

TEACHING PHILOSOPHY

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Introduction

I am strongly committed to mathematics education.

The single most important thing I teach is critical thinking — a tool that can influence educational development beyond just mathematics. When teaching I emphasize concepts and interpretations of mathematics and not just the mechanics necessary to arrive at the answer. I strive to share my enthusiasm for the subject with my students, with the hope that they will develop an interest in mathematics and its application. I set high expectations and have found that students will generally rise to these expectations. Beyond instruction, I see the classroom as a social exercise whereby different individuals from diverse backgrounds come together to share their perspectives and desire to learn. I try to encourage a blending of social and academic interaction, so that students find academic support among their peers. As such, I design exercises and activities which demand peer interaction both in and out of the classroom. This is especially helpful for younger students, since it allows them to form social circles in which academics is not only respected but also encouraged. These academic peer groups continue to provide the students with academic peer support for many semesters after their introduction.

Teaching Experience:

I have taught a variety of mathematics courses at the University of Texas at Austin and the University of British Columbia. In particular I have been an instructor or a teaching assistant for precalculus, calculus (for engineers, for business students, both first and second semester) and most recently introduction to number theory. Additionally I have participated in a number of special academic programs concerned with minority retention, emphasis on study skills and accelerated learning.

I am very comfortable (and enjoy) teaching at the level of calculus and below. My experience has taught me to anticipate, identify and correct student difficulties early on. In these subjects I aim for a three-pronged approach: conceptual, graphical and formal. Many students are most comfortable with a conceptual approach, where concepts are presented through analogies and examples (identifying derivatives with velocity for instance). By understanding the basic idea of what we are studying, the actual mechanics necessary to arrive at the answer become less frightening. I also rely heavily on graphical models. Much of my board time is spent analyzing graphs with the idea that pictures often carry more information than strings of abstract symbols. There is significant overlap between graphical and conceptual teaching, and together these techniques often join to explain *what* we are studying and *why* we are studying it. Since mathematics is employed by other disciplines, it is also important to teach students *how* to get to the solution. This is achieved through both peer learning and formal presentation of the steps necessary to arrive at the answer. I rely heavily on class interaction to teach the formal steps necessary to solve problems. When lecturing, I quiz the students at every stage of problem solving, taking different ideas and

directions to arrive at the answer. Often I let the class take wrong steps before finding our way to the solution. These missteps are an opportunity to employ critical thinking, correct misconceptions and to demonstrate the actual process of doing mathematics. Not every student appreciates all three methods of presenting mathematics, but among the three one of them is usually accessible to each student.

I have had class sizes ranging from 14 to 60 students. Teaching for different sized audiences presents different challenges. Large classes are fun to teach, since there is an element of showmanship necessary to captivate the audience. In large classes, using conceptual, graphical and formal teaching components is especially important since it is often impossible to identify and correct the difficulties of every student in lecture. In large classes, interaction and feedback is also important so that students see the class in some sense directed by their peers. Recently I have employed a web log (<http://drsincclair.blogspot.com/>) so that students in my large number theory class of 50 students have an opportunity to interact with me and each other beyond just class and office hours. Small classes provide a different teaching environment. The ability to learn students' backgrounds and learning styles makes teaching small classes very rewarding. In small classes I employ structured peer learning by providing exercises and activities which demand social interaction, with the hopes of developing long term academic peer groups. I still employ conceptual, graphical and formal teaching methods, but in a way tailored to the individuals in the class.

While the bulk of my teaching experience has been in lower division mathematics, I have also very much enjoyed teaching introduction to number theory. Teaching proofs and advanced concepts is a new challenge, and one which I have found very rewarding. I look forward to the opportunity to teach more and varied advanced courses. I would also like to participate in mathematics education at a graduate level — I would like the opportunity to guide and influence the mathematical development of other mathematics researchers. I have given numerous talks to graduate students, and professional mathematicians at every level. I see this as an important extension of teaching. I strive to give coherent lectures which provide information to both experts and non-experts in my field.

I view my role in mathematics education as a facilitator of critical thinking by teaching the *why*, *what* and *how* of mathematics. As a student myself, I have discovered that mathematics often must be learned instead of taught, and that conversations with others interested in mathematics facilitates the absorption of mathematical ideas. I try to establish an environment in the classroom which lends itself to individual critical thinking, but also provides a place where students can interact and learn from each other. Teaching is an interactive discipline, and I am constantly learning how to be a better teacher. To me, being a mathematics educator is an important part of being a professional mathematician; a view which inspires me to continually improve myself as a teacher.

Overall Instructor Rating

Out of a total of 267 student evaluations.

very unsatisfactory	unsatisfactory	satisfactory	very good	excellent
.5%	.5%	8%	29%	62%

Selected Comments from Student Evaluations:

Chris Sinclair is an excellent teacher. In fact, he has been the best math teacher I've ever had. He's a great speaker and very knowledgeable in calculus. He communicated very effectively to the class. He is the reason I actually understand calculus.

Chris was helpful in and out of class. He was very knowledgeable of the subject and I learned a lot from him. He pushed to give me the confidence I once had, and I think he did well. Thanks, Chris.

Chris has been a great instructor. His enthusiasm is contagious and he is genuinely interested in the class.

He is a very good TA not only because he knows the material very well but because he makes everybody in the class involved. If I have to pick a TA again I will certainly pick him.

Awards:

2001-2002 Frank Gerth III Teaching Excellence Award

Special Programs:

1. **Emerging Scholars Program (ESP):** The Emerging Scholars Program is a challenging honors-level academic program for a select group of entering freshmen majoring in the Colleges of Natural Sciences, Engineering, Business, and Liberal Arts. Started in the Fall 1988, ESP was designed to provide motivated students with an opportunity to study calculus in a challenging but friendly environment.¹
2. **Texas Interdisciplinary Plan (TIP):** The TIP First-Year is a highly selective academic program in the College of Liberal Arts and the College of Natural Sciences for

¹<http://www.utexas.edu/cons/esp/>

incoming first-year students who have demonstrated strong motivation and commitment to their own learning while in high school. TIP First-Year creates a small college atmosphere at this major research institution. The program offers a rigorous course of study with an emphasis on core classes and critical thinking in concert with a unique blend of academic opportunities and personal benefits.²

3. **First Year Interest Groups (FIG):** A FIG or TrIG is a cohort of up to 25 first-year freshmen or transfer students who take two to four courses together. Typically, one of these classes is small, to allow you to recognize your FIG-mates there and in your larger classes. In addition, your cohort also attends a 1-hour seminar once a week. This seminar is facilitated by an academic advisor and a peer mentor. In the seminar, you will take part in discussions about issues you will encounter as a first-semester student, including study and time management strategies, social opportunities and issues, campus life and involvement opportunities, and a lot more.³
4. **Connexus:** Connexus provides a diverse set of academic programs and resources that traverse boundaries between colleges and disciplines and enhance the quality of undergraduate education.⁴
5. **Supplemental Instruction (SI):**
 - SI is an academic support program sponsored by the U T Learning Center.
 - SI offers content-based discussion sections attached to large entry-level courses
 - SI discussions may be optional and announced the first week of classes or may be integrated into the course as a required discussion section.
 - SI discussions are led by graduate and undergraduate Teaching Assistants and are designed to reinforce the content of the course and at the same time offer course-specific study, problem-solving and test-preparation strategies
 - SI discussion leaders are trained in active learning techniques and meet weekly in groups according to discipline to discuss lesson plans and teaching strategies.
 - SI helps students be more successful in the course. Research has shown that SI students score an average of 0.5 to 1.0 grade points higher than non-SI students in the same course.⁵

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²<http://www.utexas.edu/tip/about.html>

³<http://www.utexas.edu/student/vpsa/FIG/about.htm>

⁴<http://www.utexas.edu/student/connexus/>

⁵<http://www.utexas.edu/student/utlc/si/readabouts/supplementalinstruction.html>