Teaching Statement

I firmly believe that effective communication of mathematical knowledge should be a core goal of a professional mathematician. The success of a mathematical community, be it of a math department as a whole or of a single class, relies on the ability of the members to foster an atmosphere that stimulates interest and a common desire to learn, discover, and improve one’s mathematical knowledge and skills. Pursuing this goal encompasses everything from writing an effective and clear introduction for a research paper to sharing knowledge with the students during a lecture course, from stimulating interest in a research area by presenting it in an approachable but exciting and challenging way to showing interest towards a colleagues work and ideas. I strive to put these ideas into practice throughout my work, in particular in my teaching.

In teaching lower level classes it is important to maintain student’s interest, to help develop both their skills and their confidence in their own abilities to allow them to tackle more difficult topics without anxiety. It is important to transmit the enthusiasm of learning new material through a channel of mutual trust and respect. Students should never feel that a lecture is a loss of their time, be it because it is too difficult or trivial. The lecturer must accomplish this even though a class is made of diverse students with different characteristics, backgrounds, and skill sets.

I supplement abstract mathematical definitions with motivation, specific examples and explanatory pictures. Presenting and discussing counterexamples is also a very efficient technique. Each student is then free to choose if they prefer to think abstractly or experiment with a specific scenario until they feel comfortable. I believe I have had success: one student was inspired and asked me to advise him on some independent summer research; others wrote:

[Multivariable Calculus] Great professor. Very excited about the material, which made lectures fun to attend. I also really appreciated the written-up lecture slides that he posted online.

[Graduate Real Analysis] Prof. Uraltsev is a great teacher and I really loved attending the classes. It was initially difficult for me to cope up since I wasn’t used to the kind of ideas used in the course but he was helpful and by the end course I am really comfortable with them.

[Graduate Real Analysis] Very interesting homework that builds on itself to help the student construct interesting results. Highly recommended.

[Graduate Real Analysis] I found the content covered to be apt for my requirement and it was well structured. The homework and especially the exams very well set and thought about.

For intermediate to advanced courses the role of homework and discussion during office hours is crucial for the student to gain a solid working understanding of the topic and gain confidence in their knowledge. I was a TA for Harmonic Analysis as a grad student in Bonn; during my assistant professorship at Cornell I taught core graduate Real Analysis, Intro to PDE, and Honors Analysis. For these courses I prepared homework and weekly discussions of varied level of difficulty: this provided both an occasion for students to revise concepts presented in class and explore more advanced applications. Often, in a series of guided steps, students were encouraged to arrive at the statement of a less trivial result or lemma that could then appear in subsequent lectures. I used office hours to provide help in tackling the harder exercises. This approach yielded fruitful results: it maintained engagement even in non-homogeneous classes. It provided challenges for more advanced students and allowed students with more limited background to catch up without being discouraged.

Homework structured this way provided for meaning and motivation and students were happy when they managed to recognize parts of proofs presented in class as having already been covered by a homework assignment.

[Graduate Real Analysis] I really like the professor’s enthusiasm, and his ability to really quickly figure out great answer to the questions asked by students.

In advanced topics courses and seminars it is important to reiterate important ideas and to provide a series of pertinent examples. I find the examples that work best are obtained by considering a
Teaching Statement

Gennady Uraltsev

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I have taught an advanced topics course on “rough differential equations and paracontrolled calculus with applications to stochastic PDEs”. Even though I do not work on these topics specifically the decision was due to the appeal to a variety of graduate students, whereas a course on time-frequency analysis (my area of expertise) would only have been of interest of a couple of them. It was a challenge for me, but students said that they appreciated the course and that I presented an original take on the material by offering insights beyond what can be obtained through an overview of published notes and papers.

Finally, I have always engaged with students both as a postdoc and as a PhD student. Some of these interactions even resulted in significant progress in solution of open problems (e.g. uniform bounds for the bilinear Hilbert transform – see the research statement).

In terms of extracurricular math, as a postdoc I have held a weekly Putnam preparation session for undergrads. I organize lessons by doing an overview of some tips and tricks for a given type of problem (e.g. game theory, inequalities) and then preparing worksheets for individual work and group discussion.

I constantly strive to improve my teaching methods and to adapt the material I am presenting to the audience. I do this by listening to the feedback of my students both through official channels and through personal interaction, and trying to accommodate each student’s needs. Students have expressed their happiness about the relaxed and stimulating environment that I managed to create both during courses and during individual discussions in office hours.

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