

Teaching Statement

Xiaoping Zhu

Teaching mathematics is an essential component of my career as a mathematician. It is always a wonderful experience for me to help students understand abstract concepts and appreciate the power of mathematics as a teacher. Moreover, teaching mathematics is one of the most efficient ways for me to learn how to elaborate a new topic to others.

I have taught various courses both as a teaching assistant and an instructor at the Rutgers University at New Brunswick, including the complete series of calculus, linear algebra, ordinary differential equations, and various courses like linear optimization and partial differential equations. As an instructor, my duties include designing the structure and the syllabus for course, giving lectures, holding office hours, writing and grading exams. As a TA, my duties include holding recitations and office hours, writing the rubric for practice problems, grading exams.

During my teaching, I always try my best to simulate every lectures or recitations with organization and preparation. Delivering clear and organized lectures is the most fundamental but sometimes challenging task for a teacher. At the beginning of each course, I would tell my students clearly about the expectation of the course and give an overview of the topics covered in the course. Before every class, I usually collect materials including examples, pictures, and explanations from various sources, then spend half an hour simulating the flow of the lecture: how to introduce the topic, how to present examples and computations, and how to relate the new topic to the previous topics. I pay attention to details during the lectures such as blackboard arrangement, handwriting and the notations used, and try to avoid the errors and erasing important ideas so that my students can have a big picture in mind.

Aside from the efforts I put into the teaching, I also strive to establish an effective communication system to my students. Although in theory students can always email the professor any time, in practice they might be too shy or embarrassed to admit that they couldn't figure out the problem by themselves. They need encouragement and a feeling of safety to start doing so. Here is what I would do:

- When I finish the explanation of a problem, I would give them 30 seconds for asking questions. This pause provides enough time for students to look at the board(screen) work and review the whole process. As I have observed, a lot of questions were asked within the last 5 seconds.
- No matter how silly the question looks like, I would still answer it. Although some other students might feel bored, this is a necessary cost for the questioner not to feel discouraged. But if the question needs too much time to explain, I would say that the time is limited and the problem will be asked after the class.
- In case some students are missing classes or missing an assignment, it would just take a minute to send a brief email saying "I didn't see you today, what happened?" Such messages proved to be the most efficient way to know what is going on.
- It is important to make sure struggling students not to feel being left behind. Controlling the pace of exposition, frequently recalling the prerequisite knowledge and asking struggling students to answer an easy question will help them to focus on the class and grow confidence.

- It is also important to make sure top students not to feel bored. My trick is to include something that is very unlikely for them to get from self-studying. For example, when teaching upper and lower limits, I would briefly mention the conjecture $\liminf_{n \rightarrow \infty} n^2 |\sin n| = 0$ and its relation to number theory (how irrational is π). Also, challenging problems will usually be provided during the class. So even if they do not want to pay attention when I am explaining an easy question, there is something for them to work on.

When it comes to assign the grades for homework, quizzes and midterms, I would strictly stick to the mathematical standard, not making any compromise, which I think it is helpful for my students to think about the problems in a more logical way. If someone writes $\ln(\mu) = -\ln(x) \rightarrow \mu = -x$, then he or she receive absolutely no partial credits, no matter how other parts are done. Aside from such harsh grading policy, I would also do the following to compensate:

- Overdue homework is always collected and graded, but with a 20% of the late penalty. Comparing to rejecting their late work and thus they do nothing, I would rather they get some practice anyway.
- Ample time will be left for the quizzes at the end of each class. I would walk around to check their work. If someone doesn't know how to start, I would give a hint. If they are submitting the quizzes with mistakes, I would point out the errors and ask them to redo it, whenever there is time left.
- When I am the instructor, I always offer a second chance for the quizzes and midterms.

I firmly believe the following: Mathematics belongs not to the mathematicians, but to all mankind. The advance of mathematics is not marked by achievements of individual mathematicians, but by the understanding of the whole mathematical society. Mathematicians are responsible not only for discovering new mathematics, but also for explaining mathematics to whoever needs it. Therefore, teaching duties, together with the annoyance they brings when they are interrupting my research progress, are just part of my life as a mathematician that I am enjoying.

The complete list of courses I have taught can be found on my webpage <https://sites.math.rutgers.edu/~xz349/>. I would very much like to provide detailed evaluations for all courses I have taught at Rutgers University at New Brunswick if needed.