Teaching Statement

Manuela Girotti

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1 Teaching philosophy

Teaching Mathematics requires care and dedication. Mathematics is often perceived as very abstract to students, especially first-year students, while other fields have direct applications and evidences in everyday life and therefore it is easier to relate with them. From there comes the common belief that Mathematics is a difficult discipline. Given such prejudice, a “bad Math teacher” can furthermore discourage many students and it is hard to give back to them the confidence to learn and understand Mathematics.

My primary goal as a teacher is to create a motivating environment for the students: show enthusiasm when teaching, instill interest in the topics, engage students in class discussions and make them feel safe to ask questions.

A maieutic methodology based on dialogues and argumentations is the inspiration for my teaching. Through this, students will be able to develop a mathematical intuition, instead of blindly applying theorems to a set of problems, and they will acquire a forma mentis that can be also used and applied in areas other than Mathematics. Examples and, where applicable, pictures can show them the way to abstraction and theorization. It may also help to challenge students and invite them to think about a problem that is easy to solve with the tools just taught in class.

A good teacher should be dedicated, patient and knowledgable. I make every effort to empathize with the students’ struggles and success to understand new concepts. During class, I dedicate the first minutes to quickly review the material seen in the previous class and to clarify possible doubts that students might have. When a considerable portion of the program has been covered, I take a brief moment to reflect with the students upon what has been done so far in class and where the class is heading to.

Attendance and attention are crucial in learning Mathematics. Any possible source of distraction should be limited. This doesn’t only apply to technological devices, but also to books. While I am teaching in class, I don’t use the textbook, though I refer to it with clarity, so that the time spend in class is for the students a valuable time, worth investing in, since class will not be just an oral repetition of the written textbook. Also I suggest students to not have their textbooks open during class, as it is an often underestimated source of distraction. Textbooks are extremely valuable in the review process that students should undergo after class, but not during it.
After illustrating the theory, I implement it with some exercises. I usually solve at least two exercises, with the active participation of the students: an easy and straightforward application and a more challenging one. In doing so, students will be able to explore all the possible ways to solve the problem using recently explained tools; they will analyze the exercise and they will compare the hard problem with the previous easy one, to find some common pattern and get an intuition of the method to follow. Again, if possible, I don’t borrow the examples from the textbook, but I propose genuinely new exercises.

I consider my teaching job to not be over at the end of every class, but to continue outside the classroom. I encourage my students to come to me to expose their doubts and ask for clarifications during office hours, at the end of classes or through email exchanges. I make an extensive use of the online learning management system (Moodle for Concordia, Canvas for CSU) by sharing stimulating links, useful mathematics webpages and old versions of midterm and final exams, when availables. Whenever possible, I also link the topics covered in class to real word applications and show the possible developments of theorems and techniques.

I create a structured and coherent outline of the program that will be covered along the semester and occasionally write my own notes (shared with the students) to complement with the contents of the book.

Easy quizzes on recently viewed topics are handled to the students to be solved in class on a regular basis. It is a useful tool for both the students and myself to understand to which level the concepts are understood. On the other hand, assignments are intentionally created to be challenging in order to boost students’ intuition and discussions among themselves. While grading homeworks and exams, I give constructive feedback and post the solutions with a detailed description on the course webpage.

I strive to give to the students every possible facility to deeply acquire methods and theories so that they can succeed in the course and become fully independent and confident in tackling future related problems that they may encounter.

2 Description of teaching experience

Courses at Concordia University.  As a consequence of the scholarships “Exemption MEQ” and “Concordia Merit award” (see résumé), teaching duties were waived for most part of my Ph.D.

For two consecutive semesters (Winter and Fall 2011) I was appointed as instructor for one of the sections of the (coordinated) course MATH 205. MATH 205 is an introductory course to integrals and series; the focus is set on applications, rather than on the theoretical aspect. It consisted of 4 hours per week for a total of 13 weeks. Assignments were created and graded through the online system WeBWorK. I was responsible for the preparation of the mid-term exam, while the final was common throughout the sections.

During the Fall semester 2013 I conducted exercise sessions (1 hour per week for 13 weeks in total) for the (coordinated) course MATH 201. MATH 201 is a course covering basic mathematical notions (composition of functions, inverse function, polynomials of second order, exponential and logarithmic function) and trigonometry.

The students attending both of these courses (about 50 per section) were mostly students enrolled in Engineering, Economy and Science.

For two years (September 2012 - August 2014) I have been responsible for the management
of the online system WeBWorK for the assignments of the courses MATH 200 - 201 - 202 - 203 - 204 - 205.

**Courses at Université catholique de Louvain.** The post-doc position I had at UC Louvain was funded through a European research grant (CRaMIS ERC grant) and a teaching activity was not allowed in my contract.

Nevertheless, I was involved in mentoring activities: I posted a thesis (*mémoire de maîtrise*) proposal on Soliton theory and integrable systems for the master students in Mathematics, I gave my availability for mentoring undergraduate students for their final project and I gave some private tutorial lessons in Probability and Statistics.

**Courses at Colorado State University.** In the Spring semester 2017, I was the instructor of one section of the (non-coordinated) course in Linear Algebra (MATH 369). MATH 369 is an introduction on the basic notions of Linear Algebra: linear systems, matrices, vector spaces, linear transformations, eigenvalues and eigenvectors. It consisted of 3 classes per week of 50 minutes each for a total of 15 weeks. The size of the class amounts to about 30 students, most of them being Computer Science or Engineer majors.

In the Fall semester 2017, I was the instructor of the (non-coordinated) course in Advanced Calculus for one variable (MATH 317). MATH 317 is an advanced course mostly aimed at senior students; the goals of the course are to review the main results of Calculus I and II with a deeper and more theoretical perspective: sequences, limits, continuity, derivatives and integrals, series. It consisted of 3 classes per week of 50 minutes each for a total of 15 weeks. The size of the class amounts to about 30 students, the majority of them being Mathematics majors.

In the Spring semester 2018, I am the instructor of the Honors course in Differential Equations (MATH 345; non-coordinated). MATH 345 is an intense course on introduction to Ordinary Differential Equations: it covers first and second order equations (techniques of integration), first order systems of equations, numerical methods, qualitative analysis. It consisted of 4 classes per week of 50 minutes each for a total of 15 weeks, with complementary computer lab sessions. Being an honors course, the class size was limited to about 12 students, the majority of them being Mathematics majors.

In the coming Fall semester 2018, I will be the instructor of the graduate course Mathematics for Scientists and Engineers (MATH 530). It is a course aimed at graduate students from Departments other than the Mathematics Department, who are enrolled in the Mathematics Graduate Interdisciplinary Studies Program at Colorado State University. The goal of the course will be to teach the students a working knowledge of the fundamental mathematical tools in linear algebra, ordinary differential equations, and partial differential equations.