Tell me and I forget. Teach me and I remember. Involve me and I learn.
– Benjamin Franklin

STEM courses are often viewed as notoriously difficult by undergraduates, and a common fear I hear among students is that they will not excel in or enjoy STEM courses. However, even a small amount of confidence can improve students' performance in these courses, as well as their impressions of STEM courses and careers. Therefore, a major goal of my teaching is to build student confidence in their understanding of mathematics and data science. I strive to promote practical application of mathematical concepts and teach course material in multiple ways to support the different learning styles that students bring to the classroom. My teaching philosophy is built on connecting course material to relevant, "real-world" scenarios, and I emphasize the utility of course material by choosing assignments and discussion material related to current events, either in students' lives or the surrounding community. In doing so, I aim to create a participatory environment that engages students and forgoes the age-old question of "When will I use this in real life?"

I believe that many STEM concepts, including mathematics and coding, are better learned through practice than observation. One of the classes I've taught most recently is Introduction to Data Science I at the University of Chicago (Data 118 Winter '22, Autumn '23). This course introduces students to data science as a discipline, teaches students how to use the programming language Python, and is a core component of the data science major. Due to a large class size of 70-90 students, the course is taught primarily in a lecture format. However, having interactive lecture components is critical to me, so I use Jupyter Slides to integrate Python code with lecture material. This allows students to practice coding during lecture without having to open anything other than their lecture slides. During most lectures, I also incorporate "Your Turn" activities into the lecture slides to encourage students to practice coding with their peers after learning a new concept. Having students work with peers provides opportunities to explain concepts to each other, which further deepens learning. Explicitly allocating time to practice coding during lecture also provides students a chance to ask questions in a low-stakes environment, which helps build confidence. Students reacted positively to this lecture format with one student commenting, "I liked the in class quizzes and demonstrations. The jupyter slides were really really useful and the best way of learning to code that I've seen."

An engaging learning environment with practical, relevant examples is crucial for retaining student interest both in class and in the field as a whole. Manipulation and analysis of large datasets is a key component of data science, so I aim to always include data that are contemporary and drawn from a variety of topic areas. In my experience, topics that best promote student engagement are those the students have direct experience with or that affect their lives in some way, for example analyzing user data from Goodreads or crime reporting data from the Chicago Police Department. This is particularly salient when working with smaller class sizes where students have more frequent opportunities for discussion. In Spring 2023, I taught a similar Introduction to Data Science course at Harry S. Truman College through City Colleges of Chicago, with a total enrollment of 9 students, and providing lecture examples and practice datasets that students find

interesting was essential for student engagement. During a lab activity on working with DataFrames, I asked students to use a dataset from Spotify to find songs with certain popularity metrics or by a particular artist. I noticed students veering off-track and searching for their favorite artists, calculating the average popularity for recent albums, or selecting only songs with high bpm. Though these weren't the questions I had asked, the students were engaging with the material at a higher level than I had hoped. The dataset sparked their curiosity, and they were practicing concepts voluntarily, without feeling it was an assignment or a chore.

Creating an inclusive classroom atmosphere in which students feel comfortable exploring and discussing topics and questions with both the instructor and fellow classmates is another important goal of my teaching. Working with peers can normalize the difficulty of learning a programming language and thus have a protective effect on student confidence, which is important for courses with demanding workloads. For larger classes like Data 118, I utilize online polling with Poll Everywhere throughout each class session to assess student understanding of the material being covered and maintain engagement. These 'check-ins' allow me to ensure students are following before moving on to more advanced material and gives students who might feel uncomfortable asking a question during class the opportunity to anonymously give feedback. I also stay in the room after class has ended until every student has left, allowing time for students to approach me with individual questions or concerns. This additional opportunity for assessment and clarification has been well-received. Several students from Data 118 wrote in course evaluations that this was one of the aspects of my teaching that contributed most to their learning. I strongly believe that feeling comfortable asking questions and normalizing approaching your professor directly is an important part of building a comfortable learning environment.

My goal with every course is for students to leave understanding not just the basic material, but also why the material is important and how it can be useful to them in their career or broader life. Students react positively to this approach, and many have specifically written in their course evaluations that they appreciated the discussion prompts and use of current events for lecture and coursework examples. I aim for each student to be able to apply what they learn in their future courses and in contexts outside the classroom. To this aim, I work with other instructors to write a free, open-source data science textbook that can be referenced by not only current students, but anyone who wants to learn or review data science. I am vastly interested in developing curriculum that is not only effective but motivating and interesting for students. Some of the most exciting feedback that I have gotten was that nearly half of the students who completed the Data 118 course evaluation last winter marked that their interest in the subject was heightened by the course, with the remaining students maintaining their current interest. I plan to use my data science skills as well as my passion for teaching to serve my institution through developing and testing innovative and interactive teaching strategies that build skills, interest, and community. It is my sincere goal that my students gain confidence in their abilities and continue in STEM.