Teaching statement for Venkata Sai Narayana Bavisetty

TEACHING PHILOSOPHY

My teaching philosophy has evolved from my reflections on experiences as both a student learning math and a teacher of mathematics. Its main principle is that active student engagement is indispensable for learning mathematics. I capture students' attention by telling stories, intentionally apply a variety of active learning techniques, encourage my students to be self-learners, acknowledge diversity in the classroom, and strive to foster an inclusive environment where everyone can succeed.

I capture the attention of my students by narrating mathematical stories complemented with technology and crafts. When presenting a new concept, I elucidate its place within the broader mathematical landscape. For instance, when introducing power series, I elaborate on how they address the overarching challenge of approximating complex functions using simpler polynomial functions. Similarly, when delving into gradients, I provide my students with a glimpse of their application in state-of-the-art machine learning algorithms, such as ChatGPT.

I intentionally use active learning techniques to engage my students. I scaffold my examples to illustrate concepts without overwhelming the students with technical details. For instance, when introducing Riemann integration, I use examples of constant functions (easy), linear functions (medium), and quadratic functions (hard). After explaining something new, I use multiple checkpoints (such as thumbs up or polls) to check if the students understood the material. I incorporate technologies that promote collaborative problem-solving, such as Kahoot and Teacher Desmos. Additionally, I supplement these activities by including animations, mathematical games (such as chess on a torus), and paper crafts (making a paper octahedron) to aid in visualizing and understanding complex mathematical objects.

I encourage my students to become self-learners by actively engaging them with the material. For example, when a student gets stuck, I ask probing questions like, "What do you think is the next step?" (which allows them to focus on the next step rather than being overwhelmed by trying to come up with the full solution), "What property of the derivative do you think we need?" (which allows them to connect theoretical knowledge with practical problems), and "Let's explain your idea to your group and see what others think" (which encourages collaborative problem-solving among students). I ask them to evaluate their own work. For instance, during the review sessions, I encourage them to "come up with some non-identities that look true" (making it easy to remember which identities are true and which are not). I ensure that the students communicate and share ideas. To make sure they are comfortable discussing with each other, I include icebreaker activities such as "Would you rather" and "Name game."

I recognize that students in my classroom have different backgrounds, experiences, identities, and expectations, and as a teacher, I build a welcoming community for everyone. In order to know my audience, I hand out a "getting to know you" survey asking students questions about their mathematical background, concerns about the class, and their expectations. During the first section, I clearly explain what they can expect from the course and what they are expected to do. Early on in the semester, I ask my students to fill out an anonymous early feedback form with questions like "What do you want me to start/stop/keep doing?". As the course progresses, I identify students who are struggling with the course and tailor my support accordingly. I make sure to invite students to my office hours, especially first-generation college students who may not be aware of how to use office hours. For instance, I have previously arranged meetings with first-generation college students outside of regular office hours to guide them on how to study for a university course and provide them with study guides, demonstrate how to study for each class (skim textbook ahead of class, carefully reread notes for class, attempt examples from the book on their own, and attempt homework problems). When teaching first-year classes, I make sure to hold review sessions and practice exams to familiarize students who are taking a university class for the first time with what to expect in the exams.

I find teaching an extremely satisfying and rewarding experience, especially when I see my former students doing incredibly well in subsequent classes and life in general. I often run into my students, who tell me that having me as a TA helped them not only grasp the material

better but also prepared them for subsequent classes. As a teacher, I actively engage with my students to build a community of critical thinkers and to make the process of learning math a memorable experience.

TEACHING EXPERIENCE

For the past five years, I have taught the calculus sequence as a Teaching Assistant using Active Learning format (students learn through collaboration) and I have been ranked as excellent by my students for seven semesters. My duties included making worksheets, holding office hours, review sessions, proctoring exams and creating rubrics for grading. I have been a Merit TA for the Merit Program for Emerging Scholars. This program targets students who are members of traditionally underrepresented groups in mathematics and science. As a Merit TA, I designed additional learning material which typically consists of conceptual worksheets, review Kahoot sessions, or vistas into upcoming material. I have also written/conducted several mock exams for Merit students.

In the Fall of 2023, I served as the head TA for the course *Linear Algebra with Applications*. This course includes traditional discussion sections along with a synchronous lab component, making it highly popular among students. The lab component serves as a prerequisite for many advanced machine learning and artificial intelligence courses. For example, within the lab, students apply the linear algebra techniques learned in class to tasks such as image compression and speech compression. They also implement a simplified version of PageRank, the algorithm used by Google to rank websites by relevance. Additionally, students utilize linear algebra to analyze their Facebook networks. This practical application allows them to understand the relevance of the mathematical concepts they learn to their daily lives. As the lab TA, I designed these online lab components and created corresponding assessments.

For the Summer Illinois Math camp, I designed a week-long topology course each for middle school and high school students. I developed an original curriculum including lecture notes, worksheets, and activities to motivate and simplify abstract concepts like homology for the students.

Before joining University of Illinois, I was also a teaching assistant at the Indian Institute of Technology Bombay, where I taught complex analysis and differential equations and was a Head TA for the differential equations course. Besides the regular TA responsibilities, I organized and coordinated all TA hours and work schedules, and mentored less experienced TAs.

UNDERGRADUATE RESEARCH MENTORING

I have co-led, together with my advisor, a three-semester undergraduate research project titled *Modular Forms and Homotopy of Q(2)*. The main goal of the project was to simplify certain algebraic computations of homotopy groups of a spectrum named Q(2), using a complex theoretic viewpoint. The students utilized the computer software MAGMA to carry out these calculations. To prepare the students for the project, I gave several expository lectures on background material, such as homological algebra, elliptic curves, and chromatic homotopy theory. I met with the students regularly, discussing ideas they had, examples they worked out, and other questions that came up in their readings.

At the end of each semester, I supported the students in creating a poster, building a presentation, and improving their mathematical communication skills. Seeing the students explore and engage with material they would not normally encounter in class and getting excited about new results was a very rewarding and proud moment for me. I eagerly look forward to leading more undergraduate research projects