My teaching style has been greatly influenced by several excellent math professors I had in college. Combining reflection on their teaching methods and experience with my own students, I have found the best approach to teaching math is to equip the students with the necessary mathematical ideas, engage them with the material in every aspect of the course, and encourage them in their pursuits. For the first three years of college, I was an economics major. I did not sign up for Calculus I until the second semester of my freshman year, and I was terrified on the first day of class about being able to keep up with the engineers and science majors. Two and a half years later, I changed my major to mathematics. What changed me from an economics major interested in public policy to a math major wanting to make a difference in STEM education was exceptional professors. These professors not only saw potential in their students, but also brought their students to the point where they realized they could succeed in mathematics.

**Equip.** In order to effectively equip students to solve problems, it is necessary to understand their backgrounds and adjust accordingly. At the University of Illinois, I taught two different versions of Calculus I. In one section, all of the students had prior exposure to calculus; in the other section, most students had not. Because of the difference, I wrote out more steps in a solution for the latter group of students than I did for the students who were more comfortable with the course content. Once I know the background of my students, I aim for an appropriate balance of proving theorems, providing examples, and illustrating applications. Liberal arts students tend to appreciate examples more than theory, whereas students in Calculus I should see a proof of the Fundamental Theorem of Calculus in addition to examples.

Another key factor is to make good choices of textbooks, examples, and problems assigned for homework. When confronted with an inflexible course schedule, I write up my own set of detailed lecture notes for students to use as a supplement to the provided curriculum.

**Engage.** Learning is an active process, which means listening to a polished lecturer may not translate to optimal learning. This is especially true in mathematics, because students will not simply be asked to recall facts presented in lecture, but will also be required to think analytically. Hence, it is imperative to establish an environment that engages students throughout all aspects of the course.

Different class sizes require different strategies for engaging students during lecture. With smaller classes (fewer than 75 students), I call on students by name throughout the class to provide input on the next step in the current problem on the board. In this scenario, the challenge for me as the instructor is to ask the right question of a student in order to guide them to the right response. This year, I am teaching large lecture sections of calculus (∼200 students), and it is not feasible to individually engage the students. I also found that asking questions of the class at large, expecting students to shout out the next step in a solution, was not actually an effective way to engage their minds: many of the intermediate steps were below the level of the course, and students would zone out during these problems. Instead, I now pose problems for the students to try on their own once we have done an example or two at the board. I will walk around the lecture hall to check the progress of the students as they work on the problem. When dealing with smaller groups of students (e.g., helping students in office hours or working with small groups completing worksheets), it is
important to have the students reach each step of a solution on their own. This means that I ask questions ("What famous theorem allows us to relate \( \sin(x) \) to \( \cos(x) \)?") rather than telling them the answers.

Exams and quizzes are further opportunities to engage students in a course. Because I want to communicate to my students that learning problem-solving skills is key, I select questions that allow me to give feedback on the process and not only the end result. Furthermore, I try to incorporate conceptual questions and questions that test different representations of the same idea (e.g., having students compute a derivative using the limit definition as well as explaining the graphical interpretation of the limit definition of a derivative) to place a greater emphasis on understanding the underlying concepts, rather than mindlessly following a rote process.

While at the University of Illinois, I have explored how to best integrate technology into the math curriculum to increase students’ engagement with the material. Data I collected suggests that one of my Mathematica demonstrations designed to help students visualize the Mean Value Theorem was extremely helpful. On the other hand, students did not gain anything from a demonstration that let them visualize a growing pile of corn for a related rates question. In courses that have technology homework assignments, I found that students gained more from a lesson when they learned how to use the commands in the computer algebra system for themselves, rather than when they modified pre-written code.

Encourage. I have encountered many students who are nervous about mathematics, and since I was once in their shoes, I work to instill confidence in their ability to master the course content. I am respectful and professional in every interaction, remaining patient with students who need substantial practice in a topic. When a student comes to office hours and says something such as, “I am struggling with trig substitutions,” my first response is to tell them that by coming to office hours and seeking help, they are taking the best first step towards learning the concept at hand. I found this to be especially important when I taught a math course for liberal arts majors at Penn State, because many of those students had not taken a math course in several years.

Beyond encouraging students in their ability to analyze problems, I also use interactions with students to encourage them in qualities that characterize an effective learner. Students mimic what their instructor does in class. This means that in order to have my students improve their ability to explain their work in a clear and organized fashion, I need clear board work and organized lectures, which in turn requires me to prepare the content of my lectures in advance. It is necessary to take academic integrity seriously as an instructor if we want students to understand that we value them learning how to solve problems themselves. I also encourage curiosity in my students, communicating that there is more to mathematics than simply obtaining the right answer. For example, I have done honors projects with students in Calc I to explore root-finding techniques beyond Newton’s Method.

As I grow as a mathematician and learn more, my enjoyment for the subject increases, and I want to share this effectively with students. I would welcome the chance to continue to equip, engage, and encourage math students.