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Teaching Philosophy & Experience

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Disclaimer: This document has not been updated since Fall 2016, when I accepted an assistant prof. position at Augusta University.

Since the beginning of my academic career, I always taught and learned: the alchemy of a good student-teacher exchange always drove me to re-enforce my ability to analyse, communicate and question myself, as I was sharing my knowledges and communicating my enthusiasm. I taught formal lectures, small groups sessions and gave lab assistances, in Universities with different characteristics, both in France and in the US. Please find below a detailed overview of my teaching experiences, including a quick description of my previous environments and personal evolution. Those past experiences helped me to forge my own teaching philosophy, that I'd like to expose in a second moment.

Past teaching activities

Detailed overview

I have been a Teaching assistant (TA)[1] in the IUT during my Ph.D. (2010–2013) at the LIPN (Université de Paris 13). I then was, on top of my post-doctoral position in the LACL (2014–2015), assistant[2] at the U-PEC, at the Faculté des Sciences et technologie (FST). Finally, I am currently, on top of my post-doctoral appointment at the ASU (2015–current), an instructor in the Computer Science department. In all those situations, I volunteered to teach in those liberal, comprehensive and professional Universities.

The table page 2 gives the detail of my service ($\pm$340 hours, spread over 9 semesters). I am this year teaching formal lectures and co-monitoring TAs as it is expected in a US university. In France, I was TA, i.e., in charge of lab and classes sessions, but I volunteered to take more responsibilities:

○ I was the coordinator of a course on software engineering, designing from scratch the content, activities and assessments, being in charge of a TA and responsible for the evaluations
○ I was TA two year in a row for a decisive course for the students, and had an active part in the writing of sessions, exercises, lessons and evaluations.
○ I was the sole TA during the design of a new course on C, previewing the exercises, providing feedback on the lessons and re-orienting them.
○ I beta-tested the WIMS e-learning platform, composed exercises sheets and evaluations, and guided a group of $\pm$20 students in its usage.
○ I often consulted accreditation's documentation (such as the IUT's national program [4]) and discussed with Professors on the best way to achieve its requirements.

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[1] As "allocataire-moniteur", which corresponds roughly to a faculty non-tenured position. Please refer to the **??**, and to Wikipedia [7] for a correspondence between French and US academic ranks.

[2] In a teaching-only, part time and non-tenured position.

Fall 2016

70h   **Computer Science I** (1st Sem.)   Coordinators: Clément Aubert & Patricia Johann

Introduction to CS, in `Java`: first interactions with IDE, data types, control structures, recursion, object-oriented paradigm, class development. Syllabus: `https://lacl.fr/~caubert/ens/2016_fall/CS1440/`

2014–2015

35h   **Initiation to Algorithms and Complexity** (3rd Sem.)   Coordinator: Sergey Verlan

Fundamental concepts in algorithmic: recursion, stacks, backtracking, data representation and problems on graphs. Lab session in `C`.

❀

39h   **Imperative Programming** (2nd Sem.)   Coordinator: Eric Petit

Compilation, data types, arrays, expressions, functions, etc. Lab session in `C`, ambitious and innovative pedagogic methods.

2012–2013

24h   **Databases** (2nd Sem.)   Coordinator: Jean-Michael Barrachina

Models (`UML`, class diagrams, normalization, relational algebra) and practical design and administration of databases: `SQL` queries, constraints, views, functions, programming in `C` and `SQL`.

❀

27h   **Network Administration and Operating Systems** (2nd Sem.)   Coordinator: Laure Petrucci

Content similar to that in 2011–2012, with increasing involvement in the writing of exercises, assessments and proposal of modifications of the course.

2011–2012

27h   **Network administration and operating systems** (2nd Sem.)   Coordinator: Laure Petrucci

Initiation in bash scripts, databases, `*NIX` systems administration (users rights, Filesystem Hierarchy Standard (FHS), etc.), network card configuration and packet control (Wireshark). The content can be accessed at `http://lipn.fr/~petrucci/cours_R3.pdf` and `http://lipn.fr/~petrucci/tp_R3.pdf`.

❀

20h   **Learning differently** (2nd Sem.)   Coordinator: Clément Aubert

Content similar to the one developed in 2010–2011, but this time without lectures. I was responsible for evaluations (consultation with colleagues, evaluation design, in charge of the final grades).

❀

51h   **Algorithmic and Programmation** (1st Sem.)   Coordinator: Camille Coti

Deployment of a new course on algorithms and programming in `C`. The pace alternated exercice classes explaining the algorithmic key concepts in natural language and lab sessions. Its content was ambitious: loops, graphics libraries, pointers, linked lists. Syllabus: `http://lipn.fr/~coti/cours/#I3`.

2010–2011

23h   **Learning differently** (2nd Sem.)   Coordinator: Fayssal Benkhaldoun

Guiding of 25 students projects in groups of 2 to 5. I designed an introductory course on software engineering and guided the students in the development of their software (writing specification, workflow, monitoring and evaluation). The projects were largely developed at home, class serving as stepping stones. The languages chosen were numerous (`C`, `Java`, `PHP MySQL`, `HTML`).

❀

18h   **Learning differently** (1st Sem.)   Coordinator: Fayssal Benkhaldoun

Lectures to help the students struggling with mathematics. The goal was to get them through the program content differently, thanks to the e-learning platform WIMS. There was a need for consultation with the heads of mathematics modules, writing exercises, regular evaluations.

Environments

In the US Appalachian State University has more than 18,000 students, primarily in bachelor's and master's degree programs in both liberal arts and applied fields. The Department of Computer Science, a unit of the College of Arts and Sciences, offers a B.S., M.S., a certificate program, and a minor. The fundamental purpose of the Department is to provide excellent teaching in these programs and in the service courses for which it is responsible, and to engage in appropriate scholarship to energize and direct such teaching.

The class I'm teaching is "the bottleneck" of the Department, and hence play a crucial role: we all want our students to benefit from the best start in their study of CS. A lot of effort and resources is put in those sections totalizing $\pm$300-students, to make sure they benefit from all the resources one could wish for to grasp fundamental aspect of CS as well as to provide hands-on experience.

In France Villetaneuse (Université de Paris 13) and Créteil (U-PEC) are in the suburbs of Paris and known to reflect a great diversity. Official statistics regarding religion, ethnicity or race are not allowed in France, and fact books are less common, but miscellaneous reports can help to get a global overview of the environments where my teachings took place.

The University of Paris 13 is faced with an over-representation of modest or disadvantaged backgrounds students, comparatively to other Universities [6, p. 33]: 40% of the students come from socially disadvantaged backgrounds, and nearly 20% are holding a foreign *Baccalauréat* [3, p. 15].

Paris 13 is a mixed organization with the CNRS, with a strong record of national and international fundings, awards and Ph.D. diploma (around 120 in 2011 [6, p. 17]). Teaching is delivered notably through Instituts universitaires de technologie (IUT) (University Institutes of Technology), whose students prepare a two-year undergraduate technical diploma called a DUT, whose program is fixed by the ministry [4]. Admission is selective, assistance is mandatory and grades are weekly. I taught in the DUT Réseaux & Télécoms (Networks & Telecoms), where 90% of the students choose to continue studies [1]: this very high rate pinpoints that students are well-prepared and willing to face liberal studies afterwards.

The University of Paris 12 (U-PEC) attracts over 1000 foreigners students each year [2, p. 48] and integrates them to the population of its region. Its staff is made of around 1200 faculty tenured position [2, p. 61], it has international partnership with more than 300 institutions [2, p. 48] and almost 1500 Ph.D. students [2, p. 25].

The Bachelor degree where I taught regroups majors and non-majors freshmen, sophomores and juniors. This require a strong cooperation between colleagues of different fields (CS, Mathematics, Physics, Chemistry). The coordinator of one of the course I was involved in was in a different department, and we weekly discussed mock-up and pre-requisites with colleagues.

An Ever-Growing Involvement

I should stress that, before my Ph.D., I did *not* studied any programming language or received any technical CS-related instructions: my intellectual journey to TCS went along Logic and Mathematics. I had some OS administration skills, using Linux since 2007, basics knowledge in `PHP`, `HTML` and `CSS`, rudiments in `Prolog`, and practical knowledge of LaTeX.

I taught in the IUT to freshmen and sophomores, with a growing complexity of content, and varying the subjects. During my Ph.D., I successfully learned from scratch to teach a programming language (`C`), network administration, `*NIX` and `UML` theories, and a query language (`SQL`).

I sharpened my teaching methods in the 1st semester of 2010 thanks to the "Learning differently" courses, whose mathematical content had to be taught with special care to students in difficulty. It pushed me to be vigilant on coaching students and to double my efforts to present the content in innovative ways. Being the coordinator of a course in software engineering early in my career (2nd semester of 2011) strengthened my organization skills and abilities to plan ahead as well as to adapt my lessons to the students' needs.

My experience is varied and demonstrates my ability to quickly acquire specialized contents. I learned to train myself efficiently, and I have no doubt in my ability to ensure new lessons in terms of pedagogy or content. I learned during my Ph.D. a subject of deemed difficulty—the von Neumann algebras—, studied by myself the basics in automata, concurrency and category theory during my post-doctoral positions.

Teaching Methods and Practices

Engaging a Diverse Student Body

I was a volunteer (2010–2013) in the non-profit association Goutte d'Ordinateur, in the "Goutte d'Or", one of the most multi-cultural and poor neighbourhood of Paris, with an estimated 28% of foreigners [5, p. 35] and almost 50% of unemployment rate [5, p. 36]. My goal was to reduce the digital divide through group, free and weekly lessons and sessions with newly arrived migrants: some of them never used a keyboard, some of them had difficulties with French, most of them had a practical use of cellphones and smartphones.

This 2-year experience taught me to be patient, comprehensive, to use plain but precise vocabulary, and to work with complete beginners. This helped me greatly in my teaching experiences: I could anticipate some special needs, knew different etiquette and paid attention to respect them.

I took pleasure to adapt my lessons and explanations to diverse bodies, and know I have facilities to level my teaching, without lowering my expectations, to my public. Having being, through my studies and professional activities, regularly in a beginner's position provides me with facility to imagine the state of mind of students who are faced for the first time with a new subject.

Being able to think pedagogically does not, of course, prevent me from tailoring the content of my lessons. Independently of the student body, rigour and accuracy always drive me. I hope the general writing and organization of this application, as well as the content of my research articles, testify of my clarity and organization skills.

Methodology as the cornerstone of all skills

I taught software engineering for 2 years, and noticed that many students had trouble with basics FHS, file naming conventions, and had difficulties into organizing their efforts. I further remarked that (also among my colleagues), a lot of recent tools to efficiently work as a team were unknown.

Too much time and energy are wasted by students googling again and again variations of the same keywords. I now always introduce students to general methodology regarding
- How to organize their workflow (by using keyboard shortcuts, adapted software and efficient interfaces),
- Where to find documentation and resources (`man` pages, official websites, Stackexchange websites, handbooks, specifications),
- How to keep track of the resources consulted (from simple text file to bookmarks, or others reference management software),
- How to automate redundant tasks (scripting, file synchronizer, mailing-lists),
- How to share, backup and version data (using git, svn, archives, Etherpad).

I encourage them to keep a diary of their progress, and always leave ± 5 minutes at the end of my classes to let them quietly write down what they learned. All researchers know that being able to formulate the question you are stuck on is half of the work done: I want students to acknowledge that being able to disentangle their problems is the first path toward their resolutions. To that end, *writing* it (rather than typing it) looks to me as the shortest path to let the mind rest and focus on the problem you are facing.

Clarity and explanations

Being repeatedly in the learner's position when preparing lessons and exercises allows me not to let anything implicit when teaching. Having been through the situation the students are going to face (with, of course, some advantages), I foresee their difficulties, traps and questions.

This pushes me to assume as little from the students as possible, and to monitor each step with great care. Lessons and labs sessions starts with reminders and basic questions addressed to students on what has been achieved so far: this allows to monitor students having trouble, helps the hesitating ones gaining confidence on what they learn so far, and prepares everyone to the coming content.

I pay a great attention to the clarity and readability of the content I deliver: I indent, comment and tidy my code, list references precisely and pay an extra attention to syntax and spellchecking. This level of detail in codes, proofs and contents, is in return expected from the students, whose level of clarity is significantly reflected in the grades.

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