

TEACHING PORTFOLIO

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1. TEACHING PHILOSOPHY

I have taught calculus and linear algebra to life science, engineering, statistics, and mathematics students. Through my teaching I hope to not only motivate students to learn, but to instill in the students the desire and need to perform to the best of their abilities. My teaching is currently guided by the following principles:

To Motivate Students To Learn

When I think of the mathematics courses from which I retained the most, I recall motivated teachers who were passionate about the course material being taught. Their interest in the material not only encouraged me to want to learn mathematics but showed me that mathematics can be beautiful. I hope to engage my students in the courses I teach and bring mathematics to life for them as it was for me. In order to do this I try to find aspects of the material that interest me and share these with my students. I also ask my students to share aspects of the material that interest them. I encourage my students to overcome their challenges and celebrate their successes with them.

To Talk With Students

The majority of the mathematics which I have learned has been through conversations with other people. These conversations have taken place during classes and in private meetings with other students and teachers. I believe that these conversations had such a positive impact on me because they gave me a chance to clarify facts and my own confusion. A student's misunderstanding can have serious implications in the learning of the material. For this reason, it is very important that I talk *with* my students rather than *at* them. I hope to encourage my students to ask me questions by demonstrating that I will sincerely listen and attempt to provide answers.

To Challenge Students To Think For Themselves In Logical & Creative Ways

I realize that not all my students will appreciate mathematics as I do. I believe that a university should prepare students to become productive citizens in society. With this in mind, I try to keep the courses I teach interesting by showing that the material is relevant to other fields of study. By linking students' other courses to the material seen in my course I express that an individual never knows when their thoughts will influence the face of a subject. For example, I often tell the story of how Gaussian elimination, a topic seen in an introductory linear algebra course, was described by Gauss who needed the process for studying an asteroid! I hope to instill in my students the pleasure of thinking for themselves in logical, creative ways. In class we examine how to analyze mathematical problems and discuss numerous possible methods to solve them. I also challenge my students to further pursue what has been seen in class by giving weekly challenge questions and assigning guided in-depth projects.

To Improve My Teaching

I admire the teachers who have taught me difficult courses in an effective manner. I believe that the best way to say thanks to these teachers is to strive to also be an effective teacher. In order to do this I need preparation, practice, and feedback from self-reflection, students, and colleagues. I always work to improve my teaching abilities because I desire that my students get from me the personal best that I can give them (afterall, I do expect my students to perform to the best of their abilities so they should not expect any less from me).

2. UNIVERSITY TEACHING EXPERIENCE

The following is a brief description of my experience as a university instructor.

Queen's University:

- *APSC 174 - Introduction to Linear Algebra for Engineering Students*, Winters 2003, 2004, and 2005.
- *Math 121 - Differential and Integral Calculus*, Fall 2001 and Winter 2005.

Syracuse University:

- *MAT 295 - Calculus I*, Fall 2005 and Spring 2006.
- *MAT 331 - First Course in Linear Algebra*, Spring 2006.

California Polytechnic State University:

- *Math 141 - Calculus I*, Fall 2006 and Fall 2007.
- *Math 142 - Calculus II*, Fall 2006, Winter 2007, and Winter 2008.
- *Math 143 - Calculus III*, Spring 2007.
- *Math 248 - Methods of Proof in Mathematics*, Spring 2008.
- *Math 206 - Linear Algebra I*, Spring 2007.
- *Math 306 - Linear Algebra II*, Fall 2007.
- *Math 406 - Linear Algebra III*, Winter 2008.

3. TEACHING AWARDS

- Golden Apple Teaching Award. For teaching *Introduction to Linear Algebra for Engineering Students (APSC 174)*, Queen's University, 2005.
- First Year Applied Science Teaching and Learning Award. For teaching *APSC 174*, Queen's University, 2005.

4. CURRICULUM DEVELOPMENT ACTIVITIES

- Co-author (with C. Koestler and D. Pollack) for course notes for *APSC 174 - Introduction to Linear Algebra for Engineering Students*, Queen's University. The notes were introduced in the Winter 2004 semester and revised for the Winter 2005 semester.

5. PROFESSIONAL DEVELOPMENT ACTIVITIES

5.1. Instructional Training.

- As a graduate student I tried to take advantage of workshops and courses which focus on instructing at the university level. In particular, in the Winter 2003 semester, I successfully completed the full semester course *SGS 901 - Teaching and Learning in Higher Education* offered by the Instructional Development Centre at Queen's University. In this course students and instructors participated in reading various articles on teaching, small-group work, and seminars. Students were required to give small presentations after which feedback was given. To conclude the course, students were asked to complete a teaching portfolio.
- I participated in the *WINGED (Writing in Generally Every Discipline)* workshop offered by the Centre for Teaching and Learning, California Polytechnic State University, Fall 2006. This workshop suggested useful tips for constructing writing assignments for students. As a result, I often assign course projects which involve some writing.

5.2. Instructional Certificates Obtained.

As a graduate student, I participated in the *Program in University Teaching and Learning* organized by the Instructional Development Centre at Queen's University. As a result, in May 2003, I was awarded the following certificates.

- Certificate I: Scholarship
- Certificate II: Practical Experience
- Certificate III: Professional Development

5.3. Educational Leadership Activities.

- Algebra Graduate Examination Committee Member, California Polytechnic State University, September 2006 - present.
- Active participant (non-member) of Curriculum Committee Meetings, California Polytechnic State University, September 2006 - present.
- Academic advisor of undergraduate mathematics majors, California Polytechnic State University, September 2007 - present.
- Panel discussion member: "Getting a Job in Academia", 32nd Annual New York State Regional Graduate Mathematics Conference, Syracuse University, April 2006.
- Organizer of Teacher Session for the Sonia Kovalevsky Festival, Syracuse University, October 2005.
- TA Mentor/Liaison, Department of Mathematics and Statistics and the Instructional Development Centre, Queen's University, September 2004 - April 2005.
- Organizer of Marking Session, Teaching Assistant Workshop, Department of Mathematics and Statistics, Queen's University, September 2004.
- Canadian Mathematical Society Student Committee Co-Chair, July 1, 2002 - June 30, 2004.
- Canadian Mathematical Society Board Member, Student Rep., Jan. 2000 - June 30, 2004.
- Canadian Mathematical Society Student Committee Member, Jan. 1, 1998 - June 30, 2004.
- Co-organizer (with Dr. M. Orzech and C. Leith) of the Teaching Assistant Workshop, Department of Mathematics, Queen's University, September 2001 and 2002.
- Canadian Mathematical Society Judge, Canada-Wide Science Fair, Queen's University, May 2001.
- Co-organizer (with Dr. L. Jonker) of two day-long math camps for elementary-school students, Queen's University, June 2000 and 2001.

6. TEACHING STRATEGIES

I believe that one's teaching style is constantly developing. This natural change is the result of personal growth, experience, and education about teaching and learning. I have been fortunate to teach motivated and capable students who have encouraged me and given me the confidence to experiment with different teaching strategies. The following is a list of a few successful strategies I have experimented with.

FAQ

During most classes, questions based on the previous lesson will be posed. Students either volunteer or are chosen at random to answer. Each student starts with 20 points. If the question is answered correctly, then the student is removed from the FAQ pool (and loud applause is gained!). If a question is answered incorrectly, then 3 points is deducted and the student remains in the FAQ pool. If a student does not attempt to answer (e.g. is absent), then 10 points is deducted. This may be an uncomfortable

exercise for some students, but I explain that a part of mathematics is thinking and presenting ideas in a calm and clear fashion. The questions asked are not intended to be tricky or embarrassing. Rather, this exercise is intended to motivate regular attendance, regular studying and to build confidence of the students.

Mini - Break

After considering the feedback of my students and reading some articles on teaching, I realized that within a fifty minute class the attention of the students is quite low after twenty minutes or less. In order to re-energize my students I provide a “mini - break”. This break takes place about twenty minutes into the class period and lasts anywhere between one and three minutes. During this break I encourage the students to look over the notes they have taken during the first part of the class and to ask any questions they may have to the students sitting around them. I find that the students appreciate the break and that the energy level in the class is increased for the rest of the class period. In addition, the students are also quite surprised and happy to see that their questions are common and that together they can usually find a satisfactory answer without my help.

Mathematician/Quote/Joke of the Week

Once a week I will present either a mathematician, quote of a mathematician, or a joke related to the material currently being covered. I think that it is important for students to realize that the field of mathematics has a history. By having mathematicians or quotes of the week I hope to peak the interest of students in the history of mathematics.

Physical Candy Examples

In my experience students often find the concepts of 1-1 and onto mappings quite difficult. I will often toss candy towards the students to emphasize the differences between 1-1 and onto. This technique has proven to be quite successful, wakening up the sometimes sleepy students.

The Venice Dictionary

I have spent four months visiting Italy and love to share my experiences with students. When discussing coordinates and change of bases in introductory linear algebra courses I often set the topic matter up by describing a city made up of many regions (such as Venice). I insist that each region has its own language or traditions and that in order to communicate with people from these different regions we need language dictionaries (or boats between the islands of Venice). I then go on to equate the dictionary (or boat) with the change of basis matrix. In addition, I also give examples of how it sometimes may be more convenient to be in one region rather than another, although we are still in the same city, and hence we see the motivation for changing coordinates at times.

7. MEASURES OF TEACHING EFFECTIVENESS

I believe reflection plays a very important role in the development of a teacher. In order to reflect on my teaching techniques as well as how I view other strategies, I try to speak with many experienced teachers in the area of mathematics about their teaching. I have been fortunate to be surrounded by very experienced and deeply committed teachers.

7.1. Selected Teaching Evaluations.

In order to be an effective teacher, I believe that it is very important to collect and interpret constructive feedback from students. As an instructor, I usually ask my students to fill out a mid-term feedback form part ways through the semester. I always find this data to be quite useful for the second part of the course and, as a result, find myself experimenting with new techniques which may help my students be successful. In addition, formal student evaluations are completed at the end of each course. I briefly share some selected feedback below. Results not shared here are comparable with those shown. Copies of the complete reports are available upon request.

Queen's University:

At Queen's University, each instructor is to have their students complete the *University Survey of Student Assessment of Teaching* (USAT, formally known as QUEST) feedback forms near the end of the semester. On the USAT evaluation forms students are asked if they strongly disagreed or strongly agreed on a range from 1 to 5, where 1 = "strongly disagree" and 5 = "strongly agree", with some statements. The following is a summary of selected feedback.

- *Math 121, Fall 2001:*

Overall, this is an excellent course.	Mean: 3.0	Dept. Mean: 3.7
Overall, this instructor is an effective teacher.	Mean: 3.6	Dept. Mean: 3.9
The instructor showed concern for students.	Mean: 4.3	Dept. Mean: 4.1
The instructor presented material clearly.	Mean: 3.5	Dept. Mean: 3.7
The instructor was available outside class.	Mean: 4.1	Dept. Mean: 4.0
I would recommend this instructor to others.	Mean: 3.4	Dept. Mean: 3.8
Number of forms completed:	306	
Total number of students in the course:	370	

- *Math 121, Queen's University, Winter 2005:*

Overall, this is an excellent course.	Mean: 3.6	Dept. Mean: 3.7
Overall, this instructor is an effective teacher.	Mean: 4.5	Dept. Mean: 3.8
The instructor showed concern for students.	Mean: 4.6	Dept. Mean: 4.1
The instructor presented material clearly.	Mean: 4.5	Dept. Mean: 3.7
The instructor was available outside class.	Mean: 4.2	Dept. Mean: 4.0
I would recommend this instructor to others.	Mean: 4.5	Dept. Mean: 3.7
Number of forms completed:	71	
Total number of students in the course:	125	

- *APSC 174, Winter 2003:*

Overall, this is an excellent course.	Mean: 3.3	Dept. Mean: 3.6
Overall, this instructor is effective.	Mean: 4.1	Dept. Mean: 3.7
The instructor showed concern for students.	Mean: 4.3	Dept. Mean: 4.0
The instructor presented material clearly.	Mean: 3.8	Dept. Mean: 3.5
The instructor was available outside class.	Mean: 4.1	Dept. Mean: 4.0
I would recommend this instructor to others.	Mean: 4.1	Dept. Mean: 3.7
Number of forms completed:	91	
Total number of students in the course:	112	

- *APSC 174, Winter 2005:*

Overall, this is an excellent course.	Mean: 3.9	Dept. Mean: 3.7
Overall, this instructor is effective.	Mean: 4.8	Dept. Mean: 3.8
The instructor showed concern for students.	Mean: 4.8	Dept. Mean: 4.1
The instructor presented material clearly.	Mean: 4.6	Dept. Mean: 3.7
The instructor was available outside class.	Mean: 4.4	Dept. Mean: 4.0
I would recommend this instructor to others.	Mean: 4.7	Dept. Mean: 3.7
Number of forms completed:	62	
Total number of students in the course:	73	

Syracuse University:

At Syracuse University, each instructor is to have their students complete standard feedback forms near the end of the semester. On the evaluation forms students are asked to rate certain statements from 1 to 5, where 1 = “excellent” and 5 = “terrible or never”. The following is a summary of selected feedback.

- *MAT 295, Fall 2005:*

Group = all sections of MAT 295

Overall rating of this instructor.	Mean: 1.05	Group Mean: 1.81
Rate the effectiveness of instructor’s oral communication.	Mean: 1.00	Group Mean: 2.08
Rate the effectiveness of instructor’s written communication.	Mean: 1.15	Group Mean: 1.90
Did the instructor present material in a clear and logical manner?	Mean: 1.14	Group Mean: 1.92
Was the instructor well-prepared for class?	Mean: 1.00	Group Mean: 1.26

- *MAT 331, Spring 2006:*

Group = all sections of MAT 331

Overall rating of this instructor.	Mean: 2.03	Group Mean: 2.14
Rate the effectiveness of instructor’s oral communication.	Mean: 1.97	Group Mean: 2.14
Rate the effectiveness of instructor’s written communication.	Mean: 1.83	Group Mean: 1.93
Did the instructor present material in a clear and logical manner?	Mean: 1.97	Group Mean: 2.07
Was the instructor well-prepared for class?	Mean: 1.34	Group Mean: 1.43

California Polytechnic State University:

At California Polytechnic State University, each instructor is to have their students complete standard feedback forms near the end of the quarter. On the evaluation forms students are asked to rate certain statements from 0 to 4, where 4 = “excellent” and 0 = “terrible”. Data is officially only collected for the ranking of teacher effectiveness. The following is a summary of selected feedback.

- *Math 141-16, Fall 2006:*

Ranking of teacher effectiveness.	Mean: 3.48
Number of forms completed:	25
Total number of students in the course:	32

- *Math 142-07, Winter 2007:*

Ranking of teacher effectiveness.	Mean: 3.75
Number of forms completed:	24
Total number of students in the course:	29

- *Math 143-01, Spring 2007:*

Ranking of teacher effectiveness.	Mean: 3.62
Number of forms completed:	34
Total number of students in the course:	36

- *Math 206-01, Spring 2007:*

Ranking of teacher effectiveness.	Mean: 3.47
Number of forms completed:	17
Total number of students in the course:	18

7.2. Selected Student Comments from Course Evaluations.

- “Susan did an excellent job. She is the best math prof I have had at Queen’s. She shows actual interest in the subject matter and a genuine concern for the students. Queen’s needs more profs like her.”
- “Susan Cooper is a very good instructor. She gave lots of examples throughout the material, even beyond those done in courseware notes. She wanted to make math fun for the students and not just work through the course material. She attempted to encourage students not only in the area of math but in life. Susan Cooper is an excellent teacher.”
- “You’ve made a great improvement from the beginning of the course, keep up providing us with extra examples to reiterate points made in the courseware, the way you’ve started to repeat questions that have been asked and try to make sure everyone understands the answer to those questions is also awesome! You really have taken our suggestions from the beginning of the year seriously, and the improvement in your communication with us reflects that! Thanks!”
- “Cooper was very good at helping students on an individual and class basis and trying to explain concepts in a different way if the material was not understood.”
- “She also tried to make the class more interesting with “Quotes and Mathematicians of the Week.””
- “The teacher was interested and motivated and always tried to stimulate class participation.”
- “The instructor is very enthusiastic about the class and ready to teach us anytime we were ready to ask questions. She seemed to stand out from the list of profs that I have in showing genuine care to teach the students. She goes through the basic steps to incorporate everyone who don’t understand that topic and even goes through the complex steps to challenge the able minded. She especially gives us examples from outside the work notes. This is a great plus!”
- “I thought that Professor Cooper was fantastic at simplifying difficult concepts.”
- “[I liked] the examples which included food and other interesting things to keep us interested.”
- “Cooper is an excellent instructor! I really enjoyed attending her classes. She is extremely helpful, and makes sure that everyone understands the material. She is always available for outside discussion.”
- “Susan Cooper is a really good prof! [A]lways open to suggestions, very friendly and approachable, explains concepts at our level, “office hours” are great. Prof. Cooper will answer any questions, no matter how “basic”; neat writing - very helpful! She is good humoured and always in a good mood.”

7.3. Unsolicited Student Email Comments.

- “I think you are doing a great job. You make math interesting!!”
- “I am really enjoying your class, I like your attitude and the way you teach it.”
- “I just wanted to thank you for all your help throughout the semester. You put in so much extra time and energy and I really appreciated it.”
- “I don’t know if you remember me, but I’m the girl who came to your office almost in tears and seriously considering dropping math 121. You were very encouraging and gave me some good advice that lead me to persist for a couple more weeks. Well, guess what? I have an 83% in the course, which is way better than a bunch of my friends who took calculus in high school (3 of whom failed the Dec exam). If it weren’t for you I would probably have dropped the course and had to take it either in the summer or next year. THANK YOU!!”
- “I just wanted to say, even regardless of what my final grade will turn out to be, thank you for sticking with me through all my calc troubles and my struggles with test anxiety. I came into this year really arrogant about calc I, as I had taken it in high school. And to be perfectly honest, I was so comfortable and happy with my high school teacher’s way of teaching that I initially didn’t like your teaching style at all (for example, my teacher’s tests consisted of utterly straightforward, easy problems, and yours, well, were a step up). Your way of teaching really grew on me, which is why I decided to stick with your class throughout. And now looking back, I think you’ve been the most effective at getting the material through my head in an understandable fashion.”
- “Thank you very much for your kind words this evening. I probably should have talked to you before. There have been many days that I feel helpless in this class because my grades never come back reflecting my knowledge about certain subjects. The solution I have always taken on was to just study longer and harder, which in turn has caused me more stress and helpless feelings. Your recommendations and compliments have certainly made me feel better about this class. I feel that you have just made this extremely bumpy road a little smoother.”