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## Formal educational training

- 2012-2013 University Lecturer Training Programme. I followed the Lecturer Training Programme in 2012 at University of Southern Denmark (8 ECTS) during which I also participated in the following pedagogical courses: 1. Engage your students with discussion forums, blogs and Wiki's (½ ECTS), 2. Teaching with cases (¾ ECTS), 3. How to use Smartboards as a part of your teaching (¾ ECTS) I completed the Lecturer Training Programme in 2013
- 2019 PhD Supervision - Regulation, Recruitment and Expectations

## Administrative tasks related to education

I am involved in different tasks related to the education of biologists and pharmacists at University of Southern Denmark. I am also a part of a team of three scientists who are developing and teaching a course in statistics at international conferences.

- 2012-2015 I was involved in the startup and planning of a program called "Maritimt Hus" (the maritime house) at Department of Biology where high school students are invited to a three day course at our marine facilities in Kerteminde working in practice with specific projects related to the sea as for example a project about sea ranching and the sea as a food resource.
- 2012 - I have been one of three teachers developing and teaching an 8h short course called "Statistical issues in the design and analysis of ecotoxicological experiments" at the European SETAC conferences (Society of Environmental Toxicology and Chemistry). The course is designed for PhD-students, Post Docs and other academic personnel working with ecotoxicological testing.
- 2018 - I am representing the Department of Biology in the Study Board for Pharmacy

## Experience of study programmes, supervision and examinations

Teaching responsibilities:

I have been teaching different courses at both undergraduate and postgraduate levels at Department of Biology since 2002. Besides, as described above, I have been teaching short courses in statistics at international conferences (SETAC Europe Since 2012) and mentored more than 50 students at levels from research and Master projects to PhD projects. During a research stay in Singapore, I taught graduate biology students at Nanyang Technological University about endocrine disrupting chemicals. I have been involved in outreach and recruitment at Department of Biology for many years and in this relation, I have given numerous presentations to high school students about specific research topics as well as general information's about studying biology. For some years, I have been in charge of a specific outreach project called kemikaze where high school students are introduced to the university life by some of our students where after they have a full day in the laboratory working with gene modified yeast cells and endocrine effects of parabens extracted from the students own cosmetics followed up by a lecture about the topic endocrine disrupting chemicals. I have also been in charge of several study-direction projects where third-year high school students visit our laboratory – doing small studies as a part of their project.

Supervision and examination:

I have been mentoring and supervising around 50 students since 2002. Of these were 30 master students that defend their thesis at an oral exam with presentation and discussion with the supervisor(s) and a censor. I am very fond of the oral examination because it gives the possibility to support the weaker students and challenge the stronger students to achieve the maximal performance of the individual student. Beside it is good student training in relation to oral job applications. I have supervised more than 15 bachelor students that are assessed through their written report. This is a good way to check the students writing capabilities and whether they are familiar with the format of scientific reports but I miss the personal discussion about scientific results. In BB 807 there is a standard 4 h exam and this type is excellent to check and evaluate the gained knowledge by the students. Especially when the student numbers are high, it is more or less the only assessment possibility. It is though important that the questions asked is in agreement with the course learning goals.

- 2002-2004 Undergraduate courses: 2002, 2003 and 2004 Biologists, BB 19 Introduction to information technology: Teaching a course where the students were trained to use different computer software in relation to studying natural sciences, i.e. writing reports, using Excel etc. The course was a combination of lectures and tutorials. In total 180 hours teaching.
- 2006-2007 Natural Sciences, NAT 501 natural science project: Teaching a course where the students were taught how to write scientific reports and how to apply computer software in relation to analyzing experimental data. The course was a combination of lectures and tutorials. In total 48 hours teaching.

- 2011 - Biologist, pharmacists and engineers, BB820 Risk assessment of chemicals: A course for biology- and engineer students at master level as well as employees in the private or public sector working with risk assessment of chemicals. The course supplies the basic theory and terminology necessary for doing risk assessment of chemicals. Tutorials where a toolbox to do risk assessment is introduced will give the students practical experience in performing risk assessment of chemicals. In total 60 hours teaching.
- 2011 - Biologists and pharmacists, BB807/FA 802 Molecular toxicology/Mechanistic toxicology: These courses are combination of lectures, tutorials and laboratory exercises. The aim of the course is to explain, at the molecular level, why some chemicals are toxic to living organisms. The processes and cellular structures that are attacked by chemicals and the defense mechanisms that living organisms possess will be studied. The laboratory experiments are planned by student groups that are given specific tasks to solve. In total 90 hours teaching.
- 2012 - Pharmacist, BB 524 Pharmaceutical toxicology: This course is a combination of lectures, tutorials and laboratory exercises. The course aims at providing thorough knowledge about the toxic impact of pharmaceuticals on organ and organism levels and to introduce the students to the environmental impact of pharmaceuticals and their metabolites. In the laboratory part the students are introduced to the use of a reporter gene assay to analyze the estrogenic effect of chemicals as well as metal analysis via atomic absorption spectroscopy. In total around 250 hours teaching.
- 2012 - PhD course, Statistical issues in the design and analysis of ecotoxicological experiments: I am one of three instructors in an 8 h short course held at the yearly European SETAC (Society of environmental Toxicology and Chemistry) conference. The course covers statistical considerations of experimental design and statistical analysis used to evaluate toxicity of chemicals in the environment. The students attending are predominantly PhD students but also academic personnel working with toxicological or ecotoxicological experiments. In total 56 hours teaching.
- 2016 - Biologists, BB 536 Sustainable Future: I have given lectures in this course since 2016. My topic is invasive species and their global distribution via ships ballast water. The lectures include the effect of aquatic invasive species on ecosystems, the technological development to "clean" ships ballastwater from potential invasive organisms and the challenges with the verification of such technologies. In total 8 hours teaching.

## Methods, materials and tools

Course development: I was included in the development of a new way of doing laboratory exercises in 2012 at a master course (BB807 molecular toxicology). I have also been involved in the development of a course named Kemikaze, where we teach high school students about endocrine disrupters. The students bring their personal cosmetics and we investigate how much endocrine activity the different brands and types of cosmetics contain by use of genetic modified yeast cells and HPLC. I have taken part in the development of the SETAC short course "Statistical issues in the design and analysis of ecotoxicological experiments" • Teaching methods: Lectures: I have been giving traditional lectures to larger classes where the student activity was limited to questions from a few students. This method is practical when the student number exceeds 25-30 and can work well for a shorter period in the "intro phase" where the curriculum is basic or background knowledge of the subject. My experience is though that some students loose attention and interest within 10-20 minutes. Therefore I have tested activating tools as Shakespeak and Poll Everywhere in my lectures. These tools can be used to do online testing of gained (or not gained) knowledge in relation to the subject. In combination with short brakes where the questions to be answered are discussed with the students next to each other, I have experienced that the students keep focus much better. Besides, these tools can show which parts of the teaching subject should be explained again and which parts are well understood. In the future, activating tools and short group chats will be a fixed part of my lectures. Tutorials: When I have been teaching tutorials, I have shortly introduced the subjects to be studied and then letting students (in groups) work with these subjects, both answering pre-made questions and generating their own questions to be answered by co-students. This tutorial form has worked fine especially when the teacher is alert of silent students and put a special effort to activate them in the group work. In the future I will continue this form of tutorials. If the tutorials are followed by laboratory exercises, I plan to design the questions for the tutorials so that the solving of these questions prepares the students for the exercises increasing the alignment between theory and practice. Laboratory exercises: For some years, I have been teaching traditional laboratory exercises where the theory presented in lectures and discussed in tutorials are translated to practical work following pre-made recipes that describe the exercises step by step as a "cookbook" recipe. By doing it this way, it is very easy for the teacher to setup equipment and plan the work and to keep in track with the time schedule. But on the other hand my experience is that the students are not challenged enough: They do not need to include the learned theory in the work and they do not learn how to plan exercises. They just have to follow the fixed steps! As a part of a teaching team, I was included in the development of a new way of doing laboratory exercises in 2012 at a master course (BB807 molecular toxicology). Here we challenged the students (group wise) by giving them some specific tasks to solve. The groups then got plenty of literature and a list of available laboratory methods making them able to plan their exercises so they could answer the questions given. This form requires that the students can understand the methods theoretically and understand the connection between different methods. In the end we experienced much more engaged students that took responsibility for the exercises and had the feeling of success when methods worked. There are some challenges with this type of laboratory exercises because more methods are in play and the time schedule can be difficult to handle, but the positive outcome largely exceed these challenges. This course continued with the same success in 2013. I will continue the development of student planned laboratory exercises in the future and I will work on a form adapted to bachelor courses, where the students also participate in the planning but in a little more controlled process. • Teaching materials: Book: I have co-authored a book on Statistical Analysis of Toxicity Of Chemicals in the Environment together with my two co-teachers from the SETAC short course in "Statistical issues in the design and analysis of ecotoxicological experiments". The book was published in 2018 by John Wiley &

Sons, Inc. •Bioassay: I have developed and refined an enzyme linked immune-sorbent assay (ELISA) so that it can be performed within a four hour laboratory exercise instead of the normal two days, which made it possible to introduce this very commonly used biomarker assay into both Pharmaceutical Toxicology, BB 524 (and Molecular Toxicology, BB 807).

### **Educational development and educational research as well as educational awards**

During the Lecturer Training Programme I made a project about changing laboratory teaching from the normal “cookbook” lessons where the students follow a detailed stepwise recipe to an individual planning of the exercises. The project was developed to engage the students much more in laboratory exercises and to take responsibility of their results, which in my opinion increases the learning dramatically. I finalized the project with a poster presentation.

### **Reflections on teaching practice and future development including student evaluations**

My main teaching philosophy is built on the idea that learning is highly connected to student involvement and activity. Therefore, I as teacher should be obligated to activate and inspire the students during all the different teaching forms via pedagogical methods and activating tools. During the courses intro phase where student numbers are high, lectures are often the only practical solution, and I believe that these lectures can be much more efficient in relation to student learning by breaking up the lectures with small group discussions and activation tools.