

My goal as an instructor is to make an environment where students can enjoy and learn mathematics. This comes from a place of learning: I started graduate school expecting my recitation students to be as passionate about mathematics as I am. Halfway through my first semester, one Calculus I student remarked that, *“The TA seems to know what he’s doing, but sometimes doesn’t explain it to students.”* By the end of the semester, I received comments such as *“Alex seems to truly care about his students and helps explain concepts effectively.”*, and *“does a great job explaining the problems we do”* and *“does his best to point out tips or tricks to help with similar problems in the future.”*. Since then, I have made strides in learning to teach effectively.

Engagement in a comfortable learning environment. I want my students to look forward to class and I want them to be engaged. As much as I love mathematics, it frequently brings me stress and discomfort. Why shouldn’t my students sometimes feel the same? I like to joke with my students and I like to tell them what I enjoy and find useful when we learn new topics. Some of my 8am differential equations students in Spring 2017 *“really enjoyed recitation because of Alex”*, and noted that class was *professional and easy to understand* with an *“appropriate air of entertainment”*. This led to a healthy amount of engagement. Another differential equations student *“liked the casual nature of the class”* and how they *“were able to ask questions and have thoughtful discussions”*. .

Exploring concepts before finding answers. I believe that students become effective problem solvers first by thoroughly exploring the concepts surrounding a problem. In Spring 2017, one of my differential equations student liked that I *“explain difficult concepts in a way that helped me understand the material”*. After understanding and setting up a problem, I encourage students to look at the information we have and discuss the tools we have available to solve. While some methods are preferable to me, I open the floor to solutions and shortcuts that students are also familiar with. At the end of the day, I want students to recognize the pitfalls that regularly happen in the middle of a calculation, why it is important to simplify before substituting variables, and so on. Another Differential Equations student liked that I *“teach the concepts from a student’s point of view”* and that I *“explained things in a way that made sense to me.”*.

Success as a sole instructor. In the Summers of 2017 and 2018, I had the opportunity to structure a course as I saw fit. Class periods of 80 minutes posed a serious challenge, as well as the breakneck speed typical of in the summers semesters. To keep students engaged, I decided to make my class period consist of 30 minutes of lecture, 20 minutes of a group practice worksheet, and 30 minutes of lecture. This allowed students to ask questions and digest the material together. It also gave me immediate feedback, *“Did my students understand?”*, *“Should I have taught that differently?”*. I evaluated the worksheets by answering: *“Did the students come to class and learn something new?”*. In 2017, one student frequented my office hours with questions about math beyond the course material. They later decided to minor in mathematics and learn about proofs. In 2018, one student remarked that, *“His preparedness and overall understanding of the topics made this course one of the best I have taken at Iowa State.”*

Success in online teaching. In Fall 2020, Calculus III recitations are held online and each week, students may choose to attend any recitation. Since the first week of class, I have maintained the highest attendance rates of nearly 20 graduate students. Many students are struggling, many are isolated, and I think so many have stayed engaged in part because of the class environment I have made. We have an open report. I spend 5 minutes each class chatting, discussing their week, what they had coming up, and especially what they struggling with in this class. As I talk

about the problems, I draw a line down the screen to separate the problem statement from a (typically large) “thought cloud” meant for pictures, formula derivations, and general discussion. I take frequent breaks of 15 – 30 seconds to ask them – “Does this make sense?”, “Did we draw the right picture?”, “Is this what you would have tried?”. One student reached out to me via email and said, *“your little gray thought bubbles are one of the most helpful procedures in not only doing my own Calculus but also teaching math to others.”* I encourage students to engage and when they do, I thank them, tell the class that I appreciate the reply, and compare the different ideas. The same student went on to say that, *“the way you explain math tends to bring out the beauty in it.”*