TEACHING STATEMENT

MICHAIL SAVVAS

It is my firm belief that teaching constitutes an integral component of the role of an academic, being one of the main ways of having direct impact and contribution to society. This is reflected in my passion, rich experience and continued success in teaching mathematics across various settings and levels.

As a graduate student at Stanford University, Visiting Assistant Professor at the University of California, San Diego (UCSD) and Postdoctoral Instructor at the University of Texas at Austin (UT), I have been the instructor of record for many lower and upper division courses of small- and large-scale lecture format, including calculus, analysis, mathematical reasoning and linear algebra. As a result, I have accumulated significant teaching experience and have been in charge of the administrative aspects of organizing a course, making decisions about the syllabus, homework and exams, working with teaching assistants and handling issues that usually arise throughout the class period. I thus feel very well equipped and confident to be an effective instructor.

My approach towards teaching and learning revolves around two fundamental axes: the human factor and the mathematical content. Regarding the former, one of my main goals as a teacher is to create a congenial and engaging atmosphere with a conversational, explorative tone inside the classroom so as to avoid a sterile, one-sided lecture. In my interaction with students, I am friendly and approachable and try to eliminate any sense of fear or hesitation, while at the same time keeping boundaries clear. This helps me ensure that everyone feels welcome and included regardless of their background or identity and also makes me more relatable to the students, humanizing the material. Moreover, I always make a concerted effort to learn my students' names as this makes the experience more personal and comfortable, facilitating student participation as I call on my students by their names and can refer back to their input or feedback during the class, when they ask or answer a question. This validates their contribution and encourages more students to be vocal in the future.

To further engage the class, I use questions as a fundamental tool of my teaching method. I make it a point during the first lecture that students should not be reluctant or intimidated to raise questions and make comments or corrections even at the cost of interrupting the flow of the lecture. Especially in mathematics, asking questions is extremely important. There is no such thing as a "bad question" and I strive to make this abundantly clear by being very receptive to students' comments. Pointing out instructor mistakes instills confidence in their abilities and can help reduce the gap that the students feel between themselves and the instructor, creating an atmosphere of equality in the classroom. We are all on the same team, trying to understand and apply mathematical ideas. I also like to pose questions to the classroom, sometimes specific and other times more open-ended. Within my lecture plan, I often try to pursue students' suggestions, even when they don't lead to an answer directly. This can be a chance to highlight a subtle point and illustrate that unsuccessful attempts at tackling a problem are a natural part of the mathematical process. To broaden the discussion and avoid an oligopoly of the most vocal students, I typically ask for new hands to reach more hesitant learners.

From a content perspective, my goal is to achieve an ideal balance between abstract mathematical concepts and rigorous reasoning on the one hand and motivation and intuition on the other. The main techniques I employ are doing examples, giving analogies to already familiar concepts, and drawing pictures (even simple conceptual doodles) whenever possible. These are an avenue to motivate the material appropriately, which is important and often necessary for keeping students' interest and engagement levels high, especially in lower division classes. They also help in honing critical thinking and problem solving skills and developing intuition by visualizing abstract notions, abilities which are useful at all levels of instruction and in any scientific discipline the students decide to follow in their studies. A concrete instance are the integral and derivative in calculus. While these admit somewhat abstract definitions, one can use the analogy with position and velocity to make them more intuitive and interesting and illustrate how they behave and why they have crucial applications to the real world. Furthermore, emphasizing their interpretation as an area under a graph and a slope of a curve can enable students to have a visual representation of these concepts further enhancing their understanding. In more abstract proof-based courses, I like to introduce a general theorem by a corollary or a special case relating it to ideas that the class is accustomed with.

I maintain a critical approach towards teaching and am continuously trying to adapt and improve by educating myself on pedagogical strategies and experimenting with new means and ideas beyond the traditional lecture format. To that end, I have incorporated Active Learning methods by giving students time in class to work through examples in pairs or small groups, which we then collectively discuss, and have also been implementing technology, like a tablet, as a teaching aid or medium of instruction together with the traditional (black)board. This prepared me effectively for transitioning to remote learning when the need arose. In addition, I make an effort to prepare my students for success by providing advice on how to effectively navigate mathematics courses. An example is reading mathematical textbooks, which in my opinion is a skill that takes time and practice to develop and should not be taken for granted, especially in introductory courses.

As a speaker for the UCSD Teaching and Learning Commons Content Training program for undergraduate Supplemental Instruction leaders and tutors, I gave a presentation on effective learning strategies for mathematics classes in February of 2020, which touched on the above principles and more (for example, activating students' prior knowledge) and is available on my webpage at: https://web.ma.utexas.edu/users/ms86959/documents/TLC_Presentation.pdf.

Besides being conscious about the learning process, I am well-versed and can "speak the language" at a high level in a breadth of fields within mathematics and its applications in other sciences, which are becoming increasingly important and many students are interested in. I have taught applied linear algebra multiple times and have collaborated with a team of engineers at UT on a machine learning paper, submitted to the AAAI Conference on Artificial Intelligence (AAAI-23). This makes me confident in my ability to incorporate modern real world applications in my teaching, serve as an undergraduate advisor and even supervise undergraduate research projects on more applicable topics from a mathematical point of view, potentially in collaboration with other departments.

Apart from instruction in lecture courses, I have participated in smaller group or individual outreach and mentoring schemes. During the Winter quarter of 2020, as part of the UCSD Research Communications program, together with a mathematics teacher at a K-12 school in the San Diego area, we gave a series of presentations to communicate modern ideas in algebraic geometry to students and parents using a variety of visual metaphors and art media.

In the summer of 2016, I was a graduate student mentor for SURIM, a Stanford University program designed to expose undergraduate students to the process of mathematical research. My group consisted of two first-year and two second-year students working on the project "Toric varieties and their geometry". We met at least twice per week and the main focus were several conjectures on the properties of generating sets of toric ideals. After getting them up to speed on the fundamentals of algebraic geometry and toric varieties, I helped guide them through possible questions and ways to approach them. Eventually they were able to navigate the literature on their own and formulate questions independently, coming up with and implementing an algorithm to test properties of smooth Fano polytopes. At the end of the project, they were working as blooming research mathematicians and we were interacting as colleagues.

To conclude, I find great enjoyment and value in teaching mathematics and believe that I am an effective teacher and great communicator. Across all settings, my goal is to create a supportive environment, conducive to active student participation and learning. It is my belief and hope that the level of mathematical education can and will further improve so that the next generation of students have a greater affinity for mathematics and science in general.

Selected Student Evaluations from Taught Courses

MATH 10A - Calculus I (UCSD)

- Professor Savvas is one of the best math teachers I have ever had. His lecture style is very easy to follow and he takes questions. He makes sure there are no questions before moving on to the next example or topic. He explains the examples very well and writes all examples on the board so you can do the problems as he is explaining it. The lecture pace is not fast at all. Paying attention to the examples in lecture will ensure a good grade on the exam.
- I really liked Professor Savvas! He was very understanding and really seemed dedicated to helping us learn. He is always encouraging and makes students feel smart, not stupid, for asking questions. He also explained concepts in a easy to understand way and clarified if necessary. I highly recommend him as a professor, especially if you don't like or struggle with math like I do.

MATH 10B - Calculus II (UCSD)

- Ugh I love this man! I'm so sad he's not teaching math 11 next quarter. He is so nice and always very concerned about how well his students are doing. He goes out of his way to provide lots of examples and explain and clarify difficult concepts. You can tell he is very passionate about the topic, which makes lecture much more enjoyable and his teaching more effective. He has office hours THREE TIMES A WEEK which is honestly amazing, like the amount of effort he puts into his teaching and us understanding is unlike anything I've ever seen. He puts out surveys after every midterm as well for us to critique his teaching so that he can improve lectures. Overall he has made calculus (a subject I previously hadn't been a fan of) so much more enjoyable for me, to the point that I'm actually now considering a math minor. I just can't emphasize enough how much I loved his class—I would honestly take calculus again just to have him as a professor again. I just wish he was teaching math 11 next quarter so I could have him as a professor again (I really wanna thank him for being such an amazing professor but I'm an introvert and bad at talking to people so that'll probably never happen oof. I hope this review can make up for my lack of social skills).
- Professor savaas is one of the best professors at ucsd. I've had him for two math courses and I have excelled in many ways in my math knowledge. I am able to quickly solve problems and know correct atrategies. He explains material concisely and clearly. I am rarely confused. He works step by step and makes sure we understand what is going on as a class. He genuinely cares about his students and his class. He is very prepared and well suited for math. He is incredibly intelligent as it shows in his lecture and ability to teach math. He is a fabulous math professor and should honestly be given a fat raise. He changed my perspective on the subject math itself which I used to approach with worry and fear I now approach math with a positive and growing mindset. He encourages us and teaches us so well. I genuinely feel like I know what is going on. He is literally so amazing I can't emphasize this enough.
- The instructor rarely assumed the gender identities of students in the course. He took questions from everyone. He constantly asked the lecture hall if people could understand or if clarification was needed. He is extremely supportive.
- Professor Savvas is the best professor I had at UCSD. Most organised professor I have ever had. I genuinely believe that UCSD needs professors like Professor Savvas for students. He explains the material extremely well and is very organised. Very engaging and makes me actually enjoy attending lectures. He simplifies concepts and explains everything very well and addresses all students' question. I like the format of his class and was helpful. Overall the best professor any student can ask for because he cares about students and their concerns. I am glad that I was a student of Professor Savvas and would instantly take another class with him without hesitation and would recommend him to anyone. UCSD has a great professor with Professor Savvas and I hope they keep him because I had regained my interest in math because of him. Thank you professor for an amazing quarter.
- Was the best math professor/teacher i've ever come across. To put into perspective, i have never been good at math and it's been an area of struggle and anxiety for me so it's a topic i dread with my whole existence. This professor right here taught me a great deal, had me excited to attend lectures, and made me feel intelligent when i would understand and grasp the concepts. His teaching style is absolutely wonderful and he entertains us during the lectures with stories or bits of witty sarcasm.

His notes are very clean and precise and very easy to read. When i had multiple questions he would patiently answer them and go into detail on why/how that concept worked. He is an angel sent from heaven and the only prof/teacher who ever taught me anything in math.

MATH 18 - Linear Algebra (UCSD)

- Definitely the best professor I have had so far. I can see why many students praise this teacher. He does not make the class too easy or too difficult. He gives you the material and explains it in very simple terms. He makes abstract concepts so easy to understand. He is not a professor that is teaching for a paycheck, he genuinely cares if students learn the material and makes sure to go over examples and engages with students during his examples.
- The best professor I've had so far at UCSD. Super clear and articulate about math, makes it easily understandable with great examples. Lecture notes are super neat and easy to read. Clearly breaks everything up and summarizes. Very engaging during lecture, and great at answering questions. Take him when you can!
- Professor Savvas is one of the best professors I've ever had! I wish many more students could have the chance to take his class. When it comes to a Mathematics course, having a good professor is crucial. Professor Savvas explains the course material very well. He is always open to questions. I like that he makes his lectures interactive and very engaging. His review sessions before quizzes are very helpful. Professor Savvas is a caring professor. I enjoy his class. I wish I could take more Math courses with him. Thank you, Professor Savvas!

MATH 102 - Applied Linear Algebra (UCSD)

- Wow what a great professor. He taught to everyone in the class. His examples were simple and easy to understand if you've never seen the material before, but also hinted at the larger elements of the theory so students who were familiar could move ahead on their own. Savvas was enthusiastic about math and cared that his students understood what he was teaching and why it mattered.
- Professor Savvas is hands down the best math professor I've ever had. He knows exactly what he's talking about. He knows how to answer every question asked in class. He is approachable and available. He clearly cares about the material and the students' understanding of the material. Thank you so much for everything!
- He is an amazing professor! He's extremely nice during office hours, and makes sure every student's question is answered. He also makes the tests fair, but the homeworks pretty difficult, which really tests if you display a command of the core learning objectives. The homework allows you to go deeper and further, so you don't risk messing up your grade because you have to be creative. I personally like this because it doesn't harm your grade, but you also get to have a chance at exploring more difficult, higher level problems!
- He is fantastic. His enthusiasm for the material and for teaching is made clear during his 8am class in which many of the students are still tired. He is a caring, humble, stimulating, funny and expert teacher.

MATH 109 - Introduction to Mathematical Reasoning (UCSD)

- Not enough words to describe how much I admire the professor. He is an extremely talented, well-spoken individual and very very good at breaking down difficult concepts into concise, simple understandable ones. Honestly, I wish my professors in the Math 20 series were like him. The course was a fast-paced but it was extremely helpful to have the professor explain the concepts after reading the book. He makes everything make sense, like pineapple on pizza.
- His understanding of the material really shows through when answering students questions. He repeats back how he understands the student's question, and then gives either logical direction or a very digestible example that clearly walks the student through understanding, all while not solving the assigned exercise for the student. If the student still struggles to reach the desired conclusion, he is then able to break it down further without overwhelming the student with excessive information. I have had my own experiences in these situations, and I only walk away with lingering confusion when I do not communicate the remainder of my own doubts. Moreover, I have never seen him

shame a student for any 'dumb' questions. He comes from backgrounds that are known to yield pretentious individuals with expectations of the world matching his command, yet he exhibits none of these frustrating mentalities. His patience is admirable for those that aspire to be instructors themselves. Another note: his pacing in lecture is perfect for those who process information slower. his perfectionism in writing his lectures allows for slower thinkers, such as myself, to keep up with what is going on. I can honestly say I have nothing negative to say about his instruction.

- Professor Savvas is an awesome professor – probably my favorite professor so far. His lectures are easy to understand and he breaks down the material – especially complicated materials – in a way that is easy to understand. More importantly, though, Professor Savvas' office hours are an excellent way to get additional help on homework problems or concepts taught in lecture. His office hours also gives you an idea of how Professor Savvas really is as a person. It is extremely clear that, regardless of how you are doing in Math 109, he is ready to help. He does not criticize you at all if you don't understand something – even if that something is extremely simple. Rather, he tries his best to guide students towards the right answer without actually giving the answer. The same applies to the homework – he will slowly guide you to the right answer without actually giving you the answer so the student learns. He also occasionally cracks a few jokes here and there and tells random stories, which I personally find funny. :) I hope I can take more classes with Professor Savvas. 500% recommend.

M408C - Calculus I (UT Austin)

- Dr. Savvas was absolutely fantastic. He did a phenomenal job teaching and I was engaged every single class period. He was by far my favorite professor this semester. I could not ask for a better professor to have my first semester here at UT. He was through and through a great professor and a great human. I would absolutely take his class a million times again.
- Professor Savvas may be the best professor I have had the honor of being taught by. His class is a joy to be in every single time. He doesn't just teach the material, he is always motivating it beforehand, giving reasons why it is useful and important, as well as helping us develop an intuitive understanding of it, which is one of my favorite attributes of a professor. He relates to the students, understanding when some material may be uninteresting or vague, but he always is sure to voice thator clear up any misunderstanding. When you are in his class, you always feel like you can ask questions about the material, and he will always answer genuinely and without making you feel bad about not knowing. Even though I had previously taken this course in high school, I feel like I have developed an even deeper understanding and respect for the material taught.