Teaching Statement

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PHILOSOPHY OF TEACHING:

Since my high school years, I have always believed that every science discipline can be made interesting and exciting, and it is the teacher’s job to convey the beauty of the subject to the students. In my opinion, to be truly successful, a mathematician has to share his or her knowledge and passion with other people. It is unfortunate that many people consider mathematics uninteresting and boring. The reason for this antagonism lies in the fact that students are often taught to memorize rules and formulas rather than to understand ideas. In my teaching, I try to make sure that students are able to grasp the meaning and essence of new concepts, to see the justification, at least on the intuitive level, and to draw connections with familiar topics. This approach brings students to realize that everything in mathematics is very consistent and logical.

Researchers know the pleasure of making a discovery, and it is exactly this pleasure that I would like to pass on to the students in class. I tend to discuss several examples first and then gently guide the students towards deducing a general rule and giving a proof or an explanation. This gives students a feeling of investigating and exploring the subject rather than simply learning it. Besides, students memorize information better if they come up with it themselves, than if they read it in the textbook. I teach students to face the challenges and to attack mathematical problems without fear. When I solve problems in class, I do more than just copy the solutions from the manual – the students are intelligent enough to do it on their own. Instead of reproducing a readily available solution, I pretend to be solving the problem from scratch - with trial-and-error, “thinking aloud”, intuitive reasoning - eventually shaping it into rigorous mathematical statements. This method allows students to better understand the thinking process, which is valuable not only in the classroom.

My teaching experience in the past several years has been quite extensive. I have taught a wide range of classes: from College Algebra (and even high school) to graduate Complex Analysis, and each class forces me, as a teacher, to perceive something new. In lower level classes, one learns to explain mathematical concepts in a way which is understandable by everyone, and in more advanced classes, by answering (sometimes rather nontrivial) questions that arise, one gains a deeper understanding of the subject. Hence, I find that teaching is also a rewarding and educational experience for me as well as for my students. I deeply enjoy teaching courses of various levels and the challenges that they present me with. I view it as my goal to not only convey the information to the students, but to inspire, motivate them,
ignite their passion about the subject, and make them realize its importance and beauty.

Applications to real world, science, and engineering are an important component of any mathematical course. They relate the material to the life outside of the classroom and motivate the students to learn the subject. In an attempt to make my classes more exciting and relevant, I often discuss such connections and try to tailor the content of my classes to the needs of my students (their major, interests, level etc.) – and this applies to classes of all levels, from Calculus to graduate classes. In my recent undergraduate Fourier Analysis and Wavelets class, I have spent a substantial amount of time talking about the applications of the field to sound and image processing and actually demonstrating these applications (e.g., on one occasion, I have recorded a guitar chord, and made the students figure out which chord it was by analyzing the Fourier transform of the signal). Naturally, applications abound in the Differential Equations class that I currently teach. I illustrate each topic and every single type of equations that we study with an applied problem which is modeled by such equations. To deepen the student’s conviction in the importance and power of mathematics, I illustrate my examples with additional materials: for example, I showed real world population graphs when teaching population models, and when studying oscillations and, in particular, resonance, I played the video of the Tacoma bridge collapse. Even in the graduate Complex Analysis class, in addition to constantly making connections to other areas of mathematics (harmonic analysis, differential equations, number theory etc.), I occasionally mentioned applications to, e.g. aerodynamics (Joukowsky transform). While preparing for such discussions, I myself learned many interesting topics from physics, biology, economics, and other areas. Furthermore, it stimulated me to learn and use technology in the classroom (Matlab, internet, interactive lecture slides, sound and video presentations).

Thus (contrary to the opinion of many mathematicians, that teaching is a burden which takes time away from research), I find teaching extremely beneficial for my development as a person and a scientist. In fact, I take opportunities to connect my research with teaching. I have given talks on the topics of my research at graduate student seminars and colloquia, and currently I am planning to design a graduate course on discrepancy theory (which may be of interest to students specializing in analysis, number theory, numerical methods etc.) and a one-hour talk about the subject aimed at undergraduates.

Finally, I believe that no amount of useful information can be absorbed by the students without the feeling of mutual respect and comfort in the classroom. I always strive to create a friendly and interactive atmosphere in class, encourage students to ask questions and to attend office hours. I start each new topic with easy examples in order to make students feel comfortable with the material and to involve everybody in the discussion. I also like to give interesting and challenging extra credit problems to students to stimulate their thinking and creativity, broaden their knowledge of the field, and to inspire talented students to continue studying mathematics. Several students who took my classes went on to major in mathematics or to continue their education in graduate school.

I believe that teaching is a very important aspect of academic life. It brings meaning and satisfaction to my work. I view it as a chance to share my appreciation of mathematics and my experience, to make my career useful, and to influence young people’s lives.
TEACHING EXPERIENCE:

Over the last few years, I taught a variety of college-level mathematical courses at three different universities, ranging from introductory freshman classes to graduate courses, as well as classes geared towards business, engineering, science, or math majors. The complete list of classes is given below. In the future, in addition to teaching an assortment of standard courses of all levels and flavors, I would like to teach some advanced classes in analysis and other areas related to my work, perhaps including a graduate topics course.

- University of Missouri-Columbia: College Algebra, Elements of Calculus, Calculus for Business Students, Finite Mathematics, Advanced Calculus
  - “Green Chalk” Teaching Award, Spring 2004.

- Georgia Institute of Technology: Calculus 2, Calculus 3, Analysis 1, Analysis 2
  - Average evaluations: \textbf{4.67} out of 5
  - “Thank a Teacher” Award, Spring 2006.


OTHER TEACHING ACTIVITIES:

The variety of educational activities that I am involved in is wide and versatile. In my undergraduate years, I taught various extracurricular classes for talented middle and high school students. I also actively participated in the organization of numerous mathematical competitions for students. I have carried this passion on: at University of Missouri, I occasionally helped Alex Iosevich with his Putnam club, and currently I take an active part in the organization of the High School Math Contest held at USC. In fact, this year I am chairing a committee which prepares the problem set for the competition. In addition, I act as a faculty supervisor of the Pi Mu Epsilon club, advise undergraduate mathematics majors, help run the Analysis and Compressed Sensing seminars, give seminar talks for graduate students.

- Teaching mathematical clubs for middle school and high school students. Participation in organizing, mentoring, and refereeing various mathematical competitions for high school students. (Kharkiv, Ukraine, 1996-2001)
- Active part in the organization of the High School Math Contest: preparing the problem set (chaired the committee), judging, proctoring. (South Carolina, 2010-2011)
- Advising undergraduate mathematics majors. (South Carolina, 2009-present)
- Serving as the faculty advisor of Pi Mu Epsilon and Gamecock Math Club. (South Carolina, 2009-present)
MENTORING ACTIVITY:

I am actively involved in mentoring the work of graduate students. Several of my collaborative research projects include students as integral parts of the teams. The work with graduate students confronts one with numerous challenges. However, the results are often outstandingly rewarding and exceed all expectations. My gratifying experience with graduate students included:

- **Armen Vagharshakyan** (PhD 2010, Georgia Tech; currently a postdoc in Brown). My supervision of Armen’s work turned into a fruitful collaboration, which has already resulted in four joint papers on the Small Ball Inequality and discrepancy function – and I sincerely hope that this list keeps growing. In addition, I have served on Armen’s PhD committee.
- **Rui Yu** (PhD student, USC). I take an active part in guiding Rui’s work on low-discrepancy sets and numerical integration. We have written a joint paper with Rui and V. Temlyakov and are currently working on the sequel. I am serving on Rui’s PhD committee.
- **Xiaomin Ma** (PhD student, Brown University). I direct Xiaomin in our joint work in progress on the directional discrepancy, together with J. Pipher and C. Spencer.
- **Ranil Wanigasiri** has asked me to advise his work on the master’s thesis on “Interpolation of entire functions by integer points” after he had taken my class in complex analysis. He has received an MA in mathematics at USC under my supervision in May 2010. He is currently continuing his academic career at University of Colombo, Sri Lanka.

In April 2011, I have organized a mini-conference “Analysis: connections and applications” with five outside speakers whose talks were directed towards graduates students. In the summer of 2011, I am conducting an unofficial reading course on the basics of analysis (Rudin’s book) with an undergraduate math major at USC, Rachel Graves, preparing her for a graduate analysis course. Furthermore, I have encouraged and sponsored (with my NSF grant) the trip of 6 graduate students and one postdoc from USC to the Southeastern Analysis Meeting 2010 in Atlanta, GA, giving young researchers an opportunity to present their work and get acquainted the mathematical community.

I also effectively collaborate with other young researchers, e.g., Craig Spencer (PhD 2008), Ioannis Parissis (PhD 2007). It is my sincere intention to further evolve and deepen my involvement in the mentoring activities and overseeing the professional development of young mathematicians, including recruiting and advising PhD students.

STUDENT FEEDBACK:

My deep conviction that I have chosen the right philosophy and approach towards teaching is confirmed by the positive feedback that I have been constantly receiving in student evaluations. It gives me enormous pleasure to read the words of appreciation and gratitude from students – to me, these words mean that I am on the correct path to achieving the goals set in front of any teacher. In what follows, I have included excerpts from the student evaluations of the past several years.

University of South Carolina:

- **Calculus I** (Math 141). Fall 2010. Evaluations: **4.76 & 4.78** (out of 5).
  - Dr. Bilyk was great. Very easy to understand.
• Dr. Bilyk was able to clearly demonstrate and convey ideas and concepts covered in this course. He was also extremely helpful outside of the class during office hours.

• Great instructor. Would take him again in a heart beat.

• Great guy, great help when it comes to test prep. Knows his stuff and would take again!

• This was the second time I have taken this class and Professor Bilyk was the best teacher I’ve heard of so far. Great class!

• I truly enjoyed this class. I thought Professor Bilyk was a really good teacher, and I wish that I could take another class with him.

• He knew what he was talking about. Clear understanding of the subject. Helped us with our questions. Very, very, very helpful. Great professor.

• The professor spoke clearly and paced the material well. He has a superior Knowledge of calc and translates into a strong conviction when he teaches.

• Professor Bilyk is a superb professor.

• I believe he’s a great teacher.

• Knew what he was teaching well and could help you with whatever problem you asked.

• Mr. Bilyk provided useful information and taught in a way the course material could be easily understood.

• I thought Professor Bilyk did a great job of teaching and explaining course material. I had no negative experience with him.

• Has a great grasp of the course material, explains everything clearly making the subject matter easy to understand.

• He’s an excellent instructor who makes the concepts of calculus clear.

• Professor Bilyk tries his best to explain the material as thoroughly as he possibly can. The best mathematics experience I have had.

• He is a great teacher, he cares about the students and about them learning the material. If someone is lost, he will go back through the problem to the point they got lost at and explain how to do it.

• Professor Bilyk was great.

• Clearly explains everything step by step.

• I feel I’ve learned a lot.

• Awesome teacher.

- Very approachable and patient with student questions.
- The emphasis that was placed on qualitative aspects and interpretations of the methods and techniques studied in class was a great help in understanding the importance and applications of the material.
- Good professor.
- Very good professor. Very nice and helpful.
- Very good course. I enjoyed getting to enjoy and learn the theory.
- The additional Matlab work was very helpful for learning the material. It gave parts of the class a “hands on” feel.
- Real world applications are clearly evident. Good applied mathematics course.


- Very good teacher, used examples.
- The instructor was very straight forward and clear about his expectations.
- He explains the material clearly so that students understand it.
- He’s easy to communicate with. Gives good answers to questions.
- Best math teacher I’ve ever had. He has mastery of subject and he relates all the topics together well. He showed how examples can be applied to real world and the “big picture”. Excellent text used!!!
- Great classroom environment
- The professor did a great job teaching this class.
- The professor was great at explaining the material. Enjoyed lectures. Was able to follow along well in class.
- The course is complicated but the instructor makes time for students during office hours.
- The tests were a great reflection of what was actually taught and learned in class.
- Great for my engineering courses as a precursor.

• Dr. Bilyk is awesome! Hi class is easy to understand and the material makes me want to learn more. He is a great professor!

• Very good professor. I’ve learned a lot from him.

• He was a very good math teacher. He was better than anyone I’ve had in the math department. He was wiling to work with students, go slow, and help students as much as possible.

• Great professor.

• He is much better than my other math teachers. I was happy.

• The professor is very good. Even if the students are too scared to ask questions, he writes and explains every part of a topic.

• Dr. Bilyk is very knowledgeable about calculus. He has eloquence about the way he lectures. I greatly enjoyed his class.

• He presented the material in a very clear and discerning matter. It really helped me to learn and remember for exams.

• Great instructor, understands the material and does not mind answering questions. Made classroom atmosphere pretty relaxed...

• He knows what he’s talking about and really cares if the students learn the material.

• Dr. Bilyk was really helpful. I thought he taught everything very clearly, and was willing to explain something if there was a misunderstanding.

• He was an amazing instructor. His concern was that we learned the material.

• He is helpful and patient with students. Has slight accent but still gets his point across.


• Dr. Bilyk is very personable and approachable. Very helpful.

• Very well prepared for classes. ... Gentle to the students when students had questions, good at making everything clear and simple.

Georgia Institute of Technology: Calculus 2, Calculus 3, Analysis 1, Analysis 2
diamond Average evaluations: 4.67 out of 5

• An excellent teacher! I know you’re a postdoc right now. I hope, after you become a professor (especially a senior professor), you are still approachable like now and still willing to make efforts explaining complex materials—you have been doing really great in teaching this semester!
• I really enjoyed the class. I thought that Calc 3 might be hard but it ended up being manageable. thanks.

• I enjoyed the course. I think that the professor, Dmitriy Bilyk did a great job and I would like to take higher level math courses taught by him if I am able.

• This professor was probably my favorite professor so far at tech. The class was extremely well structured and planned out. As long as I attended lecture I was fine. It is also the only class where the professor clarified things that the TA made confusing.

• The Prof. was a great teacher. He explained some really hard concepts extremely well!

• Gave plenty of examples, starting with the simple and working up to the more complex, explaining every step along the way.

• Professor Bilyk was extremely effective. This has been, by far, my most effective math course here at tech. Normally it seems as if the professor doesn’t care for you, however I felt that Bilyk actually cared about my performance. A+++ 

• You are by far the best Calculus teacher I have had so far, despite my rather poor performance in your class.

• The professor did a phenomenal job teaching this course. He made it easy to understand difficult material