Teaching Statement

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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 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 and the engagement of the class, 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.

Finally, when a considerable portion of the program has been covered, I take a brief moment at the end of 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.

Complementary resources and activities. I make an extensive use of *digital resources*. Whenever possible, I 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. More recently I became interested in the use of interactive notes with Jupiter Notebook where the theoretical part of a course is integrated with its applicative part (numerical simulation, modelling, data visualization, coding, etc.).

The homework assignments are either directly solved online (e.g. WeBWorK) or evaluated using grading softwares (e.g. Gradescope). 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 and discussion group* (e.g. Piazza). I participate into the threads by giving hints or help, when appropriate.

When a test date is approaching, I usually 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, 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.