Statement of Teaching Interests

I have had a good number of teaching opportunities in the last few years, from casual situations where I was helping out a fellow student to teaching at a classroom in front of 80 undergraduate students. In between, there has been the private tutoring, the part time position in a high school in France, teaching assistant position at UIC, mentoring masters students at the UIC multimedia lab, presenting papers at reading groups and to the department seminars and much more.

My first teaching experience began with a tutor position at a recognized tutoring institution in France. The position involved giving private lessons as well as teaching groups of up to 10 students in the areas of Mathematics and Physics at high school level. It was then when I realized that pedagogic style is a crucial factor in communicating materials conveyed in a course. I have learned to

• Prepare for lectures and discussion sections by synthesizing material from different textbooks;
• Relate the material being presented to what has come before and what is still to come in the same course, to material in other courses, and to the students’ experience;
• Balance practical applications with the abstract concepts such as theories and mathematical models;
• Provide concrete examples of the phenomena the theory describes or predicts;
• Use pictures, diagrams and graphs liberally before, during, and after the presentation of the material;
• Show films or use multimedia simulations to provide visual demonstrations;
• Provide brief intervals in teaching for students to think about what they have been told;
• Use some open-ended problems and exercises that call for analysis and synthesis.

I delivered about a hundred lectures stretched over 2 years and I believe each one of them was better than the previous one.

I acquired a different level of experience as a teaching assistant at UIC for undergraduate level classes. I had lab sessions where I interacted a lot with the students not only to help them conduct the experiments but also to make the link between the experimental and analytical results. Sometimes, I was given the responsibility to deliver lectures and I appreciated the opportunity to be a substitute teacher. The main thing I learned was that it is simply not sufficient for a teacher to know something in only one way. Though you may believe you have the cleverest possible representation for a given concept, it may be quite meaningless to the student you're helping. In the classroom, I could present material in the way I thought best and see that most of the class was nodding along, but it was during the one-on-one teaching and advising that I really saw what had worked and what hadn't. Being able to adapt one's representation, to attack the same problem from many different angles, was an important skill I learned through this experience. It’s something I've since applied to my research collaborations as well.

Another experience that has shaped my teaching interests has been during my PhD at UIC, where I had the good fortune to be a mentor for 2 master’s students. Graduate students are generally self motivated and with their inquisitiveness comes a healthy dose of skepticism. In the beginning, I had to teach them the tools needed to develop the project and giving them references to read and to present during internal seminars. Once they digested the required tools, they started asking me why I was using a certain approach to a particular problem rather than other methods that they came across during their readings; I had to convince them using simple examples and particular solutions. Slowly, they came up with their own suggestions to the project and discuss them with me.
Examining new facts and ideas critically and making numerous links between ideas helped us make great progress on our project. From this experience, I learned that beyond the primary purpose of educating and leading students, there is a direct benefit from teaching for my research and myself. Teaching is often the best way to thoroughly study, rehash, and absorb ideas. Even teaching core classes on familiar subjects often yields fresh perspectives resulting from finding ways to give the students intuition on the main ideas, or from designing the progression of the course.

Looking over my teaching history, I have found both in teaching large classes and in working with undergraduates and graduates that the most efficient way for learning and teaching engineering is to properly combine theory and applications. As a professor, I would like to integrate both of these aspects into courses I will be teaching in the future. I feel I'm qualified to teach the following courses:

- Digital Signal Processing
- Analog and Digital Communications;
- Multimedia Systems;
- Digital Image Processing;
- Adaptive Digital Filters;
- Probability and Random Processes;
- Detection and Estimation Theory;
- Information Theory.

In which I have done substantial course work and have had some practical exposure by way of project and research work. I would also like to create multidisciplinary courses where tools from electrical engineering, statistics and mathematics are applied to practical engineering problems. Given the opportunity, I would like to offer courses in:

- **Introduction to Bioinformatics:**
  Bioinformatics is a growing area in computational biology involving skills from engineering, computer science and mathematics. The course outline will include: Computational analysis of genomic sequences and other high throughput data. Sequence alignment, dynamic programming, protein motifs, DNA expression array, and structural bioinformatics.

- **Probability on Graphs:**
  In many applications to biological engineering, computer science, data flow on the internet, electricity suppliers networks, outbreak of epidemics as SARS epidemics, traffic in big cities, one deals with rapidly evolving events on big graphs. Many of these phenomena can be modeled by appropriate probabilistic processes on big graphs. The course outline will include: 1) Graphs; 2) Markov Chains; 3) Randomized algorithms on graphs; 4) MCMC Markov chain Monte Carlo.

- **Game Theory with Engineering Applications:**
  Although traditionally a subfield of economics, elements of game theoretic modeling are increasingly used in a broad spectrum of fields and in particular in engineering. The course will develop the basics of game theory, with a heavy emphasis on applications to engineering systems such as networked systems (e.g., internet) and algorithmic design (e.g., resource allocation in networks).

To conclude, I feel that my ideology of a perfect professor together with my research, course work and teaching experience make me qualified to explore the possibilities of an academic career.