

Teaching statement

Petr Kosenko

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Throughout my time as a PhD student at University of Toronto I was a teaching assistant at various calculus courses, ODE courses and group theory courses. Moreover, I was a course instructor at a group theory course and an introductory ODE course. In my statement I want to briefly talk about my experience.

0.1 As a Teaching Assistant

In general, teaching assistants perform the following duties : organizing tutorials and office hours, grading papers and invigilating exams. In my teaching statement I will concentrate on the first two duties.

University of Toronto is a **large** institution with 45,370 undergraduate students enrolled, and, moreover, enrollment for many 1xx and 2xx courses can reach more than a thousand students! Therefore, teaching assistants have to work with relatively sizeable groups of students during tutorials, ranging from 20 to 40 students. So, organizing group work is very important in order to maximize students' engagement.

Our duty is to help facilitate discussion, and, in the process, making tutorials fun for students, because if a student is bored during a tutorial, they will not absorb the material as efficiently. However, it is important to keep in mind that there are students who work alone, and there are many valid reasons for them to isolate from the rest of the class. A teaching assistant cannot abandon them, and one absolutely needs to talk to them personally as well, and help them if they are stuck on a problem.

Finally, tutorials are supposed to supplement the lectures, in other words, we want the students to understand the lecture material better during these sessions, and a TA should be able to help them in that regard.

0.2 As a Course Instructor

In the last two years I have taught an introductory course on group theory (MAT301) and a course on ODEs(MAT244). In either course I was handling pretty large sections: for example, total enrollment for the section I taught in MAT301 in 2021 was 136(!) students. In 2021 the whole course was taught online, while in 2022 I delivered lectures in person, with online office hours. I used a more traditional teaching style, which consists of preparing lecture notes and using a graphing tablet to write down the material.

My primary goal is to make the students understand **the ideas** behind some of the more important statements and notions that are introduced. First of all, I do not want my students to engage in mindless memorization of the proofs, but gaining intuition behind the lemmas and theorems. The courses I taught are proof-based, and many proofs can be quite confusing, especially for students who mostly lack experience with research-level mathematics, so a good course instructor has to take this into account. Also, for additional context, it is important to know that the majority of my students are not math majors, most of them come from Computer Science, Physics, Geology, Biology, and so on. This, in particular, led to the classes being quite imbalanced: there is a good mix of inexperienced and experienced students, which creates a challenge, as well.

As I mentioned before, I delivered my lectures in-person and online using my laptop + graphing tablet hooked to a projector, this allows for some interactivity, also these notes can be saved and accessed

by students after the lectures. Also, after every lecture I used the handwritten notes to make more refined and better-structured LaTeX notes (for both of my courses), which were unanimously praised by my students, see <https://github.com/petekos-math/MAT301-Summer2021/blob/main/lecture%20notes%20MAT301.pdf> and <https://github.com/petekos-math/MAT244-Summer2021/blob/main/lecture%20notes%20MAT244.pdf>. They have an obvious advantage over handwritten notes in terms of readability and accessibility: such notes are way easy to navigate and can be updated regularly in response to the feedback. On the other hand, having a graphing tablet allows you to emulate the in-person experience while teaching online by using any online whiteboard feature, and allows for some enhanced interaction with students during the in-person sections.

Speaking about interaction, I realized that it can be very fruitful to make brief “stops” during lectures and ask the students if everything clear. Or, for example, I could write a part of the proof but omit some notions, and let the students guess what is missing, in order to test their understanding, and it is just one way a course instructor can effectively interact with students, even during Zoom sessions!. Also, I want to mention students’ feedback: one of the most important things in teaching is **being aware how your students are doing in your course**. Establishing trust with your students can go a long way, and it allows you to assess their progress in the course in a more effective way. Office hours serve as a good way to talk to students in a more personal setting, and their questions are a good indication of how they are doing in the course.

Another aspect I want to discuss is making homeworks and term tests. They have to accurately reflect the material covered in the course, and you have to balance the difficulty – this can be quite tricky, as the students have different background and learn the material at different paces. Finally, it is incredibly crucial to **keep the expectations crystal clear** in your courses. For example, constructing a detailed syllabus with explicitly written down topics and textbook references helped my students a lot. Also, before every term tests I have to make sure the students know what to prepare for. The less stressed out and prepared the students are, the better!