Teaching Statement

Teaching Interests

Introductory mathematics courses, calculus, quantitative methods (mathematics/finance for business students), real analysis, mathematical modelling, differential equations, numerical analysis and other applied mathematics courses

Teaching Experiences

I have taught courses at three different institutions: Dalhousie University, Saint Mary's University and most recently Mount Allison University.

During three semesters at Saint Mary's, I taught *Quantitative Methods I* and *II* in the Department of Finance, Information Systems and Management Science in the Sobey School of Business. Both courses covered a variety of mathematical topics related to applications in business, including linear programming, probability, calculus, and financial math. As these courses were required for all B. Comm. students, the students where split amongst 6–9 coordinated sections of about 75 students each.

At Dalhousie University, I taught a summer six-week first-year calculus class of 35 students. This shortened course involved two 3-hour lectures per week. Also at Dalhousie, I taught a second-year mathematical modelling course. This course attracted students from many different disciplines, from physics and biochemistry to architecture. This course covered a variety of topics including dynamical systems, least-squares fitting, interpolation, models with differential equations, models using graph theory, and simulation modelling as well as the fundamentals of mathematical modelling. Assignments included a computational component using the computer algebra system Maple.

At Mount Allison, I taught a new first-year course, Applied Calculus, intended for life sciences and commerce students. Covering the same basic material as any other introductory calculus course, the focus was on applications, especially to economic functions and biological models. Also at Mount Allison, I taught an upper-year numerical analysis course taken by math, computer science and physics students. It covered topics including root-finding, interpolation, numerical solution of initial-value and boundary-value problems, iterative methods for linear systems and determination of eigenvalues for matrices. Assignments and the take-home final exam included problems requiring the use of Maple. This was a relatively large class of almost 40 students. In the past semester, I taught an upper-year mathematical modelling course, along the same lines as what I taught at Dalhousie, as well as a second-year introductory differential equations course.

As a graduate student, I had the opportunity to take a graduate-level course offered by Dalhousie's Centre for Learning and Teaching entitled Learning and Teaching in Higher Education. This seminar course was framed around designing a course to be taught in the future. In addition to my teaching, I have also completed over 30 hours of professional development in learning and teaching.

Teaching Philosophy

Every teacher has different goals in the classroom. My teaching methodology and evaluation depends on the level of the course, the academic focus of the students as well as the size of the class. Here I discuss some of my teaching goals and how I go about achieving these in my classroom.

Based on my own learning experiences in mathematics, when I began teaching I thought that the way to teach well was by having very organized lectures and very well put-together notes. I thought that by giving the material to the students in an organized matter would help them learn. Although having organized lectures helps and is an important factor, I now realize there is more to teaching than coherent lectures. Simply having good notes does not foster a deeper understanding of the course material and does not promote problem-solving skills. Now I see these as two of the most important goals of my teaching. My goals as a teacher also include to create a positive learning environment where the students can get help and can be interested in the area without feeling like an outsider, to convey my enthusiasm for mathematics and learning, and to guide the students to take control of their own learning. I hope that the students gain an appreciation for mathematics, learn how to take their knowledge of the basics and apply it, and learn how to search out new knowledge.

To create a positive learning environment, firstly, I find that making myself very accessible goes a long way. Having extra office hours, promptly answering student emails and being open to questions makes it clear to the students that they can ask questions, get help and learn more about mathematics when they want. Secondly, letting students know my challenges in learning math helps them see that one can enjoy mathematics and learning without knowing everything. Also, I let them know how I have worked to improve my own weak areas. Through being honest about my challenges and about how to get help, I create an environment where the students feel that they can admit their own learning challenges and become open to help and learning.

My enthusiasm for mathematics and learning come through my teaching and my interactions with students. By coming to class every day with an eagerness to talk about mathematics, by showing the students of my continued efforts in learning, and being available and willing to talk to students about math whenever they want, my students can experience my joy of learning and my joy of mathematics firsthand, not just by me telling them how much I love math.

My method of lecturing is intended to encourage the students to think for themselves and learn to apply their knowledge. I often start off each class with a question based on last day's material, giving the students an opportunity to have extra practice and to recall the previous material. Then, in my lectures, I include many examples since I feel that students can learn a lot from examples, giving students time to think about each question on their own, and I ask leading questions as we go through each example together. I encourage them to use textbooks, to use online resources, as well as take the time to do practice problems. All this I feel motivates the students to take control of their own learning. In first and second-year courses, I think it is important to give the students assignments that include a range of problems: the basics of the particular subject, more challenging applications, and then problems that involve "thinking outside the box". At any level, projects that involve applying their knowledge or seeking out information can help develop deeper understanding. In *Mathematical Modelling*, I gave bonus marks to students who found a paper on a model that was interesting to them and wrote a page discussing it. In higher level courses, if a class is sufficiently small, allowing students to have experience teaching other students is a great way to ensure the students retain their knowledge. Also, in these higher level courses, giving assignments based on research in the particular subject area can provide a way for students to "learn how to learn", that is, learn how to continue learning in the future.

Evaluation and assessment are an important part of teaching and learning. Without feedback, the students can not know if they have understood the content and can apply it. In mathematics courses, standard evaluation methods are assignments and tests. I believe that these are essential tools in mathematics for assessing students in their learning, but these do not provide opportunities for the students to assess themselves. Creating learning activities including review questions at the beginning of class, practice quizzes before midterms, sample exams with solutions, ungraded homework questions and problems for the students to work on in groups, allows students to assess themselves: deciding for themselves whether they have "gotten it".

As most first-year math courses are aimed at serving many disciplines other than math, there are expectations of covering a lot of material. Also, some students are only taking these courses to serve a program requirement, and some come unprepared or unwilling to learn math. But within this, I believe it is still possible to foster deeper understanding. By combining lectures with worksheets, review questions and applications, the material can be conveyed while an ability to think and apply to new problems can be developed. Not all students are good at math or like math, but all students can develop thinking and problem-solving skills from a math course, regardless of their discipline. If the material is made relevant or interesting, the students will want to learn more. Most students in first-year math courses are science students or professional students. By choosing examples that show the mathematics being applied to these other sciences, the students can see where it will be relevant to their future studies and careers.

As a teacher I am still evolving and changing. One challenge that I am striving to overcome is making a course accessible to students of all skill levels. Many second and third-year courses have a variety of students: some who struggle with math, some who are pretty good and a few who are exceptional. Within such a class, I want to keep the struggling students from being completely lost, the average students engaged and the exceptional students challenged. I know that as I continue to teach, I will continue to evolve in my teaching. I have a commitment to continue to learn about teaching and to adapt my teaching approaches as necessary.