TEACHING STATEMENT

LARRY ROLEN

In addition to becoming a top-rate researcher and a leader in my field, I consider teaching to be an important focus of my career. Over the past several years, I have worked hard to hone my teaching skills. Beginning with my graduate studies, I was fortunate to be able to organize and teach two introductory Calculus courses. Alongside teaching, I also had the invaluable opportunity to take a course with other new teachers to learn many instructive techniques and to receive constructive feedback from seasoned teachers. I began to refine my own teaching style during this year, placing a particularly great emphasis on establishing a dialogue with students so that they feel comfortable asking questions and become regularly engaged in the classroom. I also aim to foster mathematical intuition, engaging in regular discussions with students about the process of problem solving. I want students to see mathematics as more than simply formal symbol pushing and memorization and instead to view mathematical objects as things that can be manipulated and played with.

At the University of Cologne, I continued to take initiatives to improve and apply my teaching. Although I was not able to teach undergraduate-level courses, as they were required to be taught in German, I worked hard to find several additional ways to contribute to the learning of young people in Cologne. After obtaining special permission to teach a higher-level course in English, I organized a Master’s-level class (similar to a Ph.D.-level topics course in the US) on elliptic functions. I found that learning to teach at multiple different levels greatly enhanced my perspective and philosophy on teaching. I very much enjoyed teaching this class, especially as it allowed me the freedom to cover a wide array of topics and truly design my own unique course. By the end of the class, my students learned a great deal about several pillars of modern number theory with connections to many current “hot topics” in the field. One of my star students from the class went on to prove great theorems in my research program (see below). I find the personal interactions with students that a course of this type fosters to be extremely rewarding. To introduce young people to, and discover their interest in, the same questions and theorems that interest me is genuinely exciting.

Currently at Penn State I am teaching two sections of Calculus, a process which I find illuminating. Daily I am examining and reflecting on my teaching, gauging my students’ understanding of the material, and using any variations between the two lectures to get immediate feedback to fine-tune my teaching plan. I understand that becoming a stronger teacher is a continual process and I am thankful for the many resources for feedback and discussions with other teachers that are available here at Penn State and regularly implement new techniques from this community.

In addition to teaching, I find it extremely important and enjoyable to mentor and foster research in young students. My advisor Ken Ono continuously supported and guided me, and I can safely say that my life would be very different without him. Simply being in his presence, one is swept away by his great excitement and passion for mathematics. The extremely positive and supportive working relationship that Ken Ono creates with his students is one
that I aspire to follow. I very much enjoy mentoring young people and think that I too have the passion and skills to become a great advisor. I am easily able to break down my knowledge in an understandable way and to come up with many interesting questions for students, with a good sense for matching people’s abilities and interests with particular questions.

Having participated in two Research Experience for Undergraduates (REU) programs, as well as helping assist as an instructor for an REU at Emory University, I have realized the best way for young people to transition to a future career in mathematics is to get involved very early in applying the theoretical knowledge they gain in classes to prove their own theorems. Besides the fact that advising puts one’s own research into perspective and is a very rewarding experience, I feel that helping these students is an important service to the community. While in Germany, I felt that the students there could benefit enormously from a similar program as exists in the US. These thoughts inspired me to ask myself: why not start such a program of my own? In order to make this idea a reality, I applied for and was subsequently awarded a 60,000 EUR grant. I had over 30 applicants for the program and recruited high quality international students. Participants included an International Mathematical Olympiad medalist and another student who was awarded a prestigious internship at the Max Planck Institute for Mathematics in Bonn.

My Cologne Young Researchers in Number Theory Program was very successful, having resulted in three papers. These results include proofs of general theorems on producing class invariants for ring class fields using negative weight modular forms (which is related to a conjecture arising from a paper of Bruinier and Ono on algebraic formulas for the partition function which I proved along with Michael Mertens), and new theorems on radial limit problems for large classes of mock theta functions. The final project is especially exciting, as the students followed up on important work of Ramanujan concerning the properties of generalized Rogers-Ramanujan continued fractions, finishing a problem first investigated in a paper of Huang, and they are going much further than well-known work of Bowman and McLaughlin in proving uncountable sets of divergence on the unit circle for such continued fractions. Intensively advising 9 students every day for over 6 weeks was very hard work, but it has been one of the most rewarding things I have ever done. I take pride in the accomplishments of my young researchers and regularly keep in touch with all of them about their research and future career plans. I am now always working to find and create more such opportunities to kickstart young peoples’ careers. I am currently attempting to organize another REU-type program with Claudia Alfes and Ahmad El-Guindy, advising an undergraduate student at Penn State on a research project which will hopefully become her thesis, and I have been invited to give three undergraduate talks at various universities this semester since I have begun to be recognized as a good mentor.

I am strongly committed and dedicated to my students’ futures whether they be Calculus students that cross my path for only a single semester or prospective career number theorists. To put it simply, my teaching philosophy is in every classroom to create an environment where the students feel supported and comfortable asking questions and creating discussion, to exhibit to my students that I care about their success in the course and their future, to assess the students’ abilities and guide the course at a pace according to their skills, and most of all to understand that to be an excellent teacher I must continuously reexamine my teaching methods and work to improve them.