

TEACHING STATEMENT

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Teaching is very important to me and something I enjoy enormously. After summarizing my teaching experience, I'll talk about (i) how I work hard to create comfortable and encouraging environments for students, (ii) how I structure my lectures, and (iii) how I use analogies with storytelling to inform my teaching.

TEACHING EXPERIENCE

I've been the instructor for four courses: two calculus courses at Columbia, a topics course in analytic number theory at Harvard, and course on differential equations for engineers at Waterloo. In grad school I TA'd every semester I wasn't teaching.

It was left completely up to me how run each of the courses I've taught. My calculus and differential equations courses were heavily personalized, e.g. featuring my own emphasis, exposition, assignments, and exams, while covering standard curricula. My **topics course** had no precedent and was designed from the ground up. My YouTube has comprehensive **lecture notes** for my topics course.

SUPPORTING STUDENTS

Of the many aspects involved in teaching, I find supporting students to be the most important. Creating a comfortable and encouraging environment motivates students to work hard during the course, helps them have the willingness to engage with material after the semester has ended, and improves their overall wellbeing.

When teaching calculus, my weekly office hours were attended by over half of my 40 students, who would then work through assignments together as I bounced from one group to the next. I typically stayed until all students had left; this was a serious time investment, but I believe that, when something is important to me, that means putting effort into it and prioritizing it over other things.

I constantly encourage students to interact with me outside of class and scheduled office hours, by email or in person, so that I can cater to their specific needs one on one. The support students feel as a result of individual, tailored care motivates them and strengthens their connection with the material.

Here are a couple experiences I've had while teaching that highlight or reflect the emphasis I put on supporting students and that make me proud of the job I'm doing.

- After regular office hours, I got a calculus student to work on a **puzzle** which is secretly algebraic topology for about 6 hours. They later switched their major to math, and, three years after taking my course, they contacted me and set up a meeting with me because they were presenting this problem in a topology seminar course and wanted to practice.
- A good number of students and one of my TAs have asked me if I'd be teaching calculus courses in the future. This also happened to me when I was a TA after I covered a lecture.
- There were a couple times when students brought me a sandwich or a cookie.
- A lot of students felt comfortable talking to me about some of their personal struggles. I work particularly hard to be available in this way because I think mental health is extremely important and woefully under-discussed.
- I received a number of emails from students after the semester thanking me for the course, some of them telling me I was the best teacher they'd ever had. A few months after the course ended, one student emailed me to ask me if I'd be willing to partially supervise an undergraduate research project of theirs. Two students wrote to me over a year later to tell me what they'd been up to.

Here are some responses from one of my course evaluations that reflect the emphasis I put on supporting students.

- *“Alexander Cowan is a fantastic person. He wants every single one of his students to succeed, really he does. To reach this goal, he holds 3x the amount of office hours he is required to in which he helps students with all of the homework. It is in office hours where the class becomes truly amazing.”*
- *“Very Very understanding and approachable, fantastic professor, lecturer and willing to meet and speak whenever.”*
- *“He was perfect! so helpful, very understanding, and always made time for office hours and to help student. Best professor I’ve had at columbia”*
- *“Alex is more than “excellent”! He devoted much time and energy preparing for the classes and holding OHs and bonus OHs. He’s like “If you guys need me, I will be there for you.” He relies all my emails in an hour. I wish I could take his Calc II, III and IV.”*

LECTURE STRUCTURE

At the beginning of a lecture I go over logistical matters, like announcements of new assignments or deadlines, and office hours reminders. I ask students if they have any questions about logistics.

I then ask the students if they have any questions about the current assignment or other course material. Depending on the course, I can spend up to a third of the lecture taking questions and ironing out sticking points.

I go on to recap the previous lecture, the level of detail depending on the course. When teaching my topics course, a recap could be as short as five minutes, whereas for calculus they can be twenty. I value these recaps because they allow me to present basically all of the course material a second time, and repetition is effective. A big part of their value is also in keeping students oriented, helping them follow the course’s overarching narrative. Material is easier to understand and retain when in context.

I pause for questions, and then continue with new material. After class I hang around so that students can come ask me questions.

STORYTELLING

To effectively convey the course material to students, I draw inspiration from the many parallels I see between teaching and storytelling.

At the scale of the course as a whole, I find it essential to have an overarching narrative of the subject material: what is the course about?, what are the main ideas?, what are highlights to hold onto and what are details?, etc. When one thinks of a story they know, they effortlessly have a notion of what the story “is”. That notion is separate from any particular concrete telling of the story, which demands its own consideration.

Lecturing is performance. I am actively mindful of pace, energy, tone, etc. — the sorts of things e.g. a musician improvising on stage would be in tune with — and prepare my lecture materials in consequence (like the musician!). I do what one naturally would to make captivating the telling of a story, in the same way one has an emotional and intuitive sense of how they’d most like to put into words their personal notion of a folk tale or crazy experience they had that one time.

I might lecture about heuristic understanding, or precise theory like theorems and proofs. I give basic examples, and some examples a bit off the beaten path for variety, which might appeal to a variety of students. I tell them what they should retain literally and what is more holistic. I take time to recall context or connections to previous topics, primarily to help ground students and refocus them. I discuss softer skills and overarching mantras, because encouraging them to fall back on general principles, or to have the bravery to do what makes sense to them, or to get their hands dirty trying a different approach, or to not worry about the vast unknown and instead focus on what’s important, does so much more for their mathematical ability than anything else. I intersperse these topics as appropriate to make my lectures enticing; the stories you know are the ones you like.