

Teaching Statement

Praneeth Narayanamurthy

I have always been committed to teaching and mentoring students at all levels. As a teaching assistant, I have had the pleasure of teaching two courses at Iowa State University. I was a TA for the course *Probabilistic Methods for Electrical Engineers*, a course that is offered as a core course in the Electrical Engineering and the Statistics programs. This is a junior level course aimed at teaching introductory probability concepts. My duties (in both semesters) included conducting recitations, setting homeworks and quizzes, holding office hours for supplemental instruction, and grading.

The second course I was a TA for was *Machine Learning: A Signal Processing Perspective*, a senior level introductory course on Machine Learning, taught through a Signal Processing lens. My duties here included conducting recitations, creating homeworks, holding office hours for supplemental instruction, and grading. As part of the recitation series, in addition to teaching the mathematical foundations to students, I created a set of illustrations in python (more specifically jupyter notebooks) to visually demonstrate the fundamentals that can more easily get through to the students. As a proponent of open-source software, I have posted all the codes and the visualizations online [here](#).

In addition to these courses, I have also served as a guest lecturer in courses such as Convex Optimization (graduate level), Detection and Estimation Theory (graduate level), Signals and Systems (undergraduate level), and High-Dimensional Probability (graduate level). In July 2020, I also initiated a mini reading group where I presented results on Multi-Armed Bandits that was primarily attended by senior graduate students and professors.

My teaching philosophy has been shaped by the following key points

1. **Explaining things that fascinated me:** As a first time teacher, I tried to mention several *amazing* things that I was exposed to as a student. I believe that these seemingly small “discoveries” can adequately kindle students’ interests and motivate them to learn more about the subject. As an example, while I was teaching the probability course, I found out that many students had not studied things like arithmetic and geometric series. To teach this, I recounted the story of how Carl Friedrich Gauss surprised his elementary school teacher by adding all integers from 1 to 100 within a few minutes.
2. **Incorporating Feedback:** As an extension of the previous point, I realized that the circumstances of students is considerably different from when I was a student. To alleviate such differences, I seek to actively obtain feedback from students, and attempt to incorporate most reasonable requests in my teaching. As an example, in my first semester, I prepared problems with the intention of enabling the students to formulate English language problems mathematically, and then use the methods learnt in class. When I observed that some students were encountering difficulty with such problems, I tried to show the students how to extract the “essence” of such problems in my recitation sessions.
3. **Preparing Students for the “real world”:** I strongly believe that although the pursuit of science is a noble goal, for most students a college degree is a means to obtain a job. To this end, I structured my teaching (in both the courses) in a way that helps the students achieve this goal without compromising the fundamental understanding of the underlying material. As an example, I strongly encouraged students in the Machine Learning course to deeply explore libraries such as NumPy, Pandas, and Scikit-Learn that are a backbone to numerous billion dollar companies currently. Although this was not part of the course curriculum, I encouraged the students to investigate the best libraries to accomplish different tasks. I believe that this exercise would put students in a significantly better position to crack job interviews.

In the spring of 2021, at the peak of the pandemic, to accommodate the various challenges that students were facing, along with Prof. Namrata Vaswani, I conducted asynchronous instruction and office hours on a dedicated Discord server. I tried to be available for students irrespective of the time of the day to clarify concepts for the students. From the students of all these courses, I have received many thanks for helping them understand the course material and teaching them how to leverage the acquired knowledge in the real world.

Mentoring: I also have experience in mentoring students in my career. In particular, I helped mentor a Masters Student at Iowa State University to conduct research on matrix completion. This collaboration led to two conference and one journal publication. I also assisted a concurrent masters student at Iowa State University. In my short stint as a postdoctoral scholar, I am involved in mentoring a PhD student. In particular, I assist the student in presenting mathematical ideas in a clear and succinct manner while writing research papers.

Future Teaching: I believe my experience in teaching, and, research puts me in a good position to teach a variety of courses at both the undergraduate and the graduate level. In particular, core undergraduate courses such as signals and systems, linear systems, signal processing, introduction to probability, introduction to linear algebra and others. In addition, I would like to develop course on more modern topics such as data science, and machine learning. I am also equipped to teach graduate level courses on probability, (convex and non-convex) optimization, and detection and estimation theory. At the graduate level as well, I am interested to develop courses on machine learning and data science.