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.

The list of the courses I have been a part of last five years:

Applied statistics, 4th semester course for the Department of Chemistry and Bioscience (BS, 80-120 students), 2014-2020.

Applied statistics, 2nd semester course for the Department of Chemistry and Bioscience (BS, 120-150 students), 2021-2023.

Chemometrics, 7th semester course for Section for Chemistry and Chemical Engineering (MS, 10-20 students), 2010-2020.

Chemometrics and process monitoring, 8th semester course for chemical engineering and bioenergy students (MS, 10-30 students), 2021-2023.

Statistical design of experiments, 6th semester course for Section for Chemistry and Chemical Engineering (BS, 20-35 students), 2013-2023.

Multivariate data analysis, an annual PhD course for Doctoral School of Engineering and Science (10-20 students), 20011, 2013-2023.

Quantitative methods in analytical chemistry, part of the 4th semester course (15%) where I teach on how to use mathematical methods for validation of measurements and analysis of experimental data in analytical chemistry (2012-2023).

Process Monitoring, Control and Regulation, part of the 6th semester course (20%) where I teach on how to use data acquisition devices and LabVIEW to make simple systems for monitoring and control of various processes, 2015-2016.

Several courses on analysis of quantitative data for Environmental Resource Management joint educational program with SDU (both on bachelor and master level, 2010–2018). Besides that I constantly supervise several semester, bachelor and master projects every year and serve as a censor for the projects at AAU. I have been a part of PhD evaluation committee both at AAU (Pavel Spirov, 2014) and at other universities (P.J. Williams, University of Stellenbosch, 2012) as well as co-supervised a PhD project by Sylvia Travers (Aarslev Research Centre, successfully defended in October, 2013) and main supervisor in industrial PhD project by Karin Engström (LKAB, 2015-2018). I currently supervise 3 PhD students.

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.

Semester coordinator, 6th and 8th semesters, Section of Chemical Engineering

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

Took a course on university pedagogy being a senior lecturer at my former working place (Altai State University). When I started at AAU I got acquainted with PBL and the Aalborg model by attending PBL lectures by Torben Rosenørn in campus Esbjerg and reading related documents and articles (including “Principles of Problem and Project Based Learning. The Aalborg PBL Model”).

In 2011 attended a two-day course and a workshop “Boost Your Lecturing Skills in English”, organized by Copenhagen Business School (24-25 March at Best Western Nyborg Strand). The course was part of a teacher-training development project titled “The Internationalisation of Higher Education: Challenges for Lecturers”, sponsored by the Centre for Development of Human Resources and Quality Management.

I regularly monitor and read selected articles from several resources, including “International Journal of Teaching and Learning in Higher Education”, “The Interdisciplinary Journal of Problem-Based Learning” and “Journal of Statistics Education”.

I participated in several PBL developing activities at AAU during the last 5 years, including PBL Development project "Improving flipped classrooms for better PBL implementation in everyday study" (https://www.strategi.aau.dk/PBL/pbl-projekter/FC-MOOC-undervisningen/) and contribution to Inspirational SES Teachers project (https://www.learninglab.aau.dk/digitalAssets/305/305360_inspirational-ses-teachers-report.pdf).

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

Participated in several local seminars, including the ones taking place annually in Teaching day.

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.

I take full responsibility for every course I am teaching and prepare all materials myself. I use a lot of computer simulations and plots in my courses in order to make the content of lectures easier for understanding. Most of the datasets students use for exercises are part of my previous research projects. For the courses on analysis of spectral and other multivariate data I have written a package for R, which I still maintain and develop (https://mda.tools).

From 2017 I work actively on using open source MOOC platform Open edX for blended learning activities at AUU. The main idea is to improve the Flipped classrooms approach and combine it with other activities, which allow to incorporate PBL naturally to learning activities, distribute load more evenly and get continuous monitoring of students' learning performance during a course run. I maintain the Open edX instance at our department:
https://elearn.bio.aau.dk/dashboard

Video-lectures used in my teaching activities are freely available on YouTube:
https://www.youtube.com/@mdatools-rbasics
https://www.youtube.com/@mdatools-asta
https://www.youtube.com/@mdatools-doe
https://www.youtube.com/@mdatools-chemometrics

In 2022 I started my pet-project Graasta — a set of interactive on-line applications, which helps to teach and understand topics from applied statistics and data analysis. I work on the project in my spare time but actively use in teaching:
https://graasta.com

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

Teacher of the Year 2015 (Kemi, Miljø og Bioteknologi)
Teacher of the Year 2016 (Faculty of Engineering and Science)
Teacher of the Year 2017 (Kemi, Miljø og Bioteknologi)
Teacher of the Year 2018 (Faculty of Engineering and Science)

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.

My main area of teaching deals with the use of mathematics, statistics and multivariate statistics for planning experiments and analysis of experimental data, first of all in analytical chemistry and biology. I have been working on improving this for at least ten years, trying to find a good balance between the mathematician's way (which is often too abstract) and the applied engineering way (which is quite often too formal).

I believe that students should understand a nature of every formula and mathematical law they are using for calculations. But at the same time they should clearly see why this particular formula or law have this nature, first of all from practical point of view. Therefore I intensively use geometrical interpretations of mathematical laws, since they are much easier for understanding. So in my slides and blackboard examples there are many plots instead of (or at least in addition to) mathematical expressions. Also instead of abstract examples I use real life cases, or, when it is not possible, computer simulations for such cases.

Another thing I am concern about is to teach students to use proper software for calculations and plotting. I believe it is better to spend some time and efforts for learning basics of scientific programming and get ready to solve more complicated and non-standard tasks later than to learn how to click on proper buttons to solve some standard problems in proprietary programs. I have no doubts that students who know how to make a simple program for finding proper solution will have no problem with any software but not vice versa. Also programming gives better understanding of mathematics that lies behind the solutions.

I see my mission as to persuade students that math is not an abstract and boring topic but a very important part of any engineering or scientific area, including biology and chemistry, and that actually math can be quite exciting. I try to be as open to students as possible, encourage them to contact me any time they have difficulties with understanding.

The students' feedback is very important and is used for constantly improving the courses. Last several years I practice the use of mini-projects in order to give students a possibility to use knowledge for solving small real problems during a course, constantly evaluate their performance and see which topics are challenging for them. Students work on mini-projects in small groups (2-5) and submit an electronic report and a code they use for calculation and plotting. The exam is then based on discussion of their solutions of the problems and checking if they understand the used instruments properly.

8. Any other information or comments.

Type your answer here...