
Teaching Statement

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In this statement I will describe my teaching philosophy and how it translates into practice. Below, what I mean by a student-teacher relationship (STR in short) is any mathematics-related situation where I serve as teacher and someone else as student. My teaching a mathematics class at a university as an employee is such a situation; however this stricter description seems to be too reductive to properly describe the role of the mathematics teacher as I see it.

My Teaching Philosophy

At the core of my teaching philosophy is respect. Respect in this context trifurcates in its direction and in its aspect. In terms of its direction, respect trifurcates into respect toward the student, toward the environment that establishes and keeps stable the STR at hand, and toward myself¹. In a university setting, the environmental element would include, for instance, the university both as an entity and as a place, as well as people in supporting roles like course coordinators and departmental administrators. In terms of its aspect, respect trifurcates like so: respect for the mental capabilities of people involved, respect for people's priorities, and respect for the human conditions of people involved². Let me describe some of these branches; I will be selective due to a lack of space.

Capabilities, Priorities, and Human Conditions of Students I think of any one of my students as having mathematical capabilities³ comparable to mine; the only essential difference is that I have spent more time doing mathematics, and as such I have more experience.

I reconcile this belief with the varied outcomes in any classroom by way of the other two aspects of respect. Each student has a right to their priorities. For some, fully internalizing the relevant material is the primary goal; for others, their focus may lie elsewhere. I strive to be supportive while still respecting the student's autonomy and maintaining the integrity of the STR.

Even when a student prioritizes their understanding and performance in a class, it may happen that whatever human condition⁴ they find themselves in may get in their way. In such situations, within the bounds of fairness, I prioritize flexibility and empathy. Such situations are almost always unique, and as such I think it's best to evaluate them on a case-by-case basis. I find such situations, together with the myriad of ethical decisions involved, the most challenging part of teaching mathematics⁵.

Capabilities, Priorities, and Human Conditions of Supporting Staff I believe that all the people who are in supporting roles⁶ are fundamentally capable, and they have the jobs that they have because they do them well. Especially when it comes to teaching at a university, teaching is teamwork,

¹This is the phenomenological triangle in disguise.

²What differentiates the latter two is the extent to which agency for change is lacking, roughly speaking.

³Implicitly I am following the Universal Declaration of Human Rights ([UNG48]); any such statement is to be taken to be "without distinction of any kind such as race, color, sex, language, religion, political or other opinion, national or social origin, property, birth or other status"; see Article 2 there.

⁴By "human conditions" I mean things like (possibly undiagnosed) disability, illness, death of a loved one and so on.

⁵I would presume this is not specific to mathematics.

⁶Supporting staff are those people whose work is crucial in the continuation of my role as a teacher; they make up the human part of the stabilizing environment of an STR as mentioned above.

and I recognize that in the eyes of the student, I as the teacher am the primary representative of the team, let alone of the department and the university. I am responsible for providing as smooth a learning experience as possible; it is irrelevant what the primary causes of problems may be.

My Capabilities and Priorities I consider teaching mathematics to be my craft. I am aware of the importance of the role of the mathematics teacher that I am filling, and as such my role as a mathematics teacher is a priority for me. My emphasis is on building personal rapport with students on one-on-one meetings and adapting my teaching to the students' way of understanding on a case-by-case basis⁷.

The biggest challenge in my approach is encouraging students to interact with me personally and be comfortable enough to ask me questions or to explain things from different perspectives. Formulating mathematical questions in ways amenable to answers itself is difficult. I address this by being proactive, first detecting and validating when a student is experiencing discomfort with a certain mathematical concept or a step in an argument, and then creating a supportive space where we can workshop the discomfort into concrete, addressable questions.

I have served as instructor for 5 classes at the University of Utah as a postdoctoral researcher, and 11 classes during my Penn State PhD. I have taught a diverse range of classes, from lower-division classes like college algebra, calculus, differential equations and linear algebra to upper-division classes like the proof-based calculus series and a course specializing in undergraduate research.

I invest significant time in course design before the semester starts, first identifying the non-negotiables of the courses I will teach. This clarity allows me to adapt my teaching methods dynamically to different audiences, class sizes and conditions outside my control without compromising the course's structural integrity or fairness.

My Teaching in Practice

Here are some highlights from my teaching experiences, understood in the broader sense:

Sections of Large Classes When it comes to section teaching it is important to keep in mind fairness across all sections, even the ones one is not teaching. For this, being in communication with the course coordinator and the instructors of other sections is crucial. Students in these sections tend to be highly variable in their priorities. As such I think that adjusting the classes to be most appropriate for "the average" student, while simultaneously mentioning more advanced tangents from time to time to keep the top of the class motivated, works the best. Similarly it is important to be more encouraging toward students who might be having trouble following the class; although again in accordance with my teaching philosophy I outlined above it is very important to be respectful of their capabilities and priorities. In practice this means being clear that only they themselves can change the tide and I as the teacher can only be helpful and supportive. I was lucky to serve as teacher to many students who started off a semester slow but with a little bit of guidance from me were able to pick up the pace and achieve excellent grades. Such cases are highlights of my teaching experiences.

DRP Turkey I have been involved with DRP Turkey⁸ since Summer 2022, serving twice as a mentor. During my first mentorship in Summer 2022 I supervised Kaan Çim, then an undergraduate student double majoring in mathematics and philosophy, on topological dynamics and the Hiraide-Lewowicz Theorem. During my second mentorship in Summer 2023 I supervised Batuhan Yilmazer, then a physics undergraduate student, on parabolic dynamics and time changes.

⁷So far I have not taught more than 100 students in one semester; presumably I would need to alter this emphasis if a much larger pool of students is at hand.

⁸<https://sites.google.com/view/drpturkiye/>

In Summer 2025, I co-organized DRP Turkey. My responsibilities ranged from advertising the program to different institutions and organizing colloquia to editing video recordings and managing our Youtube channel⁹.

Undergraduate Research At the University of Utah, during the summer of 2024 Prof. Peter Alfeld, then the Associate Chair for Scheduling and Student Affairs, now emeritus, invited me to teach MATH 4800: Undergraduate Research in Mathematics in Fall 2024. Recognizing this great opportunity, I accepted. The topic of this course changes depending on the instructor, and I decided to focus on fractal geometry and dynamics, areas close to my expertise. As the main textbook, I decided to follow the classic *Fractals Everywhere* by Prof. Michael Barnsley. There is much to be said about my thought process designing and my experiences teaching this course, but suffice it to say that it was a very rewarding challenge to find the right balance between flexibility and rigidity. I allowed my students to study more pure or more applied mathematics confined to the main topics of the course. Another highlight is that, I reached out to Prof. Barnsley to give a colloquium talk on Zoom as part of this course, and we were lucky to have him as a speaker¹⁰.

Throughout my career in academia I have written many recommendation letters for students. I was particularly honored when one of my students, Jackie Bohn, from MATH 4800 asked letters for graduate school applications. Ultimately, they were admitted to the civil engineering program at Ohio State. Jackie had pursued the applied mathematics path in my course, and I am pleased their studies in MATH 4800 contributed to their career path.

The following semester, in Spring 2025, I supervised another student from MATH 4800, Andrew Garzella, as part of the "Introduction to Research" program funded by the department of mathematics at the U of Utah. We began with the Zimmer program, using Witte Morris's *Introduction to Arithmetic Groups*, then focused on the Hopf argument that proves ergodicity of the geodesic flow on the unit tangent bundle of a negatively curved closed surface, following Einsiedler & Ward's *Ergodic Theory*. This semester, Andrew and another undergraduate, Abby Linscott, are studying smooth ergodic theory and Fried entropy theory of smooth abelian actions with me.

Mathematics Stack Exchange I am deeply committed to open mathematical knowledge, and I actively participate in Mathematics Stack Exchange¹¹. My role there is not clearly delineated as a teacher; indeed I started using this website when I was an undergraduate. However in recent years my activities on the site have been mostly answering questions on advanced topics. A big issue in mathematics communication is that often being able to even ask what their problem is requires a certain level of understanding and clarity, which may be lacking at the time. Hence for a mathematics teacher it is an important skill to be able to read into a question and meet the asker (or student) along the way. Often it is challenging to read into ill-posed questions and answer them coherently in such a way that all possible interpretations of the question are addressed, along with indications regarding which interpretations are more sensible. Thus I think my participation in this webpage has been very useful for me to develop mathematics teaching and communication skills. At the same time I really enjoy the fact that I am able to help other people in their mathematical journey.

Youtube Since Spring 2024, I have been recording my lectures and uploading the edited and annotated recordings to my Youtube channel weekly during the semester. This creates a review resource for my students. The video format is complementary to the written format of the main textbook of the course. Finally, having video recordings of the lectures makes it easier for students who have possibly missed some of the classes. My edits are minimal; typically most of the edits are to make the audio clearer and to protect the students' privacy¹². The annotations facilitate targeted review; and the fact that annotations work very well on Youtube has been a major factor in me

⁹<https://www.youtube.com/@drpturkiye>

¹⁰<https://www.youtube.com/watch?v=uYADyWzu1IE>

¹¹<https://math.stackexchange.com/users/169085/alp-uzman>

¹²In the rare event of a student being visible in the footage, I blur their faces.

choosing Youtube as the platform for the videos. I am happy to report that this regular practice of providing annotated recordings of lectures has significantly improved my teaching.

Artificial Intelligence As a mathematics educator, I take the recent developments in artificial intelligence very seriously; a glance at some of my recent problem sets will be sufficient to convince one accordingly. As it seems LLMs are here to stay, I have been allowing my students to use them, insofar as they do so responsibly. They are not allowed to solicit direct answers or proofs, and what they end up submitting officially as their work is still their responsibility.

Other Inclusive Practices To mitigate the friction intrinsic to learning mathematics, I actively and regularly solicit and incorporate student feedback throughout the semester. For instance, while teaching a combined differential equations and linear algebra course, early feedback indicated that the typography of my problem sets was creating unnecessary difficulty for students with dyslexia. In response, I researched and implemented dyslexia-friendly fonts and formatting practices for subsequent materials¹³. I view this revision toward universal design as an ongoing process.

I extend this proactive and empathetic approach to supporting student mental health and neurodiversity. To better equip myself for this responsibility, I obtained certification in the Adult Mental Health First Aid. My teaching in particular is adaptable to unforeseen disruptive events. This semester, when a campus shooting at a nearby university occurred just days before a scheduled midterm, to balance the integrity of the academic schedule with the clear need for student support, I offered a makeup option. This required rapid coordination with the supporting staff to secure a room and I proctored exams throughout an entire day to accommodate conflicting student schedules, ensuring every student had an equitable opportunity despite the circumstances.

References

[UNG48] United Nations General Assembly UNGA, *Universal declaration of human rights*, Online, 1948, <https://www.ohchr.org/en/human-rights/universal-declaration/translations/english>.

¹³The evolution of the problem sets can be seen in the course repository: https://github.com/AlpUzman/MATH_2250_001_FALL_2023.