1. Teaching philosophy

Teaching Mathematics requires care and dedication. My primary approach to teaching is to create a *motivating, engaging and safe* 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.

I adopt the method of *think-alouds* when explaining new theories or solving new problems: I invite the students to give their opinions and I guide them to formulate a logical concatenation of evidences that will lead to the answer.

The goal is to help students to develop mathematical intuition and analytical skills that can be successfully used in areas within Mathematics and beyond that. Sometimes I challenge the students by suggesting them a set of tools, that have been explained earlier, and inviting them to think about how to use them in order to solve a new problem. I wholeheartedly empathize with the students' struggles and success to understand new concepts.

Methodology. As a general scheme, I structure the first part of a lecture into three segments:

- *quick review*: I dedicate the first minutes of the class to recall previously learned material, so that the students have a solid background to start the class with. This is an effective way to gather their attention before tackling the new material. During these daily re-loopings I always engage with the class, in order to spot some eventual weaknesses or confusion that need to be addressed before proceeding with a new topic.
- *theory explanation*: when explaining a new concept, I refer to the textbook or the notes with clarity, but I explain the passages and the arguments in more details, so that the time spend in class is for the students a valuable time, worth investing in. On the other hand, I regularly remind the students that textbooks are extremely valuable in the review process that they should undergo after class.

  I pay careful attention to adjust my speech to the *students' receptiveness* and ask for feedback on their understanding: I often repeat important information, paraphrasing it, stressing the key ideas and using simple words. Only in a second moment, I write the concepts on the board, using specific and more formal words. This will help them to develop a solid Mathematical vocabulary which they will be able to use in writing homework in a clear and structured way, and it will be beneficial in strengthening their technical communication skills.
- *set of examples*: after illustrating the theory, I implement it in some examples. The goal is to solve at least two exercises with the active participation of the students: an easy and straightforward application and a more involved one. This way, students can acquire an intuition on the method to follow. I rarely borrow the examples from the textbook and I propose genuinely different and explanatory exercises.

  Depending on the topic, sometimes it is more convenient to start the lecture with an example, guiding the students, with a series of questions and answers, to the right solution. After the first example, the general theory is then exposed and more exercises follow.

A considerable portion of the lecture is then structured as a *flipped class* where exercise sets on recent topics are handled to the students to be solved. It is a useful tool for both the students and myself to understand to which level the concepts are understood.

When teaching theoretical Math classes, I make every effort to link the topics covered in class to real word applications and show the possible developments of theorems and techniques. In particular, I am keen on complementing the textbook with additional material like personal lecture notes, explicative videos or stimulating web links. Complementary lecture notes, together with a collection of sample syllabi, can be found on my website https://mathemanu.github.io/teach.html.

I am also actively working on tailored lecture notes on "Random Matrices and applications to Machine Learning", which can become an official "textbook" for undergraduate summer research projects or as an introductory set of notes for graduate students who wishes to do research in the area. Such lecture notes are an expanded and more detailed version of a series of research lectures given at Tulane University (October 2019) and at Mila (October 2020): a preliminary version can be found on my website https://mathemanu.github.io/talks.html, together with other notes from seminars at Colorado State University.

For more applied courses (e.g. Differential Equations), I structure my course so that a portion of the lectures (and homework assignments as well) are conducted in a computer lab with the help of Python's packages and/or MATLAB for numerical experiments. For the upcoming Differential Equation II course (Spring 2022), I am developing a set of interactive notes with Jupiter Notebook where the theoretical part of a course is directly integrated with its applicative part (numerical simulation, modelling, data visualization, coding, etc.).

Finally, any time that a significant portion of the program has been covered, I dedicate a lecture to reflect with the students upon what has been seen so far and where the class is heading to, so that the learned structures are constantly reinforced.

Evaluations. Assignments are intentionally created to be more challenging than in-class exercises, in order to boost students' intuition and communication among themselves. Students are highly encouraged to discuss about the theoretical contents of the class or about their homework on an online forum (e.g. Piazza, Discord) or discussion groups. I participate into the threads by giving hints or help, when appropriate.

When a test date is approaching, I set up a few hours of exercise sessions outside the class schedule to meet with the students and prepare them for the exam. I remind them that they are welcome to reach out to me at any time to expose their doubts and ask for clarifications during office hours, at the end of classes or through email exchanges. I am also very careful in giving constructive feedback when grading an assignment or a test and posting a detailed description of the solutions.

COVID, online learning. With the majority of classes being shifted to an online setting in the past year, making students involved and stimulating their curiosity has become an ever more pressing priority. Every active learning tool should be used to maintain the lectures lively and engaging: preparatory videos, interactive animations, flipped classes, instant polls, small reading groups. Some functionalities available with Zoom are very useful for this type of activities.

In conclusion, it is my goal to provide the students with every possible facility to achieve a solid understanding of the methods and theories, so that they can not only succeed in the course, but also become independent and confident learners throughout their academic path.

2. Training philosophy

I have not had an opportunity to supervise graduate students yet. However, I supervised one undergraduate student for an honor project when working at Colorado State U. (Spring 2018).

I gave the student a guided project where he had to analyze the Van Der Pol equation using the techniques seen in class (equilibrium points, phase space) and exploring some slightly more advanced techniques (perturbation methods and Levinson-Smith theorem for the existence of limit cycles). Since the student was majoring in Computer Science and Computational Mathematics, I also tailored the project to their main domain of specialization by adding a part of the project focused on numerical analysis and stability of numerical methods (stiffness).

We had regular meetings along the semester during which the student was reporting on his progresses and I would answer and clarify some doubts, if any. At the end of the semester, the student submitted a written project report (an oral presentation was also an option, but due to time conflicts we couldn't schedule it). The student performed very well and greatly enjoyed facing and solving the challenges that this project was posing.

I believe that such a training strategy can be successfully used for summer research students as well, while for graduate students the involvement and difficulty level of problems to tackle will be higher and it will require some adjustement.

3. EDI considerations

Being a woman, I experienced first-hand the ambience of veiled hostility, paternalism and dismissiveness that is unfortunately recurrent in some institutions. I acknowledge that it may be at times hard to fully grasp, in their holistic form, the difficulties that people belonging to a minority or underrepresented group are experiencing, as I do not belong to any of those groups, however I am aware of their existence and I am committed to deepen my understanding and take consequent actions.

In my teaching experience, I have been in contact with students with disabilities and minorities (Latinos and Indigenous people, in particular). I am constantly committed to make my class a safe and friendly environment where each student can feel comfortable and accepted. I pay close attention to use an inclusive and decolonized language in my communications and during the lectures. At the beginning of every semester I read the Territorial Acknowledgement with my students to recognize and reflect on the difficult but necessary Reconciliation process that Canada is undertaking.

I make sure that all my students have equal access to educational resources: I inform them about campus facilities that could be useful for their academic success and I remind them that I am always available for help, extra discussion and accommodations in order to resolve issues, conflicts or doubts of any nature.

I believe that every person is unique and valuable and deserves to be treated impartially and with respect. I consider every aspect of my students as a precious asset that can enrich myself and my class and that can stimulate an open and positive dialogue.

Being in a more senior position now, I plan to increase my involvement in EDI activities, in particular by actively engaging with the AWM Montréal student chapter, and by organizing mentoring and outreach activities in collaboration with the Otsenhákta Student Centre at Concordia and with the Indigenous Student Resource Center at John Abbott College, in order to increase Indigenous students' retention in STEM classes and facilitate their transition to higher education.

Furthermore, during the recruitment process for my research students, I actively advertise the position within the university's network, with the use of social networks (Twitter, Instagram, etc.) and more traditional channels of communications (emails, job postings). I carefully formulate the announcements using inclusive language and I encourage applications from women and underrepresented groups. The interview process will follow a strict, unbiased and uniformized set of questions and evaluation scheme, in order to fairly evaluate all the candidates, while still allowing them to express themselves and their knowledge without following westernized schemes of research.

The following is a list of relevant trainings and initiatives I followed recently:

- as part of the Mila Students' Recruitment committee (a.y. 2020–2021), I took part in the following trainings:
  - "Equity, Diversity and Inclusion in Research" training, offered by Dr. Nicole Kaniki (Western University);
  - "Database and best practises" consultation session, offered by Dr. Kaniki to discuss best EDI practices in recruitment;
- "Mental Health First Aid" training offered by the Mental Health Commission of Canada. In particular, we discussed best practices for approaching people with mental health problems belonging to a different culture or to the 2SLGBTQ+ community.
- Pîkiskwêtân virtual workshop series offered by the Office of Indigenous Direction at Concordia University (a.y. 2020 – ongoing).
- invited panelist of the event "Work/life in academia" during the Connections and Introductory Workshop: Universality and Integrability in Random Matrix Theory and Interacting Particle Systems at MSRI – UC Berkeley (September 2021).

I am also including a list of EDI initiatives I launched in the past year (a.y. 2020–2021):

- as member of the Mila Students' Recruitment committee, I raised the issue of the self-identification form that was used at Mila for recruiting new students, as it was incomplete, confusing and inconsistent. I solicited the adoption of a new form and requested the Administration more transparency on how this sensitive information is used for 1) recruiting new students and 2) statistical analysis.

  I implemented the new self-identification form for the recruitment portal (launch October 2021), by following the best EDI practises suggested by the Canada Research Chair agency.
- as Lab Representative, I requested to the Mila Administration to add the territorial acknowledgement on the official Mila website. To the best of my knowledge, it has not being implemented yet, however I requested and was granted permission to create one page on the Mila Intranet (internal website) on "Indigenous Realities" to spread awareness among the Mila community: on this page students can find the territorial acknowledgement and resources and information on Indigenous People in the Montréal area.