

## Statement of Teaching Philosophy

Zhifu Xie

My philosophy on teaching is relatively simple: the teacher should not only teach students to learn certain basic mathematical techniques which are sufficient for solving standard problems but also help students to have better learning skills.

My primary goal in teaching is to motivate my students to be active learners in mathematics. In addition to teaching my students mathematics, I also discuss emphatically how to study, how to read the text, and how to apply mathematics skill to their other classes or even real life. Every student in my class is there for a purpose. For those students who are engaged or gifted in mathematics, I endeavor to further inspire them and to give them more ideas of the broader context of each lesson. For those students whose true interests lie elsewhere or who struggle with the material, I focus on drawing connections between the syllabus and their chosen fields, and giving them the knowledge they need to succeed in learning. Once my students want to study mathematics and once my students know that they can do very well in mathematics, they learn more than I teach because they can teach themselves.

To achieve the goal of my students' becoming "active learners", when in front of any class, I urge students to interact with me concerning the material I am presenting, but I usually like participation to be voluntary. To achieve this, I build a personal relationship with each of my students. I have been applauded by students for being an approachable and accessible instructor. My office hours are often overflowing, leading to an impromptu discussion section in the hallway. I bring a lot of energy and excitement to the classroom, striving to keep my students learning, interested and motivated. For example, in fall semester 2004 I taught Business Calculus in our Freshman Academic program. This program allows for my students to have lunch with me. This makes them feel comfortable in class, and they do not hesitate to ask questions or make suggestions.

A main purpose of my teaching is to convince students that they can solve many problems by using their own skills. To achieve this, I usually lead students to find new methods or new theorems instead of just stating the methods or theorems. Here, for example, is how I introduced integration by substitution in my Calculus class. "The Chain Rule tells that the derivative of  $\sin x^2$  is  $2x \cos x^2$ . Now let's work backwards. What if we want the integral of  $2x \cos x^2$ ? But how can we easily know the antiderivative is  $\sin x^2$ ?" After students thought it through and eventually supplied the common method: simplification, they responded by stating the essence of integration by substitution, which we then formalized. Teaching in this manner implicitly sends the message that students can use their own skills to solve problems, even if they never encountered these problems before. Whether in research or in elementary mathematics, one learns more from a good example than from vague generalities.

We live in a time when the newest technology changes and shapes the human learning process. Our teaching should also take advantages of the modern technology. Appropriately using graphing calculators and computer programs can be a joyful adventure for the students and the instructor. The technology, however, needs to remain only a tool, it should not be the main focus of the lecture, and basic mathematical drills should be emphasized over the use of advanced tools. If a problem can be solved by using calculator, but also solvable without a calculator, I always present them a solution without using a calculator. I believe that is the way to give students a deeper understanding of the basics. For upper-level classes, the students are usually more serious science or engineering majors, and they have better mathematical backgrounds, so leading them to the frontier of modern technology is necessary, and is a great aid for their learning of mathematics.

## Teaching Experience

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For all classes below, I was solely responsible for the course, including setting the curriculum, writing/grading exams, preparing and delivering lectures, assigning homework, etc., as well as giving final grades.

### Teaching at Virginia State University (as Assistant Professor)

**1. Basic Mathematics I; Introduction to College Algebra and Trigonometry**(Fall 2007)

Used graphing calculator and multimedia technology

**2. Basic Mathematics II; Introduction to College Algebra and Trigonometry; Calculus II**(Spring 2008) Used graphing calculator and Maple in class.

### Teaching at College of William and Mary (as Visiting Assistant Professor)

**1. Introduction to Numerical Method and Analysis**(Fall 2006) Used Matlab as a primary program language to implement the algorithm in homework and projects.

**2. Calculus II**(Fall 2006) Used graphing calculator and Maple in class.

### Teaching at Brigham Young University (as Teaching Assistant)

**1. Trigonometry**(Summer 2006)

**2. Calculus III**(Fall 2005 and Spring 2004)

**3. Business Calculus**(Fall 2004)

### Other related experience: (all at Brigham Young University)

**1. Partial Differential Equation Teaching Assistant**(Spring 2006) Responsible for leading discussion sessions, reviewing lectures, grading quizzes/exams.

**2. Real Analysis (Graduate class) Teaching Assistant**(Fall 2003 and Winter 2004) Responsible for leading discussion sessions, reviewing lectures, grading quizzes/exams.

**3. Calculus Teaching Assistant** (Fall 2002, Winter 2003) Responsible for leading discussion sessions, reviewing lectures, writing/grading quizzes, grading exams, and grade assessment.

**4. Mathematics Lab Teaching Assistant**(2001 Fall, 2002 Winter) Help students on homework and with questions.

## Teaching Interests

**1.** All lower level mathematics courses (including statistics).

**2.** Higher level courses: Differential Equations (ODE and PDE), Numerical Analysis, Applied Mathematics, Mathematical Modeling, Engineering Mathematics, Linear Algebra, Analysis (real and complex), Abstract Algebra, Discrete Mathematics, Differential geometry.

**3.** Graduate courses: Differential Equations (ODE and PDE), Dynamical Systems, Applied Mathematics, Classical Analysis (real and complex), Functional Analysis (linear and nonlinear).

**4.** Also interested in application of technology in classes (computer software, web-based courses, web-based programs, multi-media classroom, computer aided lecture);