

Teaching Statement

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I would like to convey the following: **I am a uniquely compelling applicant and would be a valuable addition to any department.**

This is seen by my singular combination of strong skills:

I am both creative and practical. I like people and I like math, and this enthusiasm is expressed in my teaching. I have an intuitive understanding of students' thought processes. I can read a room and adjust to my students or audience. I am an effective communicator. I am constantly trying to better myself and my communities. I have the understanding, vision, follow-through and drive, to effect positive change.

In addition to these abilities and interests, I also have the necessary experience to teach effectively; to mentor students through their academic careers as well as into industry; and to successfully guide student research.

Here I illustrate some of these characteristics and experiences. Much more information, including a research statement, a curriculum vitae, and teaching evaluations, can be found on my website: www.math.rutgers.edu/~rlg131.

Interplay of creativity and practicality

Bettering myself

I am always looking out to learn from others and adopt good teaching practices.

Example: Following in the example of one of my undergraduate professors, I often begin a class with something lighter, a short math story or a math joke. (Sample joke: *Aisha: Bobby, do realize that this series still converges even when we make the terms positive? Bobby: Really? Aisha: Absolutely!*) Ideally, the math stories will involve mathematicians from history, and will tie in compelling concepts which were being considered at the time and which are present in the course. I find that this gets the students awake, amused, engaged, and confirms for them that math is interesting and fun! It humanizes the mathematicians and therefore the math, and helps the students to see how they might be able to fit into the story of mathematical exploration.

Example: I learn much from one of my professors in graduate school. He makes the class a conversation, where he is often facing us, talking with us, and sensitively soliciting participation from us. From him, I have learned to teach qualitatively. By this I mean that I will continually check back in - I say what we will do, what we just did, and what this means. At this professor's best, he will weave in facts about the development of the material as he introduces it. He says which related questions were asked and why; how these questions were resolved and how the answers then steered the field; and he provides anecdotes about the field's developers. This commentary is an education in itself, as it shows how mathematicians navigate through uncharted waters. These practices take time to develop, but they are something I am striving to replicate in the classroom.

Another way in which I develop my teaching technique is through attending conferences, reading MAA periodicals, and reading math education books. From these I gather helpful tips and

approaches from other math educators, including: teaching undergraduate statistics using standards from the ASA; teaching linear algebra via a hybrid format; and using Microsoft OneNote to efficiently organize course materials.

I am constantly assessing my teaching and my classes and asking myself how I could improve them.

Example: The Calculus 2 for math and science majors course at Rutgers has a workshop component, in which they work in groups on challenge problems, and for which they write up a thoroughly-reasoned solution to one of the problems. Fully half of the workshop grade is supposed to be devoted to the quality of the exposition of the written solutions. I had already noticed while a TA for this course that oftentimes international students would submit solutions where the math was correct, but the reasoning was poorly expressed. It struck me that time and again I was handing back workshops with half-credit to these otherwise capable students. So when I was an instructor for this course the following summer and I saw this beginning to happen with one of the students, I contacted a friend of mine who is also a math PhD student in the department, and who is a native speaker of the same language as this student. I asked him if he wouldn't mind speaking with this student to make it clear to them what I am looking for, and I consulted with a faculty member about how to sensitively discuss this with the struggling undergrad. The student did meet with my friend, got his advice, and from then on was welcome at his office hours to ask him any questions about written solutions. If I were continuing at Rutgers, I would explore this further. I would try finding language support for students writing workshop solutions and proofs, and if this support consistently seemed to help, then I would search for a way to institute a designated place and time for this assistance.

I am eager to pursue creative and useful projects.

Example: About a year ago, another friend of mine in the department, Alejandro Ginory, shared with me an idea of his of taking a proof and tersely breaking it down into a diagram, illustrating the various components of the proof as well as how they fit together. I told him that I really liked this idea and thought it could be helpful as a pedagogical tool. We then worked on developing this concept together and named these diagrams "Proof Maps". In the spring of 2017, we incorporated them into an Introduction to Mathematical Reasoning course, and performed a study, comparing the development of the section which used proof maps against a section which did not. We presented on our experiences at MathFest, where our presentation was well-received.

Bettering my communities

Since high school, I have been involved in communities, clubs, and other organizations. This is out of an eagerness to contribute to the change I wish to see.

As a college student, I was sensible to the needs of the mathematics majors and desirous of building the resources that I thought would be helpful. This led me to become the president of the undergraduate math club, SUMS, for two years. During this time period, I transformed the club from a mostly inactive student group with occasional talks organized by professors to a robust club with weekly meetings alternating between social events and speakers. I also coordinated a variety of special events, including a weekly puzzle, a women in math luncheon, and sessions on L^AT_EX, graduate school, and industry jobs. At the departmental graduation, I was presented with the SUMS Leadership Award, an award the department created for me to recognize my unprecedented contribution.

As a graduate student, I have continued my dedication to service. Since my second year, I have been an organizing member of the Directed Reading Program, which is run by graduate students and pairs motivated undergraduates with a graduate student for supervised learning on a topic of the undergraduate's choice. In addition, I have been serving for three years as president of the Rutgers AMS graduate student chapter. Since college, I have matured as a leader, where I am now more able to delegate responsibilities and well as foster others' leadership skills. I received, through a vote by my fellow graduate students, a leadership award for my service - this is the Rutgers AMS

Graduate Student Chapter Leadership Award.

I have had the pleasure as a graduate student to have experience with a variety of other outreach programs. This includes being a co-facilitator in a math circle, in which I designed a session about knots and Möbius strips; being a teaching assistant for two summers for CNJ PEMA, a program funded by the NSF and designed to provide K12 educators with additional mathematics training; and being a graduate student coordinator for the DIMACS REU. Through these experiences, I have learned some of what is involved in running these programs; how to teach K-8 teachers as well as how to work alongside them; and how to guide undergraduate research.

Undergraduate Mentorship

A significant part of teaching and mentorship happens outside of class time. Here I argue that I have the knowledge, skills, and understanding, to effectively mentor undergraduates.

I can offer insight into potential careers for math majors. When I was president of the undergraduate math club, I strove to gain as much information about career paths for math majors as I could, and then I worked in industry for two years. Broadly speaking, I worked with big data, which is a field much in demand now. I have also had the pleasure of getting to know mathematicians in a variety of vocations. This experience and knowledge would enable me to advise students in making their career decisions, as well as to connect them with industry professionals.

As an undergraduate, I was the beneficiary of mentorship through special projects, an REU, and a senior thesis. As a graduate student, I have been an organizer for an REU and both an officer and a mentor for the Directed Reading Program (described in the previous section). Having experienced these programs from both the perspective of a student as well as a mentor and organizer, I am uniquely qualified to provide useful guidance as a professor.

Though my primary research field is mathematical logic, which can have a rather steep learning curve to climb before getting involved with research, the objects I study are combinatorial. There are therefore more approachable offshoots of my research which would be appropriate for a mature undergraduate and which I would be eager to facilitate. Moreover, I saw while organizing the DIMACS REU and even while working, how to supervise projects outside of my principal research. I am confident that I could both initiate and productively guide undergraduate research.

Potential Future Pursuits

Through reading periodicals and attending conferences, as well as through my own experiences as a student, I am aware that there are many directions in which a career as a mathematics professor can go. I imagine myself one day writing expository mathematics books for a general audience, or approachable texts for undergraduates.

I would also have much fun with a variety of creative pursuits. This may be through developing special courses or seminars, for example a seminar on the mathematics of voting during an election year, perhaps co-taught with a political scientist.

I foresee myself initiating outreach in a variety of ways. This may include facilitating a program like those I have worked with as a graduate student, e.g. a math circle or an REU.

I have been active with all these organizations and plan to be involved with more because I believe in their utility. I am confident that wherever am, I will substantially contribute to my department. I look forward to the opportunity to do so from the position of a professor.