STATEMEMT OF TEACHING PHILOSOPHY

Learning is a highly individual process, different for each student depending on their background, their skills and aptitudes, and their goals. Some students may learn best in a group and through sharing of ideas, but even this is a matter of their individual character and style. Developing knowledge and understanding must happen for each student through their own experience. At the same time, each student comes into a classroom with a different goal: some are excited for the opportunity to learn about the subject; for some it is a prerequisite which they must master; inevitably, some who merely see it as a hurdle they must pass on the way to graduation. All of these are legitimate, and I endeavour to give each student the opportunity and resources to achieve their goals.

Teaching is like giving directions as the students, separately or cooperatively, navigate the paths to understanding. With directions, they can have a sense of their destination, of the landmarks and features to look for along the way, and be alert to potential missteps or wrong turns. These directions depend on the student's starting point and destination, and how they travel: just like drivers and pedestrians, visual and verbal learners need to look for different signposts and landmarks, take different paths. And yet, teaching in the classroom happens before a large group. The heart of my attitude to teaching is to keep in mind this tension: how can one give directions to a group of people with different backgrounds, strengths and weaknesses, and quite often different destinations? How can one speak to all the students at once, each one individually?

The answer to this question will always depend on those individual students, and so my first principle is always that teaching is a process involving two-way communication. I will always invite my students to ask questions, and to discuss their understanding of the material. Since the group may be too large (or too unresponsive) for this to work well in the classroom, I make a point being accessible to students both in and outside my office hours, encouraging them to contact me, and reassuring them their questions and participation are welcome. An open, positive, and encouraging attitude is also vital to keeping interest and focus on the subject being taught.

I have been involved in the process of teaching mathematics in some form or other for more than ten years and had a wide range of experiences, at levels ranging from two-year colleges to doctoral-level classes. I have lived, worked, and taught in diverse metropolitan areas of both French and English Canada, California, Portugal, and Germany. I have therefore experienced in different institutions and educational systems, each with diverse, but distinctly different, student populations. This has strongly shaped my outlook on teaching.

As teaching assistant and tutor, I learned the importance of interacting individually with students, and to appreciate how each person approaches learning in a distinctive way. I am always aware of these variations, and when dealing with students individually, I try to learn which style of explanation works best for each. Even in a large class, I strive to explain concepts in a balanced way, making them accessible to as many of the class as possible, balancing intuitive explanations and formal derivations, or verbal descriptions and pictures, when these are relevant, is crucial to reaching each student. Balancing this with the task of presenting a good example of rigorous and clear communication of mathematical ideas is a constantly engaging challenge.

While teaching at Dawson College, a two-year college in Montreal, I taught evening classes, whose students included both recent high-school graduates as well as adults returning for continuing education. Here I learned to appreciate how these different backgrounds gave each student a different preparation - in work ethic and social preparation as much as differences in practical experience or existing knowledge.

As a doctoral candidate at the University of California, Riverside, I also broadened my exposure to students of different language, ethnic and national origins, or socioeconomic status. I came to learn how all these influences add to individual differences to change students' experience of the classroom and the subject. Here I developed a preference for a relatively interactive class, and learned to engage students in dialogue. During this time I led a seminar for graduate students in complex analysis, in preparation for qualifying exams. This was my first experience both in teaching graduate students, and in the less didactic style needed for the seminar format, in which every student was expected to take the lead for part of each class. While this is not always possible, it reinforced my belief in the value of interaction to learning. During summer sessions I was the primary instructor for several intensive, four-week courses, where I learned how sustain interest and engagement and to handle smaller classes where a more engaged approach works well.

As a postdoctoral scholar and assistant professor at the University of Western Ontario, I taught a variety of courses, including large first-year algebra classes with several hundred students. Here I worked to apply the lessons and attitudes I have described in a situation with too many students to allow interaction with all of them. Finding ways to assess the goals and needs of such a diverse group means frequently asking questions, and presenting ideas in several ways at all times.

I believe that by keeping the balance of individual students and the needs of the group, by listening to and learning from students as well teaching them, and by constantly evaluating my presentation for both its correctness and its helpfulness, it's possible to reach both those who are excited by mathematics and those who are intimidated by it, and all those in between. This is my goal in teaching.

TEACHING HISTORY As Primary Instructor

The following is a summary of the courses I have taught as the primary instructor, in chronological order:

- **Calculus II** (Dawson College, Spring/Summer 2001). An evening course, for post- high school students as well as adults in continuing education. Covered definite and indefinite integrals, series, convergence, ordinary differential equations. The class size was about 20 students. I taught the lectures, as well as creating and grading homework assignments and midterm and final exams, and held regular office hours.
- **Vectors, Matrices, and Geometry** (McGill University, Fall 2001). A first-year course in linear algebra, featuring vectors, matrices, solving systems of equations, eigenvalues, Jordan normal form, etc. One section of a three-section course. The class size was about 35 students. I taught lectures, created and graded homework assignments for that section, as well as participating in creating and grading midterm and final exams for the full course, and held regular office hours.
- **Precalculus** (Dawson College, Spring/Summer 2002) A preliminary course covering theory and applications of trignometry, polynomials, calculation of volumes, areas, and distances, quadratic formula, etc. Course size was baout 20 students. I taught via lectures and lab sessions using Mathematica, created and graded assignments and exams, and held regular office hours.
- **First Year Calculus Part C** (University of California, Riverside, Summer 2004) A third-semester first-year course in calculus. Covers sequences and series, convergence tests, Taylor series and Taylor's theorem, calculus in polar coordinates. I taught this as an intensive summer course for both advanced and remedial students, 10 hours per week for 4 weeks. Class size was about 10. I taught lectures, created and graded homework assignments and exams, and held regular office hours.
- **Complex Analysis Qualifying Exam Seminar** (University of California, Riverside, Spring 2005) A seminar course for graduate students expecting to take the Complex Analysis Ph.D. qualifying exam for UCR Mathematics. Covered all standard topics in first and second year Complex Analysis graduate courses, including computations and proofs. I directed the seminar, planned study topics and assigned questions for students to present each week, taught supplementary material as needed.
- **Introduction to Discrete Structures** (University of California, Riverside, Summer 2005) An introductory course in discrete mathematics, mainly for computer science students. Covered propositional logic, enumeration techniques, recursively-defined structures, and probability. I taught this in two consecutive years, as an intensive summer course for both advanced and remedial students, 10 hours per week for 4 weeks. Class size was about 8. I taught lectures, created and graded homework assignments and exams, and held regular office hours.
- **Introduction to Discrete Structures** (University of California, Riverside, Summer 2006) Same as previous, the following year. Class size again about 8.
- **Topology** (University of Western Ontario, Fall 2007) A course cross-listed as fourth- year undegraduate and first-year graduate. Topics: topological spaces; sub-, quotient, and product spaces; connectedness; compactness; countability and separation axioms; topologies on function spaces; metrizability. I prepared the syllabus and selected non- core topics to study; planned and taught lectures; created and graded assignments and exams; evaluated short presentations on supplementary topics by graduate students, and held regular office hours.
- **Introduction to Linear Algebra** (University of Western Ontario, Fall 2008) A standard introductory course in linear algebra, covering vectors, matrices, solving systems of equations, row reduction, eigenvalues, normal forms. Class size about 250. I planned and taught lectures, prepared homework assignments and exams, and graded exams with the help of teaching assistants, and held regular office hours.**Complex Variables** (University of Western Ontario, Winter 2008) A second-year introductory course in calculus with complex variables, covering complex numbers, Cauchy-Riemann equations, contour integrals, Cauchy's Theorem, Taylor and Laurent expansions, residue theorem, conformal mappings. Class size about 25. I taught lectures, prepared and graded homework assignments and exams, and held regular office hours.
- **Introduction to Linear Algebra** (University of Western Ontario, Fall 2009) Same as above. Class size about 270.
- **Complex Variables** (University of Western Ontario, Winter 2009) Same as above. Class size about 25.
- **Topics in Category Theory for Geometry** (University of Hamburg, Spring 2013) A "topics" course for graduate students. I split responsibility for this course with another postdoc, Susama Agarwala. Class size ranged from 8 to 3. I taught the first half, which covered locales and sites, elementary and Grothendieck toposes, sheaves and sheafification, diffeological spaces as concrete sheaves, abelian

categories, simplicial objects, the Dold-Puppe correspondence, localization and derived categories of sheaves. The second half, taught by Susama Agarwala, covered the construction of geometric motives. We selected the topics, planned and delivered lectures. (Due to small class size, this was a non-credit course, so no exam was given.)

- **Linear Algebra** (Mount Allison University, Fall 2014) A second-year introductory course in linear algebra, substantially similar topics to that at UWO above. Class size about 50.
- **Multivariable Calculus** (Mount Allison University, Fall 2014) A third calculus course for second-year undergraduate students. Covers real-valued functions of several variables, continuity, partial derivatives, integration, change of variables. Class size about 50.
- **Probability and Statistics 2** (Mount Allison University, Winter 2015) This is a third-year undergraduate course in statistics, covering such topics as estimation, unbiasedness, efficiency, maximum likelihood estimators, hypothesis testing, likelihood ratio, and regression analysis. Class size about 10.
- **Mathematical Modelling and Problem Solving** (University of Toledo, Fall 2015) A first-year class covering college algebra with a focus on applications of: systems of linear equations; polynomial, rational, and exponential functions. "Hybrid flipped" classroom model incorporating online components. Two sections, size about 40.
  - **Study Skills for Math 1200** (University of Toledo, Fall 2015) A one-credit-hour course for students in the college algebra class noted above. Intended for less-prepared students, to help prepare for university-level classes, covering issues such as note-taking, math anxiety, learning styles, strategies for studying, test-taking, time-management, etc. Two sections, class size about 10.
- **Mathematics for the Liberal Arts** (University of Toledo, Fall 2015) A first-year class for non-mathematics majors, introducing a range of topics, such as graph theory, sets, voting systems, counting methods, probability, and statitics. Class size about 30.
- **Calculus II** (University of Toledo, Winter 2016) A second calculus course for first-year students covering integration, sequences and series, Taylor series, and elementary three-dimensional geometry. Class size about 40.
- **Elementary Multivariable Calculus** (University of Toledo, Winter 2016) A second-year calculus course covering derivatives and integrals of vector-valued functions, gradients, curl and divergence, Green's and Stokes' Theorems. Two sections, class size about 45.

TEACHING HISTORY As Assistant

I have also participated in teaching as a teaching assistant in the at McGill University and the University of California, Riverside. My duties at UCR as a teaching assistant included grading homework assignments and participating in grading of exams, leading sessions discussing example prob/lems and discussing homework assignments, and holding office hours. I was a teaching assistant in three one-semester courses per year between Fall 2002 and Summer 2007.

- **Calculus** (McGill University, 1999)
- **Precalculus** (University of California, Riverside)
- **First Year Calculus (parts A, B, C)** (University of California, Riverside)
- **Multivariable Calculus (parts A, B)** (University of California, Riverside)
- **Linear Algebra (Advanced/For Business Students)** (University of California, Riverside)
- **Introduction to Differential Equations** (University of California, Riverside)
- **Set Theory** (University of California, Riverside)