

Teaching and Service Statement

ERXIAO WANG

Teaching experience I have **extensive** teaching experience with **excellent** teaching record. I have enjoyed teaching 35 courses as a lecturer for nearly 10 years, ranging from large classes with about 120 students to small classes with 16 students. They include all levels of (multivariable) calculus, linear algebra in both pure and applied versions, college algebra, discrete math for computer science majors, linear programming, differential equations, real analysis, complex analysis, probability, basic statistics, and structure of modern geometry.

Moreover, I served in an **REU** (Research Experience for Undergraduates) program on quantum computing hosted by Northeastern University in 2001. I not only helped design the course homepage, but also audited some lectures. I won the **Teaching Excellence Award** in 2002 at Northeastern University.

I often use slides and graphics programs in teaching and always like to try new technology. For example, I have been using the *BlackBoard* software since Summer 2005, which is very useful when organizing the courses and to communicate with my students and my TAs. I am using a similar software *IVLE* in Singapore to manage my big complex analysis class.

I would also like to highlight my new teaching experience in 2006 from the course ‘Structure of Modern Geometry’, which is designed to **train high school teachers**. This was the first math course that I taught in a computer lab, using the software Geometer’s SketchPad. My students and I have truly enjoyed doing several interesting math projects together, such as geometry of ancient architecture, the golden ratio, fractals, plane tiling, Fermat point and its applications etc..

I love teaching and my students like me. The attendance of my classes is always quite high. It has been quite common for me to get students’ praises in conversations and evaluations. They have really made me very happy. I want to continue growing as a passionate teacher and scholar.

Teaching philosophy In college, I got straight A’s in all math, physics and computer courses. This rich experience enabled me to teach a variety of courses in diverse disciplines even when I was a TA in Boston. In my view,

$$\text{Inspiring examples} + \text{Problem solving} = \text{Math learning} .$$

To be excellent, a math teacher just need to know further how to convey these two aspects *interactively* and *effectively* to class. Let me elaborate it by what I do before, in and after class.

Good preparation is always important. Most textbooks nowadays come with some interesting math histories and beautiful pictures that I often use in class for fun. It also counts tremendously to prepare two different treatments of one important topic, just in case some students might have difficulties following the textbook. For example, I usually teach Cauchy-Schwartz inequality by providing both the long algebraic proof and the intuitive geometric proof. Students appreciate such a beautiful contrast very much. Another example is to find a rotation matrix easily as a linear map, then to prove quickly hard formulas for sin or cos of sum of two angles. I also use it to illustrate invertible matrices. Good examples reflect intrinsic beauty of math and/or draw connections between different fields. My students and I had a lot of fun in my probability

class last year, since we have explored many intuitive, counter-intuitive, interesting or inspiring examples such as birthday problem, the matching problem, gamblers' ruin problem and the example showing any two of three events are independent but they together are dependent. I also taught them how to prove, how to understand abstract notion conceptually, and how to appreciate mathematical abstraction, with lots of carefully chosen examples.

In class, I encourage my students to participate in the process of solving the examples. I pause for questions every few steps, and whenever a student asks a question, I explain until he or she understands. So most of my students feel *comfortable* asking questions during my lectures. But still, some are too shy to say anything. Then I will go to help them when the class is practicing a problem following the example. They really ask questions in person. After class, I encourage them to work together, or visit my office, or go to the Tutoring Center whenever they have difficulty in homework. I usually come to the classroom 5 minutes earlier and talk with the students about everything, especially homework. I also fix some time in class to review hard ones. I would extend the review to any time longer if they keep on asking questions. This attitude and policy works well to keep the class doing homework regularly and beneficially.

Besides 3 office hours per week, I also encourage students to make appointment with me whenever they need help. For example, I sometimes made up the missing classes for special students in some sports team or band who cannot attend many of Friday's classes. They found it very helpful.

Being a mathematician, I know very well that learning a new concept could be much faster and easier from a good teacher. I have appreciated such help from my colleagues, so I am willing to spend time helping my students out.

Teaching interests Based on my experience, I am open to teaching all courses in the core curriculum of undergraduate math, including some in statistics and computer science. My research centers on integrable systems and their applications to differential geometry, which involve many branches of math and physics, hence also with many research opportunities. So as a long term goal, I aim to develop with my colleagues some *undergraduate course*, to ease the learning of this interdisciplinary subject and to **direct undergraduate research projects**. I anticipate the opportunity to organize courses or seminars on geometry and analysis.

Serving the community I am always active and looking forward to new opportunities in serving both the local and the math community in general. Some of my services are listed below:

- *Administrator* of the department linux server, Northeastern University, 2000-2003;
- *Volunteer and website designer* for the XVith Annual Geometry Festival, Boston, 2001;
- *Website designer* for the summer school of quantum computing, Boston, 2001;
- *Committee member* for a Ph.D. Oral Exam, University of Texas at Austin, 2005;
- *Mentor* in Faculty and Staff Mentor Program for freshmen, Austin, 2005-2007;
- *Referees* for 9 research papers of different journals, 2003-present;
- *Reviewer* for Math Review of American Mathematics Society, 2006-present.

Further Information Some old course homepages may be found at:

<http://www.math.utexas.edu/~ewang>

In addition, the letter from Professor Daniel Allcock focuses on my teaching.