

# Teaching Statement

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I have had the pleasure of teaching and mentoring hundreds of students through various avenues, providing the guidance and compassion necessary to help them appreciate mathematics as much as we do. While we are instructors by title, we are also implicitly our students' mentor and role-model, and it is our quintessential responsibility to strike a balance between instruction, guidance and autonomy for them. This idea is at the core of my philosophy on teaching, and is strengthened by my experience as the instructor of record for various styles of classes (small, large, flipped, etc.), as well as my mentorship of various undergraduate reading and research projects.

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## 1. TEACHING EXPERIENCE

I have experience teaching many types of classes, as well as mentoring students. I have taught Calculus as a small flipped class with 10 – 17 students, as well as a large lecture class with 132 – 188 students. I have taught an upper-level elementary number theory course as a traditional lecture, as well as a graduate level topics course on elliptic curves. Finally, I have been a mentor for undergraduate reading and research projects for more than 6 years: up to and including Spring 2025, I have mentored over 10 semesters and have had over 7 students, including a summer research project which has since been published in a reputable journal, and another project which will be submitted soon. All of my teaching experience, which includes **course materials** and **teaching evaluations**, can be found here.

While at the University of Georgia (UGA), I underwent **teacher training** for both Pre-calculus and Calculus 1. I enrolled in UGA courses focused on effective pedagogy, which included presenting research papers on mathematics education, writing daily classroom reflections, addressing common student pitfalls in Precalculus and Calculus 1, and sitting in on senior instructors' classes. Continuously reflecting on my teaching, as well as observing other instructors' teaching, has helped me improve the quality of my classes significantly.

For my Calculus classes, I have used several **learning platforms** to help facilitate student learning. At UGA, I have used ALEKS and WebAssign for my courses, which are online homework and learning systems. For my large-scale Calculus classes at the Ohio State University (OSU), I have used Ximera, an open-source online textbook and homework platform. These online homework systems have the added benefit of letting students retry homework problems several times with slight differences in the problem statement. This encourages them to make mistakes while practicing the material, ultimately helping them understand the material better.

I have taught Precalculus and Calculus 1 in a **flipped format** several times at UGA. In a flipped classroom, students watch pre-recorded lectures prior to class, and then spend class time working on problems in groups (performed by me). My primary responsibility in a flipped class session is to check in with each group to see how their progress is going, share my answers with them once they have theirs, and help them if they get stuck on a problem for too long. I also make it a point to encourage each group's work, and help facilitate everyone's participation in various ways. For example, if I notice that not everyone in a group is participating, I'll ask each student in that group about what answers they got for a few problems; discrepancies among answers are usually enough to start a discussion between them. This lets me help students who may be falling behind and are having trouble bringing it up. I believe that when done effectively, a flipped classroom facilitates an effective balance between guidance and autonomy for mathematics students. It can also sometimes be more engaging than a traditional lecture style classroom for the students and the instructor – I enjoy talking with my students, and being in motion in my classroom!

At OSU, I have had the opportunity to teach a **large-scale lecture**. In Fall 2023, I taught two sections of Calculus 1, which had 188 and 132 students in each section. Calculus 1 is a required class for many undergraduates at OSU, so the math department takes measures to keep each section equitable (e.g. by having common exams for all sections). To accommodate my students' needs in these larger classes, each day I was responding to between 5-10 emails threads as soon as I could, and had individual appointments scheduled each week with students. I also recorded each of my lectures through Zoom, writing my notes live in class on a tablet projected to a screen, and uploaded the videos after each class.

In larger classes, students might feel unseen during lecture, or be afraid to speak up when they're confused. To remedy this, I offered three one-hour blocks of office hours each week, often staying for more than an hour each time. Office hours generally had a minimum of 10 students show up each day, and since students were actively thinking and asking questions during them, I found it to be a very engaging and rewarding experience. I believe that my experiences in these frequently busy office hours have sharpened my "student barometer," helping me better pick up when and where students might struggle in Calculus – this is similar to my experiences with teaching small flipped classes.

In Spring 2024, I taught an **upper-division undergraduate course** on elementary number theory, which had 13 students enrolled. This was different from my previous experiences, as I had essentially full control over the course content. I wrote my own HW assignments and solutions, project outlines and exams, and typed up more than 100 pages of notes. All of these files can be found here (solutions are available upon request). I had a grader to help me grade the homework assignments, but I would grade the exams and projects by myself. I taught this class as a traditional lecture; however, given my appreciation for a flipped classroom, for each lecture I incorporated several examples of varying difficulty that I would work through with my students' help. With my flipped classroom experience, I was particularly mindful of when students would find a topic or step in a proof confusing, and I usually found it easy to unpack and resolve their confusion.

## 2. MENTORING EXPERIENCE

I care deeply about undergraduate mentoring and research; my experiences with these have shaped my teaching philosophy. My primary goal in advising projects is to give my students an experience with somewhat open-ended mathematics, where I balance guidance with a hands-off approach to problem-solving. My experiences in mentoring have helped me practice giving the right amount of hints and details to my classes when they're working through problems with me. Psychologically, it's important for students to find the answers to problems on their own, as it is a source of both encouragement and proper math practice.

Here are some specifics on my experience. I have supervised undergraduates in reading projects, which includes projects on algebraic number theory, algebraic geometry, cryptography, elliptic curves and  $p$ -adic numbers. I have also supervised research projects, both as a project assistant with a senior professor in the lead, and as the lead professor. For example, in summer 2021 I helped with a project on so-called “nuclear” or “non-unitary” partitions. I met with student participants each week, helping them write experimental code for our conjectures, as well as prove or disprove patterns they were seeing in these partitions. Our paper has since been published, and can be found [here](#).

From Fall 2024 to Spring 2025, I led two undergraduates on a reading project in elliptic curve Galois representations. I prepared typed notes for them alongside their reading, and met with them each week to discuss the material and their questions. This project culminated in a posterboard that they created and presented on in an undergraduate research fair in April 2025, which can be seen [here](#). This was awarded for best posterboard at the fair by the audience. For a picture of the three of us next to the poster, see [here](#). They did 95% of the work for the content of this poster – I essentially only cleaned up the grammar and some notation!

From the start, my plan for the undergraduate project above was to have it segue into a research project. One student graduated that Spring, and could not participate further – but the other student continued to work on it, and met with me each week over the summer. We have been able to prove some interesting results; you can view a draft of our paper [here](#), which we will work on this semester to submit to a journal. Here is a brief mathematical explanation of it: studying Galois representations of an elliptic curve  $E$  over a field  $F$  allows one to understand the rationality of their torsion groups  $E[\text{tors}]$ , which themselves generate interesting field extensions of  $F$ . These mod- $n$  Galois representations  $\rho_{E,n}: \text{Gal}(\overline{F}/F) \rightarrow \text{Aut}(E[n])$  have images which can be realized as subgroups of  $\text{GL}_2(\mathbb{Z}/n\mathbb{Z})$ . Understanding the structure of the matrix subgroup  $\rho_{E,n}(\text{Gal}(\overline{F}/F))$  can tell one a lot about  $E[\text{tors}]$ : for example, if  $\rho_{E,n}(\text{Gal}(\overline{F}/F))$  is conjugate to a subgroup of  $\left\{ \begin{bmatrix} a & b \\ 0 & 1 \end{bmatrix} \in \text{GL}_2(\mathbb{Z}/n\mathbb{Z}) \right\}$ , then  $E$  has a torsion point of order  $n$  defined over  $F$ . In our project, we aim to determine when the “ $n$ -division field” of  $E$  is as small as possible – on the group theory side, this translates to the condition  $\rho_{E,n}(\text{Gal}(\overline{F}/F)) \cap \text{SL}_2(\mathbb{Z}/n\mathbb{Z}) = 1$ . While research on elliptic curves can be very technical, understanding torsion points through this perspective of subgroups of  $\text{GL}_2(\mathbb{Z}/n\mathbb{Z})$  allows a very accessible entry-point for worthwhile research via elementary group theory.

Following the above, I have several other projects students can work on with a similar flavor. I also have a new group of students I am working with this Fall 2025, to start a fresh

project. I find it deeply satisfying to see a reading project evolve into a research project that the students contribute towards: making math accessible is a passion of mine. Ultimately, I was fortunate enough to participate in summer research as an undergraduate student almost 10 years ago, and my experiences there are what led me to pursue a math PhD. I hope to give back to the community, and to continue to run reading and research projects for students.

### 3. SUMMARY

My experiences in teaching and mentorship are reflected through my teaching philosophy. I believe it is not only our responsibility to instruct students on course material, but to also allow them the space to develop their own mathematical intuition and problem-solving toolkit, so that they can successfully tackle mathematical and real-world problems. To be more candid for a moment: I absolutely love teaching and mentoring students, and I cannot see myself with another job. It is my dream to continue to design courses and projects in algebra and number theory.

A webpage with all of my teaching experience and course evaluations can be found [here](#). I am fortunate enough to have had several students who appreciated my teaching and left nice course evaluations. Below are a few recent ones from undergraduate classes, with a longer list [here](#).

#### **Spring 2024, Elementary Number Theory**

- Tyler has been the best professor I've had in the OSU math department. The material was well organized and communicated clearly, lectures never felt rushed or left me feeling lost, and he was always willing to help students both in class and in office hours.
- Dr. Genao is very caring about students and the course environment is very inclusive. He is a well organized and passionate instructor. This course brought me a strong interest in number theory.

#### **Fall 2023, MATH 1151: Calculus I (both sections)**

- I loved Tyler as a professor. He is always so supportive of people in the process of learning calculus. Even if you answered his questions wrong, he'd never make you feel stupid. He always just answered it back with encouragement and kindness that really spoke for his character. I also loved how in love he is with math; it's just so fulfilling to learn from someone who so clearly is passionate about what they teach. Whenever he would do a tough problem, he never described it negatively, always said "well that was a fun problem" never failed to make me smile.
- He loves to hear feedback from students, and his office hours are extremely helpful. He doesn't make students feel wrong if their answer to a question is wrong, instead of suggests another course and asks again.
- Professor Genao is one of the best math teachers I have ever had. He communicated the material easily and provided examples to students that make sense. He engaged the students and really cared about their success. He was always willing to help in office hours and ensured that there was enough space for all the students who wanted to go. He was interested in building relations with his students so he could know

them personal. I really enjoyed having this professor, especially given that it was a math course. Though I don't necessarily struggle in math all the time, it is not my best subject but I think Tyler really explains things in a way that is clear and easy to follow... Not only was the content presented well, but we were also given reasons as to why what we were learning was significant, and we were provided with several application scenarios.

### **Spring 2023, MATH 2250: Calculus I**

- I loved Tyler! He was one of my favorite professors I ever had! He made me feel comfortable in my abilities to do calculus especially since I am not a math person, but I really enjoyed his class and the environment he created. Tyler was very fair with grading and did his best to ensure every student is successful. He was always available to answer any questions I had and I felt very comfortable talking to him about anything as he was relatable and kind... I have all praise for Tyler!
- I really loved Tyler's enthusiasm towards the learning environment. He was always available whenever. He made sure that you understood.

### **Fall 2022, MATH 2250: Calculus I**

- Tyler was super knowledgeable on the subject and always gave really good feedback on gateways and tests so I knew exactly how to fix my errors. I really appreciated his dedication to helping everyone even when it meant re explaining the same thing in different ways until we understood it... Tyler did a good job always asking us if we had questions or if we needed help. He always was willing to help outside of class which was super nice.

### **Summer 2022, MATH 1113E: Virtual Precalculus**

- I have only taken one math class from this department, because I only need one math class. To be frank, I hate math, and I was not at all hyped for this class. However, Tyler Genao made the class bearable. He is absolutely fantastic. His office hours were organized, and he was extremely responsive. I would have to wait a maximum of an hour for a response— he's that AMAZING. On top of that, I know it's legally required, but he did an amazing job of accommodating with my DRC requirements. He immediately approved them the minute I sent it out to him through AIM.

Also, he was super enthusiastic and encouraging. I am actually an incoming freshman (dual enrolled last year, so it says I am a second year), and I felt so much support. Having a professor like him gives me hope for my fall semester when I'm actually a full-time student.

Overall, 10/10 professor... you should genuinely think about hiring him. I loved Professor Genao.