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TEACHING REPORT

1 Teaching experience

My first contact with teaching occurred in 2004, as I started doing oral interrogations in my former "classe préparatoire". My students were studying at the equivalent of second year at university, but in the very intensive preparation phase for entry exams to the highly selective "grandes écoles". After more time spent as a "tuteur", *i.e.* helping foreign students to adapt to the French system at the *École Polytechnique*, I started teaching in a more traditional setting at the university Paris 7 in 2007, leading seminar groups at undergraduate level. Since then I have taught every year, in France and then also in Germany where I teach at masters level.

In 2007 – 2008, I did both lectures and tutorials for a course on the symbolic computation software *Mathematica* for a total of 64h. The course was attended by first year students. The following two years, I was in charge of the tutorials for a course originally called *Mathematical tools for Chemistry* (64h). My tutorial group consisted of around 15 students in their first semester in Chemistry. One highlight of this course was the study of vector spaces.

After these first experiences, I had the opportunity to fully organise lectures and tutorials for a group of about 20 students in their second semester of a bachelor of mathematics. More precisely, we were two PhD students, M. Gaume and myself, and our students had a total of 12h per week which we could organise freely. J.-Y. Ducloux was doing the coordination of the different groups, *i.e.* he made sure that all groups had comparable knowledge when they took their exams.

Besides these courses at the undergrad level, the university of Göttingen trusted me with two courses for master students. In 2012, I was in charge of the tutorials for the *Riemannian Geometry* course, whose lectures were assumed by V. Pidstrygach. This was a good opportunity to renew contact with a topic I left aside when I started my PhD. In 2014, I organised jointly with O. Baues a "seminar" on *Graph Theory*: during this course, each student had to prepare a talk for the rest of the group. As organisers, we had an interview with each student to carry out an *a priori* "quality check" on the talks. We also provided marks and feedback after the presentations.

2 Teaching statement

The lessons I have learnt from the experience mentionned above can be organised around three notions, namely involvement, rigour and enthusiasm.

The *involvement* part means that students should be actors of their own education to the largest possible extent. This is especially critical in mathematics, which is not only an accumulation of knowledge but also involves skills and therefore appropriation of techniques. To this end, I aim to create an atmosphere of safe and open dialog in the class, where students can freely ask questions on the topics at hand.

In the first and second year courses, I like to take a problem, collect ideas from the students and then discuss them in an informal way with the class. Usually, some ideas would fall short of the goal and we would learn from their shortcomings. Further ideas would form the nucleus which we would refine to obtain the fully developed objects of the lesson. I think it very instructive and gratifying for the students to "grow their own theory" in this way.

In higher courses such care at the onset may be unnecessary, yet I think it is very important to always leave the door open for questions and I like to remind students that "it is better to have questions now than during the exam!". Looking further, for those who want to pursue an academic career, questions form the germ of research and it is very important to learn how to state questions properly.

In my experience, *rigour* has a double meaning: on the one hand, an important part of my job as instructor in early classes is to introduce students to the particulars of mathematics and especially to the notion of proof. In latter stages of mathematical education, my emphasis shifts to highlighting common mistakes. Of course, students should learn these for themselves, but it can save a lot of time to warn them against expected (but false) results. Moreover, knowing (or manufacturing) counterexamples can be very enlightening.

On the other hand, rigour stands for regularity and dedication in work. Most students will not become professional mathematicians yet such high standards at work will undoubtedly prove very useful in their future careers. I believe that the instructor should provide an example for his students hence a thorough preparation of courses is a prerequisite. On the student side, I give regular work assignements, which I collect, comment, grade and hand back as soon as possible. For both the students and myself, it provides a (usually weekly) evaluation of their understanding of the course, which I can use to adapt my teaching.

Finally, *enthusiasm* starts with the instructor himself. This aspect is complementary of the "thorough preparation" above: a good preparation of a class shouldn't hamper its spontaneity. A lecture can indeed be overprepared and "too smooth". My hope is that my own enthusiasm for the topics I teach can be shared with the students. The general message is that once the habit of hard work required to meet the previous standards of rigor are acquired, we can start having fun in our class.

I try to maintain a certain drive during the course by occasional work in small groups and homework assigned to teams instead of individuals. Work in small groups is especially suitable for the introduction of new notions. Concretely, I used these methods to approach the notion of vector spaces, *via* the study of one particular set of matrices satisfying linear relations. Clearly, such group work requires appropriate supervision and more time than regular lecturing, but on specific difficult points it is worth it. More generally, I promote teamwork in the preparation of exercises.

In conclusion, I am a firm believer in the power of experience and indeed, previous assessments of my teaching experience (see next pages) as well as positive feed-back by my former students confirm the validity of my approach.

Please find attached three assessments of my previous teaching experience (the third assessment is in French only).

3   Teaching assessments

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May 16, 2013

To whom it may concern

Dear Madam/Sir

This is a letter of strong recommendation for Olivier Gabriel who was running exercise classes for my advanced course on Riemannian geometry. His task was to prepare suitable problems for the exercise classes, recall the nesessary part of the theory with the students, evaluate their solutions and discuss the sample solutions thereafter.

Olivier Gabriel frequently put in long hours to develop classes plans. He had to monitor closely my lecture course since it was not based on some textbook. He asked for feedback regularly and managed to make his exercise classes matching my lectures perfectly in the choice of technique, terminology and notations despite the fact that Riemannian geometry is not central to his resarch interests. The problems were always thoroughly prepared to illustrate effectiveness of the theoretical methods I presented at my lectures.

One of his strengths is his ability to motivate students, recognising when a student needed special assistance or attention. He is patient yet demanding. As a teacher, he brought great depth to his discussions and was concerned with the individual development of each student.

He is one of my few colleagues to whom I will entrust my lectures when I travel, an outstanding assistant, the best I had in the last 5 years.

In short, I recomend him strongly for the position he applies to as a talented, thorough and reliable teacher.

Please feel freee to contact me if you have any further questions regarding this letter of support and recommendation.

Yours sincerely,

Victor Pidstrygach

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Recommendation Letter for Olivier Gabriel

To Whom it May Concern,

As a teacher at the mathematics departement of the Université Paris 7 Diderot, I have worked for 2 years with Olivier GABRIEL and I recommend him very strongly indeed.

In 2008–2009 and 2009–2010, I was responsible for the first semester module on algebra and analysis for one of the five sections of first year students in the *Licence Science et Applications*. During these two years Olivier GABRIEL took care of one tutorial group (20 students) in this course.

I am in no way exaggerating when I say that Olivier GABRIEL is the best junior teaching assistant I have worked with at university level. He showed very strong commitment and his work was remarkably effective. During both years, the students in his group showed more progress between the intermediate exam and the final exam than those in other groups and they also had better marks.

Olivier GABRIEL is a very gifted teacher and he has always displayed a deep motivation for transmitting mathematical knowledge.

I recommend him for any teaching structure as his presence would be a worthy addition to any team.

Yours faithfully,
Bertrand GENTOU

Jean-Yves DUCLOUX

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Paris, le 1er février 2012

Attestation d'enseignement pour Olivier GABRIEL.

Au second semestre 2010–2011, je me suis occupé de coordonner les enseignements de mathématiques en 1ère année de licence à l'université Paris 7 pour les étudiants du cursus Maths ou Maths-Info.

Il s'agissait de faire fonctionner en parallèle 5 groupes de cours/travaux dirigés (12 heures pas semaine), sur le programme suivant : espaces vectoriels, matrices et applications linéaires, formule de Taylor, développements limités et études locales, calcul intégral, équations différentielles linéaires.

Olivier Gabriel a enseigné dans l'un de ces groupes, en équipe avec un autre doctorant. J'ai pu apprécier son sérieux dans la préparation de ses cours/TD et pendant nos réunions entre enseignants. Voici quelques exemples qui le distinguent nettement des autres membres de mon équipe de l'an dernier :

– il a été le seul a répondre (favorablement) à ma proposition de mettre en commun nos feuilles d'exercices ;

– pour que la page web de notre enseignement soit plus lisible, il a m'a aidé à déplacer les informations que j'avais mises sur ma page web personnelles sur le site de l'université (en m'incitant à ajouter des documents utiles aux étudiants), cf.

`http://didel.script.univ-paris-diderot.fr/claroline/course/index.php?cid=MM2`

– il a demandé à la reprographie de faire un tirage d'un ancien polycopié de notre UFR, disponible en ligne à partir de la page web précédente (avec mot de passe) ;

– au moment des séances de révisions (communes à tous les groupes) entre l'examen principal et l'examen de rattrapage, il a été le seul à communiquer à toute l'équipe un texte détaillé sur ce qu'il comptait faire pendant sa séance de révision ;

– ne pouvant être présent pour surveiller l'examen de rattrapage, il s'est fait remplacer de sa propre initiative (mes collègues titulaires ont plutôt tendance à me dire « j'ai un empêchement, peux-tu demander au secrétariat qu'il nous envoie un surveillant ? »).

Je constate qu'Olivier Gabriel fait partie de ces enseignants qui préparent leurs cours et travaux dirigés avec soin. Il a donc clairement les qualités pédagogiques nécessaires pour être Maître de Conférence.

J-Y DUCLOUX, Maître de Conférence à l'Université Paris 7.