Teaching portfolio

1. Teaching CV: A list of any lecturing and supervision tasks, including specification of academic fields, scope, level (bachelor, master, continuing education, PhD) as well as any external examiner tasks.

Courses – Postgraduate level
Reliability, Agreement and Method Comparison
Applied Biostatistics: analysis and interpretation of experimental data
Courses – Graduate level
Advanced Signal Processing
Stochastic Signals and Processes
Time-Frequency Analysis, Adaptive Filtering and Source Separation
Stochastic Processes II
Courses – Undergraduate level
Microcontrollers and Algorithms
Algorithms and Processes
Advanced Programming
Introduction to Programming
User Interfaces
Data Structures
Mathematics – Levelling course
Supervision – Postgraduate level
Co-supervision of Ph.D. students enrolled at the Doctoral School of Medicine, Biomedical Science and Technology, Aalborg University.
Supervision of Ph.D. student enrolled at the Doctoral School of Engineering, Universidad Nacional de Entre Ríos, Argentina.
Supervision – Graduate level
Supervision of M.Sc. Biomedical Engineering student, Universidad Nacional de Entre Ríos, Argentina.
Supervision of 1st and 2nd semester M.Sc. Biomedical Engineering and Informatics
Censor for 3rd semester M.Sc. Biomedical Engineering and Informatics
Supervision – Undergraduate level
Supervision of 3rd and 6th semester bachelor in Medicine with Industrial Specialization
Supervision of 4th semester bachelor in Biomedical Engineering and Informatics

2. Study administration: A list of any study administration tasks, e.g. study board membership, head of studies or semester or course coordinator, accreditation, etc.

Member of the working group for the revision of the study program for the master in Biomedical Engineering and Informatics (Aalborg University).
Member of the working group for the revision of the study program for the Bioengineering career (Universidad Nacional de Entre Ríos).

3. University pedagogy qualifications: A list of any completed courses in university pedagogy, PBL courses, workshops, academic development projects, collegial guidance and supervision, etc.

University Teacher Education for Assistant Professors (Adjunktpædagogikum)

4. Other qualifications: Conference attendance, editorials, presentations, etc. relating to education, 'University Teaching Day', etc.

Participation in Education Conferences
Beber D., Milone D., Biurrun Manresa J.A., Sigura A., Competencias de vida artificial para fomentar la creatividad. In Proc IV Argentinean Congress on Engineering Teaching, Buenos Aires, Argentina, 1 - 3 Sept. (article in spanish)
Milone D., Beber D., Biurrun Manresa J.A., Artificial life contests: encouraging creativity. In Proc. I International Congress on Computational Bioengineering, Zaragoza, Spain, 24 - 26 Sept.

5. Teaching activity development and teaching materials: A list of any contributions to the development of new modules, teaching materials, study programmes, e-learning, collaboration with external business partners, etc.

Forms of teaching and assessment – Teaching material

The pedagogical and didactic choices in my methods for teaching and assessment, together with an overview of the teaching material I prepared during the last 10 years can be summarized in the following items (examples of any of these items can be provided upon request):
•Lectures supported by slides: I have prepared slides and presentations for all courses I have taught. They serve as a visual complement of the oral part of the lecture (since it has been proven that most students tend to learn through visual or auditory input). However, and contrary to the common practice, I do not give hand-outs of the slides before each class (although I do indicate suggested reading material). In this way, I can use the slides as triggers to induce the students to ask questions (to me or to themselves), as a way to engage the class into active participation and discussion on the topic; they basically discover what is the problem and what are the possible solutions by themselves, and I only serve as a guide and a facilitator. It also leads them into the habit of taking notes as a learning reinforcement method, since a common reaction that I found among students is to avoid taking notes when the hand-outs are given, because they have the impression that all the material they need is already in the slides.
•Lectures supported by blackboard: a downside of the use to slides is that teachers are sometimes overly tempted to include all the content of the lecture in a presentation. The problem arises in the speed at which the slides are presented, and the excessive amount of information that can be included in such presentations. I try to design most of my lectures in a way that contain the reasoning and deductive part as explanations on the blackboard; in this way, the students can follow the progression and take notes of a deduction at a reasonable speed for assimilating new knowledge (i.e. the speed at which I can write it) and at the same time get a general overview of the whole process of reasoning, which is sometimes difficult to achieve using slides.
•Exercises: I also have developed practical exercises for all the courses I have taught, from short, small problem to be solved in a few minutes in order to grasp elementary concepts, to semester-long assignments divided in stages, so the students can apply what they learn over the week into the solution of a complex engineering problem (see section Reflections on teaching for further details). I usually include two sections, one that requires mandatory solutions in order to understand the key concepts of the topics, and another which is optative, with more complex and challenging exercises for those students with further interest into the topics.
•Source code: being involved in teaching programming, part of the task consists in developing examples of source code and exercises that involve programming and coding. The extent of my developments go from very simple examples of a few lines (to show the phrase “Hello world!” on a screen), to several thousand lines of code to create a framework for artificial life simulations.
•Tutorials: the available time is a key issue in teaching, and depending on a number of factors (e.g. amount of students that sign up for a course, amount of available teaching hours to distribute among teachers), the overall time that is assigned to each course is sometimes not enough to develop all the topics in the way we desire. This is why I encourage the development and use of tutorial, that are half way between personalized teaching and learning from a book. If the tutorial is specifically designed for a course, it allows a more detailed, step-by-step overview of the topics of the course without reaching the formalism and general scope of the books (which should of course still be used as reference material). We have developed an extensive tutorial on Advanced Programming at Universidad Nacional de Entre Ríos (available upon request – in spanish) that was tailor-made for the topics covered by the course, with the depth that we required for each topic (which is frequently not the case for books). At Aalborg University, I follow the same approach in the Advanced Signal Processing course at Aalborg University (in this case, using a tutorial developed at French National Center for Scientific Research) with positive results.
•Evaluations: throughout the years I have performed group and individual project evaluation (oral exams), and diverse modalities of written exams: multiple-choice, exercise solving, final reports, etc.
•Project proposals: I have developed several project proposals for both undergraduate and graduate students, in diverse biomedical engineering topics. These project proposals have been regularly chosen since I started formulating them in 2008.
Participation in teaching/learning research projects
After implementing the Artificial Life Contests project, we noticed an improvement in the engagement of the students into these “ artificial microorganism competitions for subsistence” that resulted in students more actively interested in learning programming topics, and the number of creative solutions that arose, that we did not foresee. The success of this approach resulted in a series of publications in international conferences, and the development of new integrative problems, involving among other things, signal processing of auditory brainstem responses and angiography images (available upon request – in spanish), two topics in which I was working on at that moment. This attempt to link research and teaching proved to be very successful, so I still try to implement it as frequently as possible.
At Aalborg University, and as a result of my participation in the course on University Pedagogy for Assistant Professors, I recently received an invitation from my pedagogical supervisor at the Department for Learning, Associate Professor Kathrin Otrel-Cass, to participate in a research project on EMOtions in university science classrooms (EMOS). The aim of this project is to investigate how emotions play out and shape interactions between University teachers and their students in University classrooms. Several of my teaching session at the Advanced Signal Processing course were filmed,and two researchers from the Learning Department took field notes, photos, and additional audio recordings. After the sessions, both me and the students were asked for some reflexions on the lecture. The project is still on its early stages, but I hope that the outcome of this project will help improving University teaching practices, such as planning and reviewing of teaching.

6. Teaching awards you may have received or been nominated for.

Type your answer here...

7. Personal reflections and initiatives: Here you may state any personal deliberations as regards teaching and supervision, any wishes and plans for further pedagogic development, plans for following up on feedback/evaluations from students, etc.

Reflections on teaching

My first experiences on different forms of teaching come, of course, from the period in which I was an engineering student. Most of the courses would follow a classical approach, consisting of a theoretical lecture, a practical lecture and laboratory/experimental work. All these stages would usually be contained in small work packages or units, and we would have several of these units during the semester. The problem I experienced with this form of teaching is that most of the time the units were too independent from each other and the exercises to solve were too simple and/or not related with real biomedical engineering problems.

When I became Teaching Assistant for the Advanced Programming course in 2003, the most significant problem the students faced was that they were not able to put together the basic knowledge they acquired on programming in order to solve problems that were a bit more complex than the simple exercises they solved in the practical lectures (involving tens or hundreds of lines of code). Therefore, in collaboration with D. Milone, D. Beber and A. Sigura, we developed an integrative strategy, in which the aim for the full semester was to solve a complex, real-life biomedical engineering problem. Such problem would be gradually solved in stages, from the problem analysis, to the design and gradual development of the solution. For our first experience, we design a problem involving Artificial Life Contests, in which we programmed an environment where several colonies of virtual microorganisms (developed by different groups of students) would compete for subsistence and nutrients. As the students gained more and more knowledge into programming algorithms, the colonies got smarter, simulating an artificial evolution. An example of the current status of this project can be reached at http://alifecontest.wikidot.com/ (english version available on-site). Therefore, I strongly believe that one of the best ways to encourage students to engage in active learning is by having them face real-life problems (of adequate complexity, according to the course level) that they will have to solve as professionals.

Teaching form at Aalborg University

I was very excited when I was first introduced to the Problem-Based Learning (PBL) strategy at Aalborg University, since for me it represented an extension and a generalization of the teaching strategies I was applying at my previous position. The supervision tasks and the project assignments closely resembled the guidance that I would provide to my former students at Universidad Nacional de Entre Ríos during the development of the integrative exercises, but taken to a higher level, since with the PBL approach, it is the knowledge from a number of different courses that they have to apply in order to solve the problems posed in each project. Moreover, my vision of teaching in engineering always involves the concept of gathering knowledge not as a collection of facts, figures and formulas, but as applied to the solution of real-life problems. The PBL strategy is clearly aligned with this conception, so I found myself in the best possible environment to develop my lecturing and supervising skills.

However, I found as a supervisor and teacher that a challenge with the PBL strategy is to remind the students to develop a general perspective on their project solution. Sometimes they are very focalized in the background and knowledge related to the problem they chose to solve, so they tend to leave aside the course contents that are not directly related to it. In those cases, I tend to emphasize that similar solutions to their particular problem can be applied to a broader range of situations, so they can generalize the applicability of the skills they acquire. I also try to guide them into alternating the roles and tasks within the project, so they all gather the necessary abilities planned for the semester.

One of the tasks that I found challenging is the assessment of the students at the end of the project, which is why I took particular interest in the corresponding module of the University Teacher Education for Assistant Professors. Throughout the interactions with my pedagogical supervisors, I realized that a key aspect of the final evaluation of these projects is to focus on the knowledge, skills and competences that the students should be able to master at the end of the semester, that are described in the corresponding study plan. This aspect applies both for students and teachers: the students should be fully aware of this learning outcomes, in order to succesfully demonstrate that they compy with these requirements from the study plan, but also the teacher should carefully consider them in every activity related to teaching: planning, lecturing and evaluating.If both teachers and students are in syntony with regards to these learning outcome, then the learning process becomes more focused, leading to less overall problems and higher success rates.

Initiatives in teaching

I have a number of initiatives that I like to implement during my teaching and supervising activities:

•Development of tutorials: the development of tutorial specifically designed for the courses at the Department helps the students in their self-learning activities, and the teachers would have a material that can be both enriched and reused over time.

•Continued evaluation process: as supervisor, I like to develop a systematized strategy that allows me to periodically evaluate the contribution of each student to the outcome of the project, in order to detect unbalances or learning issues at early stages. An example would be to identify the task of each student during these brief periods, assess the outcome of their work and then perhaps advice them on how to reassign the tasks for the next brief period based on the indvidual performances. As teacher, particularly in projects courses without final examination, I would like to implement a similar system, as a follow-up of each student that could later be derived to each project supervisor in order for them to get an overview of the work and effort of each student during the development of the course, which would result in more useful information at the time of the final evaluation. This is implemented as small mini-projects or mandatory exercises, whose solution would be evaluated individually for each student.

•Systematized feedback: to the best of my knowledge, there is no systematized feedback for the teachers once the semester is finished. Some teachers and supervisors ask for feedback individually (and each in their own manner), whereas the Study Board provides feedback for some others in case there is a special situation that needs resolution. In my particular case, I always received feedback from the students I supervised, but in an informal way, whereas I never

received feedback from the Study Board, the semester coordinator or the course responsible regarding my teaching activities. A systematized feedback, based for example on anonymous surveys filled by the students, would provide a framework for improvements, that is fair and equal for all teachers and supervisors.
Type your answer here...

8. Any other information or comments.

Type your answer here...