on how I taught NCSU's "GeT" course, Foundations of Euclidean Geometry, and learned interesting teaching methods being used by other "GeT" course instructors.

The Geometry of Redistricting Workshop, Educator Track

Duke University

November 2017

This workshop consisted of two days of talks open to the public and then a two day workshop for educators. The talks introduced the public to new applications of geometry and computing to U.S. redistricting as well as the judicial and legislative barriers to implementation. The workshop led educators through a few mathematics and statistics lessons centered around redistricting that could be adapted to various levels.

Inquiry Based Learning Workshop

California Polytechnic State University, San Luis Obispo

June 2017

This was a week-long workshop where the participants were exposed to research on Inquiry-Based Learning (IBL) and various inquiry-based teaching styles. We collaborated on how to incorporate more IBL into our next semester's course. After the workshop the participants took part in a year-long listserv where we asked for and gave advice about putting IBL methods into practice.

Preparing the Professoriate

North Carolina State University

Fall 2016 - Spring 2017

Preparing the Professoriate (PTP) is a selective program that admits around 30 graduate students each year from across all departments. Through PTP we were given the opportunity to observe an upper-division course one semester and teach it the next; the course I chose was Foundations of Euclidean Geometry. Additionally we participated once a month in professional development workshops and completed a project related to our course. My project consisted of rewriting the lab assignments to instead use free software, like Geogebra, so that future teachers might use this software in their classroom.

5.2 Service

Geometry from Transformations Project

Remote

Fall 2019-Spring 2020

The participants in the Geometry for Secondary Teachers Conference were asked to take part in the projects for improving Geometry for Teachers courses across institutions. The idea for this project came from conversations between geometry educators in the year that followed the conference. The goal of this project is to formulate an axiomatic system and curriculum to teach a university geometry course from a transformations perspective that balances accessibility and rigor. Project participants meet monthly over video and participate weekly in a slack chat.

Task Repository Project

Remote

October 2018-Spring 2019

The participants in the Geometry for Secondary Teachers Conference were asked to take part in the projects for improving Geometry for Teachers courses across institutions. The project idea originated at this conference and consists of collecting, sourcing, editing, annotating,

and indexing tasks that could be used to teach particular items of geometry for teachers. Project participants meet monthly over video and participate weekly in a slack chat.

Graduate Instructor Support & Tools (GIST)

North Carolina State University

Fall 2018-Spring 2019

The GIST committee members maintain the Teaching Assistant wiki, which is a repository of teaching materials uploaded by graduate instructors. This includes pruning old material, organizing new material, and creating FAQs. GIST also organizes workshops and panels centered around teaching methods and advice for graduate instructors.

Graduate Student Course Development Seminar (GSCDS)

North Carolina State University

Summer 2018

The GSCDS was a seminar that ran several workshops during summer 2018. The focus of these workshops was for participants to brainstorm on different pedagogical topics, while thinking about the course they'd be teaching in the fall. I led two of these workshops titled "Assignment Design" and "Utilizing Groupwork." These workshops were recognized at the university level; participants in these workshops received credit from the Graduate School at NC State towards a Teaching and Communication Certificate.

6 Sample In-class assignment

Below I have included a sample in-class assignment that I used in both of my calculus II courses (Fall 2017, Spring 2018). I will also briefly describe the set-up and rationale for the assignments.

Incentivization

In-class assignments and participation made up 10 percent of the students' grades in both courses. Assignments were not graded for accuracy, but for completion. I chose not to grade the assignments for accuracy so that students would feel free to use the assignments to learn and understand the material. The completion grade served to motivate students to complete the assignments and to come to class each day; they had no prior knowledge of which days we would work on these assignments.

Implementation

I always gave students time to work on the assignment by themselves, with the option of calling me over or quietly conversing with their neighbor. The time spent alone with the assignment allowed all students to contribute when it was time to discuss the problems in groups. About 10-15 minutes after handing out the assignment, I asked the students to get into groups of four to discuss what they had done and to keep working, occasionally randomizing the groups. During this time I would answer questions if students had them and engage with groups that seemed stuck or quiet. Additionally I was on the look out for students left out of group discussions; in these cases I would intervene and directly interact with the group and the student.

Feedback

After students had a sufficient amount of time to work on the assignment, we would go over the questions as a class. In my larger section I called on students randomly to give their answer, allowing them to pass if they felt uncomfortable or didn't know. Towards the end of the semester I experimented with calling on groups, where the group elected one person to speak for them. In my smaller section I asked my students to take turns presenting the problems at the board.

Assignment Fourteen

I used this assignment to start the chapter on sequences and series. This has been my favorite assignment as students really seemed to enjoy guessing the patterns in the sequences. Students often discover that they can use both recursive formulas and functions of n for a_n . For part (e) my calculus II honors class found both a recursive and closed form for the sequence. Both of which were correct, but gave different sequences!

Assignment Fourteen MA241 Fall 2017

A **sequence** is a function whose domain is the set of positive integers and is denoted

$$\{a_n\} = \{a_1, a_2, a_3, \dots\}.$$

(a) $\{1, 2, 3, 4, \dots\}$

(b) $\{1, -\frac{1}{2}, \frac{1}{3}, -\frac{1}{4}, \dots\}$

(c) $\{\frac{1}{5}, \frac{2}{8}, \frac{3}{11}, \dots\}$

(d) $\{0, 1, \sqrt{2}, \sqrt{3}, \dots\}$

(e) $\{-\frac{1}{4}, \frac{4}{9}, -\frac{9}{16}, \dots\}$

(f) $\{1, 1, 2, 3, 5, 8, \dots\}$

1. Guess the 7th term in each of the above sequences. In other words, what is a_7 ?
2. Write a formula for a_n for each sequence, where a_n gives the n th term of the sequence.
3. For each sequence, does the sequence approach some value? How can we express this value in calculus terminology?
4. For each of the following questions, explain your reasoning. Draw pictures!
 - (a) Suppose $\lim_{x \rightarrow \infty} f(x) = L$. If $a_n = f(n)$, what is $\lim_{n \rightarrow \infty} a_n$?
 - (b) Suppose $\lim_{n \rightarrow \infty} b_n = \lim_{n \rightarrow \infty} c_n$. If $b_n \leq a_n \leq c_n$ for all n , what is $\lim_{n \rightarrow \infty} a_n$?
5. For what values of r does $\{a_n\}$ converge if $a_n = r^n$?
6. We say that a_n is bounded if there exists M such that $|a_n| < M$ for all n . Does a_n bounded imply a_n must converge?
7. How can I write $\sum_{i=1}^{\infty} x_i$ as the limit of a sequence?