TEACHING STATEMENT

Teaching experience

For about 4 years now, I teach different university courses from first-year bachelor courses such as probability and statistics, to graduate courses in combinatorics and geometry. In addition, my duties involved the supervision of research and thesis writing of undergraduate, master's and doctoral students which I would like to continue doing in the future. These theses were related to my areas of research, namely discrete geometry, combinatorics, and group theory.

In 2017, I taught *Discrete Mathematics* (bachelor/master course, 60 hours) to 45 students. I had *carte blanche* to design the complete course: its exact content, the exercises, and the evaluation, which I accomplished with diligence and a lot of excitement. The course consisted of 30 ninety-minutes classes tailored from more than 10 different books. This was an enjoyable challenge: I could implement my own point of view of the combinatorial landscape. In 2018, I taught *Wahrscheinlichkeit und Statistik* (Probability and Statistics) to 81 future teachers (bachelor course, 60 hours). This course offered numerous opportunities to involve the students in the lecture through puzzling paradoxes. Not only did it capture their attention, but it was making the learning and teaching process lively and stimulating through these animated debates with the students. The course duties also involved the elaboration of homework assignments and creation of 4 final exams. Finally, I helped 4 students with children and in pregnancy to find a family-friendly time for them to take the exam.

Also, I was involved in the organization of several informal seminars and official seminar courses. During my PhD studies, I carried out seminars to teach the computer algebra system `Sagemath` to the members of my research group. To this day, I continue to support them in learning its functionalities through first hand experience. Being accessible, encouraging, and error-friendly made me a reference person in troubleshooting LaTeX, `Sagemath`, and various computer related issues. Further, I organized a reading seminar on *Reflection groups and Coxeter groups* (12 meetings, 14 participants). Also, during more than two years, Cesar Ceballos and I led cutting-edge training seminars on polyhedral combinatorics given to professors and graduate students (32 meetings, 10 participants).

More recently, I supervised a sequence of six geometry seminars on Steinitz' theorem given to 9 young PhD students. In 2017, I taught *Seminar on Discrete Mathematics* (bachelor/master course, 30 hours) to 10 students that covered advanced combinatorial techniques. Moreover, I also taught the *Seminar zur Geometrie* (bachelor course, 30 hours) to 3 students that looked at the geometry of reflection groups, one of my favorite areas of interest. In these seminars, the students should pick a topic and prepare a 90 minutes class to practice mathematical communication. These events gave the students and me the opportunity to exchange about teaching and learning methods in mathematics, and to learn from good and bad experiences. My requirements involved meeting each student twice before giving their class. The first meeting is to make sure that they understand the topic, to answer their questions, and to plan the talk. During the second meeting, they practice the talk with me and get feedback. After each seminar, I asked the students to give anonymous comments and suggestions to their fellow students. I am fond of this form of teaching as it actively involves everyone and the students' creativity is put into play. These seminars have been rewarding and constructive teaching experiences, which greatly motivate me to continue teaching.

Teaching goals

My most important teaching goal is to provide a motivating learning experience. I do so by preparing them conscientiously, including fun facts surrounding the topic of the class, and dedicating parts of it to open discussions.

Before introducing a concept in class, I always try to find an original analogy or a story to present it. For example, we analysed and discussed the *Sally Clark case* in the Probability and Statistics class, to clarify a misinterpretation in probability theory which is remedied by a proper usage of Bayes Theorem. This also showcases the impact of a good knowledge of mathematics in real life that is too often left aside.

Learning mathematics relies most importantly on communication. Therefore, students should be encouraged to exchange and take action, especially during classes. To this end, my teaching style is closer to a dialogue taking place in an informal setting. During classes, my goal is to provide a comfortable space that fosters student feedback. I offer them opportunities to ask questions by starting classes with a short review and finish with a discussion and question session. Presenting regular summaries of the important notions to review before an exam also helps to trigger their questions. Collaborative work between students for their homeworks is welcome in order to develop their communication skills.

As most people learn by doing, my strategy for a successful class starts by keeping the students as active as possible. Nevertheless, as every student is different, I make it my duty to showcase a variety of available ressources and help them to find the one which suits them best: computer algebra systems, online forums, books, learning techniques, etc. Not only do I invite them to give feedback during class, but I encourage them to exercise by solving as many problems as possible. In the *Discrete Mathematics* course mentioned above, the homework consisted of 12 exercise sheets, with 10 problems each, of varying difficulty constructed by myself to be handed-in and corrected for feedback. Since the student body was quite international, I also gave them the possibility to write a formative exam for them to know my evaluation methods and to get feedback early on.

Course development

My solid background in mathematics allows me to teach classes covering: calculus, linear algebra, probability and statistics, abstract algebra, representation theory, discrete geometry, Coxeter groups, graph theory, and combinatorics.

Your mathematics department will benefit from my knowledge of the quickly developing computer algebra system `Sagemath`. It has been used successfully in teaching, from basic calculus to cutting-edge polyhedral geometry and optimization, and I would like to integrate it to my teaching tools. As a developer, it will be my pleasure to teach the usage of this free open source software to my colleagues and students.