Shishi Luo – Teaching experience and interests

My teaching experience spans eight years, two countries (Australia and the US), and different types of institutions (public and private). Imparting my knowledge and insight to others has been, and continues to be, a rewarding and integral component of my academic career. Highlights of my teaching qualifications include: extensive experience in course instructorship (§1.1), experience with students from diverse backgrounds (§1.2), and – owing to the interdisciplinary nature of my research – an interest in effectively teaching interdisciplinary mathematics courses §2.2.

1 Teaching experience

1.1 College instruction

I have taught four undergraduate math courses at Duke ranging from freshman calculus (Calculus I and II) to more advanced undergraduate courses (Ordinary and Partial Differential Equations and Multivariate Calculus for Economists). The students that I teach major in diverse fields, from pre-med and engineering to economics and the humanities. My duties as instructor included: preparing and giving lectures (150 mins total a week), writing and grading midterm exams, and holding office hours. My strengths as a teacher are reflected in the positive feedback I have received from students:

- **on lesson planning and organization.** *'The organization of the course could not be any clearer,' 'Shishi gives great lectures and is very organized,' 'Wonderful teacher, clear and organized lectures,' 'Shishi gives amazing lectures and is organized and knowledgeable.'*
- **on dynamics in the classroom.** *'Shishi is very enthusiastic about the course,' 'Professor Luo is an excellent teacher,' 'The instructor was very enthusiastic .... She asked us to participate and encouraged questions,' 'Shishi was a very good and informative instructor. She was good at teaching and explaining the lessons and was very helpful.'*
- **on what students learn from my courses.** *'[I learned] New ways of looking at problems and confidence that there is always more than one way of approaching a problem,' 'As I am taking Math 103 this semester, I realize that I have a very solid foundation for the course thanks to you,' 'I have gotten better at understanding how to solve math problems,' 'She also knows how to explain things well so that the student understands.'*

The effectiveness of my teaching is also reflected in the fact that, in every course I have taught, my students have received a higher proportion of A's in the final block exam compared to other sections or previous years (Calculus I: 33% vs. 18%, Calculus II: 20% vs. 16%, Ordinary and Partial Differential Equations: 43% vs. 33%, and Multivariate Calculus for Economists: 50% vs. 28%).

1.2 Experience with students from diverse backgrounds

Students from diverse ethnicities and backgrounds have featured in all my teaching experiences. The most notable of these was when I was a Peer Learning Tutor for the Academic Advancement Program (AAP, UCLA, 2004-2005). One of the goals of the AAP is 'to create and administer innovative academic programs for first generation, low-income and students who have been historically underrepresented in higher education.' In this position, I held small group tutorial sessions three times a week for students taking introductory statistics and calculus. These students were highly motivated and a pleasure to teach. To challenge them, I would occasionally make up unconventional word problems (*Explain how to apply Bayes's Theorem to assess the probability that Mrs. Peacock is guilty, given the murder weapon was found in her possession shortly after the crime.*). Not only was this particular group of students receptive to these challenging problems, it was through this process of trying to engage them at a higher intellectual level that I became fascinated with probability, a topic that is now a major focus of my research.

2   Teaching interests

2.1   Courses I am interested in teaching

In addition to the introductory-level Calculus, Linear Algebra, Differential Equations, and Probability and Statistics courses, I am especially interested in teaching advanced/specialized courses in the following fields:

- Probability and Stochastic Processes
- Computational and Mathematical Biology
- Analysis

2.2   A new paradigm for teaching quantitative biology

In what I call traditional quantitative biology courses, course material is often presented in the same way as quantitative biology research: a biological system is introduced, a quantitative method is described, insights are drawn from the method, and extensions and variations are considered. This is a great way to get students interested in existing areas of research. However, as a teaching method, it has the drawback that particular biological systems are *always* associated with particular quantitative methods or models. Given that the growth of quantitative biology will surely come from new areas where models have previously not been established or from novel uses of old models, I think quantitative methods should be presented in such a way that they stand independently of the particular system they have traditionally been associated with. As an example, the model for the spread of an epidemic on a network is mathematically almost identical to the that for the spread of a forest fire. Students may therefore develop greater insight and intuition by seeing a method for understanding a general phenomena (e.g. spread or contagion), and learning how this method applies across diverse biological systems, rather than studying each system separately.