Teaching Statement

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During my career as a mathematician, I have had the opportunity to teach a variety of courses at many levels. Each class provided a different perspective on how students learn mathematics and how mathematics can be taught. In my experience at University of Iowa, Dartmouth College, Cornell University, and at the University of Connecticut, I have become very conscious of the high expectations students have for good teaching and I tried to meet these expectations. To keep up with this rising challenge, I have worked hard to make my classes valuable to the students; I want to help them to cope with the inherent complexity of mathematics and to appreciate its beauty. To this end, I have developed a teaching philosophy that rests on three pillars: 1) an active, student-centered approach to teaching; 2) careful planning and preparation; and 3) a thorough understanding of the material, coupled with interdisciplinary examples and visual examples of the concepts discussed.

From my experience as an instructor at the University of Connecticut, Cornell University and Dartmouth College and as a teaching assistant at the University of Iowa, I have found that active involvement by students is an essential part of effective teaching. What I strive for in my classes is a give-and-take approach. I have found that informal, two way conversations are a more effective means of teaching than one way communications. To develop students' analytical and critical skills, I encourage them to justify their answers rather than to deliver yes/no responses. Justification not only facilitates a better understanding of the material, but also helps students to improve their solutions to the more challenging problems in their assignments. One specific technique that I have applied effectively to improve the students' critical and logical thinking involves the use of "intended mistakes" - plausible errors that are inserted into the discussion that may lead to difficulties if not treated critically. Students' sensitivities are heightened as they, the students, become more careful about potential errors. I have observed with pleasure the effectiveness of this method while grading homework and exams.

As an instructor for both introductory and more advanced classes, I have realized that although communicating with students and engaging them in class discussions is important, class preparation is equally significant. A comprehensive lecture preparation includes not only planning and structuring the lecture material, but also anticipating students' questions and misconceptions. Before going to class, I always take time to think of potential misunderstandings and prepare significant and intuitive applications of the material discussed in class. An efficient tool I have used is to display a prepared outline on slides, while working at the blackboard. The use of two media allows the main ideas to be displayed while carefully chosen examples, questions and problems serve to motivate theorems and ideas.

In my efforts to train students to think like mathematicians, I aim not only for them to understand and apply the mathematical ideas and concepts, but I also want to inspire in them the thrill of mathematical discovery. The most effective strategy I have found for achieving this goal is to let the students rediscover some of the key facts and results. I stimulate discovery either by guiding the students through a few carefully chosen questions, or by using computer technology. I have witnessed with great pleasure the large smiles of my students when they "discover" a variety of concepts – from limits and derivatives, to addition of vectors, to the Law of Large Numbers. I have coupled such methods of discovery with study-cases and group work. One experiment I performed with the students from an honors section of the probability class that I taught at Dartmouth College was to ask them to formulate and solve their own problem for the final examination. The challenge

was that the students had to propose a realistic problem which they had to derive from and apply to a "real life" situation. They had to use both theoretical and experimental methods to complete their project. I was amazed by the variety of problems the students suggested. They ranged from games played in the dorms to problems about piloting airplanes. The experiment helped students acquire a more profound knowledge of mathematics, and it helped them to understand the ramifications of mathematics in everyday life.

Each of my classes has inspired me, but perhaps my most fulfilling experience occurred while teaching a functional analysis class at Dartmouth College. This course is offered to first year graduate students to help improve their writing skills and to help raise the level of sophistication of the problems with which they can deal. I tried to accomplish these goals through written and oral feedback, through individual meetings outside of class, and especially through class discussions. In addition to developing theoretical concepts and supplying clear proofs, a special challenge of this class was to motivate the topics and to connect them with the students' other classes. Mediating class discussions on assigned applications, proofs, and examples proved to be very efficient for revealing multiple uses of theoretical concepts and in revealing their wide-spread implications. At the same time, the discussions helped students perceive mathematics as a unified subject. Watching young graduate students develop and learning to appreciate the unity of mathematics was a very rewarding experience for me.

All the courses with which I have been involved have reinforced the importance of teaching in a mathematician's career. I have enjoyed every class that I have taught and I look forward to having many more opportunities to help me grow as a teacher.

I believe that the most rewarding part of teaching is the comments that our colleagues and students give to us. Let me quote a few comments I received from former colleagues and former students.

> "If you remember, I posted your math3 lecture outlines on the math3 website, which appear this term at http://www.math.dartmouth.edu/ m3f07/study.htm. Now, I have begun to use them in class and am very happy with them. They give a good outline of the book. You probably know that you were the first one to use slides for lectures in the math department. Now, with two projectors in some rooms in Kemeny and projetors in most all, many faculty have adopted the system. Thought you'd like to know."
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> "Well, I hope you enjoy your time at Cornell. I enjoyed your teaching style for math 24, and hope that you continue to bless students with your work. "
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> " Hi Professor Ionescu, I just found out from a fellow student that math 24 was the last course you'd be teaching at Dartmouth, and I was just wondering if this was true. If it is, what are your plans for the future? At any rate, I'd just like to say that your course was amazing; I learned tons and you explained very well. You really inspired my interest in algebra, and I plan to pursue it in the future and will probably major in math. "
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> " Dear Prof. Ionescu, I wish you the best in NY. We'll miss you in Hanover."
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> " Hello Prof. Ionescu, When I picked classes in the fall I thought I would stop with math 8 but I liked it so much that I'm going to minor in it! I was wondering if you will be teaching math 22 or 24 any time soon next year. "
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> "Last year during the fall semester I was struggling with the idea of becoming a math teacher. This past semester your class instilled me that sense of excitement again and renewed my desire to teach math. I attribute this to you and I want to thank you for it."