TEACHING STATEMENT

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I started to teach as a teaching assistant when I was a graduate student at the Massachusetts Institute of Technology. During this time, I held recitation for the undergraduate calculus courses and worked as a course assistant for several higher level classes. Over the last three years, I have taught as an instructor for various classes at the University of Pennsylvania, ranging from undergraduate calculus and problem-solving seminars to classes on Partial Differential equations, both on the undergraduate and graduate level. For each class, I have strived to develop my ability to communicate ideas to the students, as well as to create a stimulating and productive, yet friendly work environment. My teaching technique has been shown to be effective, which was confirmed by two Good Teaching Awards that I received at the University of Pennsylvania.

In my opinion, the greatest lesson that a teacher can teach their students is excitement for the material. In this way, the students will be more likely to develop an affinity to pursue the field further on their own and broaden their perspectives. When I was a student, the professors whose teaching I admired the most were those who "drew the students in" by exhibiting their passionate for the subject. I am excited about Mathematics, and my experience has shown that transmitting this excitement to the students is fundamental in my role as an educator. The students from my undergraduate PDE class at UPenn had the following comments to this end:

> "Vedran was great. He has the best laugh of any teacher I've ever had. I enjoyed listening to him talk about a field he was clearly excited in."
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> "Vedran is spectacular. You can tell that he enjoys the subject that he teaches, which makes class more enjoyable."

In order to do anything effectively, one needs to be organized and systematic. This is something that one learns in Math early on, and it applies equally as well to teaching Math. I think that it is important to give the students clear, thoroughly prepared lectures, from which they can take good notes to which they can refer later on. My students in the undergraduate PDE class had the following comments:

> "Professor Sohinger was by far one of, if not, my best professor at Penn. In lecture, he is very methodical and organized, which I felt lent to great lecture notes."

In my opinion, a key feature of a good class is to have a well-defined syllabus and to provide the students with a sufficient of resources in order to master it. To this end, I try to assign homework problems which complement and generalize the material covered in class. In a more advanced class, I think that it is necessary to give carefully written solutions, as here I am able to emphasize important points which we did not have time to go through in great detail in class. My students have commented on this aspect as follows:

> "...I also appreciated his well written solutions to the problems and his exam study guides, clearly laying out what may be tested and telling you the relevant sections in the textbook."

As a graduate student at MIT, I mostly taught recitation in the undergraduate linear algebra, multivariable calculus and ordinary differential equations classes. In introductory classes, the

students are usually asked to absorb and master many new definitions and concepts very quickly. I understand that this may be quite overwhelming, and that the initial reaction of some is to avoid asking basic questions, often for fear of embarrassment. As a TA, I tried to use several techniques to help the students resolve this problem. One such technique, which was suggested by one of my senior colleagues, was the use of a "memory board". On a designated board, I would quickly review important and relevant concepts from previous lectures. This board was left up during the whole recitation. If students used the memory board to ask questions related to previously covered material, this was a good indication to me that the recitation was going too fast, and that I had to backtrack.

My students described my recitations as being very organized and well-prepared:

> "I really would not have done as well in 18.02 [Multivariable Calculus] if I hadn't had such a strong recitation instructor. He obviously has a really good understanding of the material, but he also shows exercises and solutions to exercises in a well-organized, easily followed way."

The first class that I taught at the University of Pennsylvania was a graduate course in Partial Differential Equations. The students who took this class were mostly second and third-year graduate students in Math whose major field was in a slightly different area. In this class, I tried to emphasize intuition and examples, especially those which could be useful in other fields of Math, instead of teaching an advanced topics course. We went into great details in the study of concepts such as approximations to the identity and harmonic functions, both of which have fundamental applications outside of PDE theory.

In the context of a graduate class, I think that it is important for the instructor to keep an open mind for the possibility of learning from the students. Since the students in my graduate PDE class came from different mathematical backgrounds, there were a lot of opportunities to search for connections between PDEs and other areas of Math of which I was not previously aware. One interesting instance of this phenomenon was a discussion initiated by a student of number theory about the importance of the technique for determining the fundamental solution of Laplace's equation on the half-space in the field of analytic number theory.

The graduate PDE class that I taught was received well and for it I received a Good Teaching Award. The course has now become standard in the curriculum. Among the students' comments were:

> "I enjoyed the course a lot. The lectures were very well organized and clear."

The subsequent year, I taught the undergraduate version of the class on Partial Differential Equations, for which I also received a Good Teaching Award. The format of this class was quite different since most of the students were not Math majors. Nevertheless, their Math background was very strong. My primary goal was to keep a balance between the rigorous aspects of PDE theory and the applications which would be useful to the students who were from Physics, Economics, Oceanography and from other related Engineering majors. In doing so, I tried to keep the class focused on the subject and excited about its possible applications, without making it strictly computational. My strategy for doing this was to explain the main points and intuition behind the theory in such a way that people with a sufficiently strong mathematical background as well as with a good intuition for the possible applications could understand them. The students' responses included:

> "I am not a math major, and my math education at Penn has been informal, gleaning what I can from the geology and physics courses which I have taken. With Prof. Sohinger's excellent ability to communicate the information and the instructive homework made sure that I really understood the material."

> "Dr. Sohinger was a great professor for this class. I appreciated his manner of proving results. He doesn't just throw a lot of math up on the board, but stops where there are key steps or insights and explains them. "
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> "Prof Sohinger is wonderful! I thoroughly enjoyed his course. This was by far the best experience that I've had in a math class at Penn. Please continue teaching this course and others as well! I feel that my understanding of functions and operators has greatly escalated, and I find much of the content very fascinating."

In the Fall of 2012, I was in charge of preparing the students at the University of Pennsylvania for the William Lowell Putnam Mathematical Competition. I found this to be a great honor, since I learned a lot of Math through various competitions when I was a high school student. I was excited to pass this motivation on to the undergraduate students. During the Fall semester, we had a problem-solving seminar in which we worked on solving problems similar to those that appear on the Putnam exam. The experience proved to be beneficial to the students and our Putnam team ranked 31st, which was the highest team score in the last couple of years.

I believe that it is important to give the stronger Math students the opportunity to work on more challenging problems, such as those that we worked on in the seminar. In this way, they can develop their mathematical abilities and they can decide in which field of Math they are most interested. One of the top students in my seminar has recently decided to apply to summer undergraduate research programs in cryptography and in this way to further develop her interests. I was happy to write her a strong letter of recommendation for these programs.

This semester, I am teaching Calculus III, which is Linear Algebra and Differential Equations. This class is comprised mostly of sophomore students who are not Math majors. In the class, I am trying to apply the techniques which I used in my undergraduate PDE class, but at a slightly less advanced level. Most notably, I try to keep an interactive component in my lecture, which includes a asking a lot of questions instead of lecturing straight from the book. This has led to a positive response from the students.

Together with research, teaching has become an integral part of my professional life. I believe that teaching is an important component in the development of one's own Mathematical skills. In the continuation of my career, I would be happy to continue teaching Math classes, both at the undergraduate and graduate level.