

TEACHING STATEMENT — ALEX HOF

The main lesson I've learned in my teaching career is that teaching well is more about the psychology of the students than about the material being taught. Generally speaking, I think just about anyone has the capability to learn any given piece of mathematics if they're really invested in it and willing to spend time engaging with the concepts involved — the hard part is getting students to a place where they both want to do this and have enough confidence in their abilities to keep at it when things aren't immediately clear. This is not to say that the material is unimportant — of course, one has to know it well enough to give students good guidance — but, at least personally, I find that the main challenge is to create an environment where they're well-positioned to take advantage of that guidance.

This is a way of looking at things which I've arrived at and applied while teaching students at a variety of levels. I've served as instructor of record for College Algebra, lead seven semesters of discussion sections as a teaching assistant for Calculus II, Calculus III, and Linear Algebra & Differential Equations, and designed and twice taught a summer review course preparing other graduate students for my department's algebraic topology and differential geometry qualifying exams. Outside the classroom, I've worked as a problem designer and grader for a math competition for 5th- and 6th-graders, supervised an undergraduate reading MacLagan and Sturmfels' *Introduction to Tropical Geometry*, and mentored first-year graduate students as part of my department's Graduate Peer Mentor program for the past four years, including one year where I served as the program's organizer. Over the summer of 2021, I organized a reading course on Freire's *Pedagogy of the Oppressed* for grad students, postdocs, and academic staffers in my department who were interested in learning about and discussing the theory of education. In the spirit described above, I've also made various general efforts toward making my department a better place for grad students to teach and learn, including co-founding a representative organization designed to give grad students more support in dealing with workplace issues and more of a voice in department policy, hosting a series of virtual social events to maintain a sense of community during the pandemic, and evaluating and providing feedback to other TAs as a member of my department's Committee for TA Policies and Procedures for four semesters.

When I was teaching Calculus and Linear Algebra & Differential Equations, my duties consisted of reviewing material from lecture for discussion sections of around 20–30 students and then guiding them through supplementary problems in groups of 3–5. Initially, my approach was very focused on coming up with explanations of the sort I would've found enlightening when I was learning calculus — rigorous without being overly technical, reflective of the way one would think about the concepts in a higher-level math course, and so on. However, interactions with students and feedback in evaluations during the first few semesters made it clear that this wasn't working. In the course of repeating Calc III a few times to figure things out, I came to see the problem through the lens of keeping students engaged — it often seemed like they were giving up on understanding me as soon as I said something they didn't immediately grasp. To deal with this, I ended up settling on the method of starting each new topic with a reminder about the analogous concept in single-variable calculus, then segueing into the new material by explaining how we were going to generalize it and what kinds of things the generalization might be useful for, so that students would always have a sense that what we were doing was an extension of what they already

knew. This approach was well-received by students, and after implementing it I was given the rating of “Superior” (given to roughly the top 30–40% of TAs) three times, in Spring 2020, Spring 2021, and Spring 2023. I also received a Math Department TA Award for my work teaching Calc III online in Fall 2020 and Spring 2021.

After this, in the summer of 2021, I was put in charge of the review course for my department’s algebraic topology and differential geometry qualifying exams as part of our Summer Enhancement Program (SEP). The structure I decided on for the course was to begin each day with a review of the topics we’d be working on, then tackle practice problems through individual work followed by small-group work followed by whole-class discussion. The point of this was to address a complaint I’d heard repeatedly about other SEP courses in the past, in the course of my mentoring work and miscellaneous other conversations with grad students — because these classes include students with varying levels of background on and comfort with the topics in question, the group work can often devolve into one or two students rapidly solving each problem before their peers have time to come to grips with things. Setting aside time for individual work before group work mitigated this by allowing everyone a chance to think about the problem on their own — in the end, I supplemented this by assigning the students most inclined to jump directly into solutions to their own group so that the others could work together at a more measured pace. This approach seems to have been successful, and, when I taught the same course again in the summer of 2023, I started out doing things the same way. However, it became clear early on that for one reason or another the dynamic among the students was different, and the designated time for individual work was unnecessary, so I stopped including it after talking things over with the students. In each of these cases, the challenging part was again more about understanding the students and what kind of environment they needed to learn than it was anything in particular about the material.

My next teaching assignment following the first SEP, in the fall of 2022, was, for these reasons, the most challenging to date. I served as instructor of record for a College Algebra course of around 60 people, using a mixture of lecture and active learning to teach students who were much more math-adverse and much more reluctant to participate than any I’d taught before. Over the course of the semester, I learned how much more they needed in the way of active encouragement and prompting to work than the students I was used to teaching, and worked on adapting accordingly — in more recent semesters, when I’ve served as a substitute for the same course, this experience has helped me get things running much more smoothly.

Going forward, the main thing I want from teaching jobs is a chance to branch out and get experience with different types of courses and students — I taught Calculus III for a long time, first to improve at it and then because I thought it was the most responsible choice amid the uncertainty of the pandemic and virtual teaching, and I’d like to work toward achieving the same level of experience and comfort I now have with it in other contexts as well. Beyond that, I’m looking for a position at an institution where there are others with an active interest in teaching and learning how to teach better, and where the department culture values providing a good environment for graduate students, undergraduates, and others as much as I do.