

## Undervisningsportfolio

**1. Undervisnings-CV: Oversigt over undervisnings- og vejledningsopgaver med angivelse af fagområder, omfang, undervisningsniveau (bachelor, kandidat, efter-/videreuddannelse, ph.d.). Type af undervisningsform angives, f.eks. forelæsning, holdundervisning, øvelse, vejledning, eksamination, censur, fjernundervisning, internetbaseret undervisning og evaluering af undervisning. Undervisningssprog angives.**

### Lectures & Exercises

At Aalborg University, lectures are typically accompanied by exercises. Normally, after each lecture (2x45 min), a 2 hours exercise period follows, where the teacher hands out exercises and is available for the students to help them with the exercises.

NMR Spectroscopy: annually since 2000. Extent varying (first 1, then 2, then 3 ECTS as independent course, in 2011, the course was merged with the course in MS, where my part first filled 2.5 ECTS, since 2013 3.5 out of a 5 ECTS course NMR&MS). Students of Biotechnology (BSc), Chemistry (previously MSc, now BSc), Nanotechnology (MSc). Occasionally Ph.D. students, international students or students from other study directions with the need or wish to learn about NMR, have also participated. The language of the course is by default Danish, however, if only one participant does not understand Danish, the course is held in English.

Protein Structure: annually since 2006, approx. 1.5 ECTS out of 5, after 2013 2.5 out of 5 ECTS, dealing with the visualization of structures, circular dichroism, fluorescence and NMR spectroscopy for the study of protein structure. Students of Biotechnology (MSc). The language of the course is by default English, however, if everybody present understands Danish, the course is held in Danish.

Food Chemistry: annually from 2006 up to (and including) 2017. My part covered approx. 1 ECTS out of two, in 2011 the course was merged with a course in industrial microbiology, then my part covered 1 ECTS out of five, from 2014 onwards 2 ECTS out of 5. I was teaching on food additives, lipids and lipid oxidation, the Maillard reaction. Students of Biotechnology (BSc) are obliged to follow the course, frequently students of Chemistry and Biology (BSc and MSc) participate voluntarily. Teaching in Danish.

Analytical Chemistry: annually 2000-2008. My part covered approx. 1 ECTS out of 3, teaching instrumental analytical methods (UV, fluorescence, IR, MS and NMR). Students of Biotechnology, Chemistry and Environmental Engineering (BSc). Teaching in Danish.

History of Science: annually 2009-2017, single lecture (2 hours) out of 13 lectures, dealing with the development of atomic models from the antique to the 20th century. Students of Biology, Biotechnology, Chemistry, Environmental Engineering, Health Technology (all BSc). Teaching in Danish

Organic Chemistry Laboratory Course: 2004-2020. My part covers approx. 1 ECTS out of 3, in 2014 the course was merged with the laboratory course on inorganic chemistry, whereafter my part covered approx. 1 ECTS out of 5. Teaching in literature research for organic synthetic work, synthesis, purification, characterization and reporting. Students of Chemistry (BSc). Teaching in Danish.

Introduction to Laboratory Safety: since 2019. 3h lecture and 3h exercises on basic safety in the laboratory. Held in Danish for 1st semester students of Chemistry, Biotechnology, Biology, Environmental Engineering, Nanotechnology and Physics. Also held in English for international MSc students (7th semester) of Chemistry, Biotechnology, Biology, Environmental Engineering. From Omics to Personalized Medicine: annually since 2021. 2 hours lecture on metabolomics and its clinical applications. The course is part of a Master in Personalized Medicine education program that is offered to health professionals. Teaching in Danish.

### Project supervision

At Aalborg University, half the teaching of each semester (15 ECTS) is covered by problem-based learning, where students work at a given project in smaller groups (usually 3-6 students) under supervision. At the BSc level, projects are often defined quite detailed by the supervisor, at the MSc level, however, students work more independently on a small research project of their own. The task of the supervisor is to develop the basic problem/question of the project, to guide the students in developing their view on the project and planning and executing experiments as well as in interpreting experimental data. Finally, the supervisor helps the students in writing up their work in report form. The report then forms the basis of the examination in the project. Project supervision is usually kept in Danish, unless there is a student who does not speak Danish.

3rd semester projects: from 2012-2016, I shared supervision of all 3rd semester projects for students of biotechnology with one more colleague. The projects dealt with the recombinant expression of proteins in E.coli, followed by purification and documentation of purity, identity and correct fold.

4th semester projects: from 2003-2012, I have been responsible for all 4th semester projects for biotechnology students. Together with colleagues, I supervised a project where students would go through a range of techniques (chromatographic and spectroscopic) to analyze protein and lipid fractions from a biological matrix. Since 2015, I am responsible for approximately half the semester project. The projects dealt with the analysis of a system of activated sludge, where anaerobic release of phosphorous and production of polyhydroxyalkanoates in activated sludge was investigated. Yet another type of project dealt with the fermentation of filamentous fungi and the isolation and investigation of one or two secondary metabolites.

6th semester projects for biotechnology students: usually deal with enzyme technology and reaction modeling. Although not responsible for the projects, I have since ~2001 supervised students on the characterization of their reaction products

by NMR and on obtaining diffusion constants necessary for modeling by help of NMR. In the spring of 2020, I supervise a project group on changes occurring in feed during fermentation.

8th semester projects for biotechnology students: usually deal with protein science. Almost every year, since 2000, I have supervised students in projects dealing with the expression, purification and NMR investigation of peptides and proteins. M.Sc. thesis projects At Aalborg University, M.Sc thesis projects (60 ECTS) are lasting two semesters, during which students work on their project. The supervisors hand out a number of projects, and the students choose a project of interest. Usually, students work individually during the thesis, although groups of students are in principle allowed. Since 2001, I have supervised 54 M.Sc thesis projects as main supervisor, usually dealing with some aspect of NMR spectroscopy. I have supervised mainly students of biotechnology, however, occasionally I also supervised students of chemistry and nanotechnology. Supervision included the definition of the project, teaching relevant methods, aiding in the search for literature, helping with the interpretation of results, aiding in compiling a final report and organization of the final exam. In addition to "my own" students, I have helped numerous students with NMR measurements and/or interpretation of NMR data.

Ph.D. courses and Summer Schools

NMR Summer School organized by the Austrian Society of Chemistry (GÖCh) bi-annually in Niederöblarn, Austria: I have participated as a teacher and supervisor every second year since 2000. I have taught lectures on protein NMR, protein structure determination, utilization of gradients in NMR, NMR Imaging, Metabolomics by NMR. The initiative to include these courses into the curriculum was mine. I also prepared and supervised exercises in computer-aided resonance assignment of proteins.

Lecturer at the Ph.D. course "Biophysical Methods of Protein Characterization", August 2003, Aalborg, Denmark

Lecturer at the Ph.D. course "High-Speed NMR Protein Structure Analysis", June 2007, Moscow, Russia

Lecturer at the Ph.D. course "Plant Biotechnology : tools, techniques and targets", April 2008, Aalborg, Denmark

Lecturer at the Ph.D. course "Macromolecular Interactions – Biology and Emerging Tools", September 2009, Riccione, Italy

Lecturer and Organizer of the Ph.D. course "Antimicrobial Resistance and Development ", November 2011, Aalborg, Denmark

Lecturer at the Ph.D. course "Antibacterial Research and Drug Development", October 2012, Copenhagen, Denmark

Lecturer at the Ph.D. course "How to use and interpret large datasets ("big data") from emerging –omics based technologies", October 2014, Aalborg Hospital, Denmark

Lecturer at the "PhD Summer School on Plastic Biorefinery and Upcycling", August 2022, Aalborg University, Aalborg, Denmark

Lecturer at the Ph.d.-course "Microscopy and Spectroscopy Characterization Methods", November 2022, Aalborg University, Aalborg, Denmark

## **2. Administration og ledelse af uddannelse: Erfaring med uddannelsesledelse og –koordinering. Oversigt over studieadministrative opgaver, eksempelvis medlem af studienævn, studieleder, semesterkoordinator, fagkoordinator, akkreditering m.v. Erfaringer med planlægning af uddannelsesafvikling. Erfaring med udvikling af uddannelser. Deltagelse i udvalg, kommissioner m.m. vedr. uddannelse.**

I have never been a part of the study board, where teaching formally is planned. However, I have taken part in the intra-departmental discussion on how to design a timely educational curriculum at a high international level. In my >20 years at Aalborg University, I was involved in three revisions of the curriculum. Since 2015, I served as semester coordinator for 9th and 10th semester students of Biotechnology and Medical biotechnology. The semester coordinator is responsible for project distribution, project approval, semester evaluation, semester seminars, handling problems between student and supervisor or internal problems within student groups.

## **3. Formel pædagogisk uddannelse: Oversigt over gennemførte universitetspædagogiske kursusforløb, PBL-kurser, workshops, udviklingsprojekter, kollegial supervision o.l. Udtalelse fra universitetspædagogikum. Deltagelse i konferencer om pædagogik og didaktik. Dokumentation i form af kursusbeviser, udtalelser m.m. vedlægges.**

During my assistant professorship (2001-2004), I underwent the formal pedagogical training for assistant professors, consisting of courses, the development of a teaching portfolio and collegial supervision. Later, I took a seminar in Ph.D. supervision

## **4. Andre kvalifikationer: Bidrag til konferencer, debatindlæg, videnskabelige artikler om pædagogiske emner m.v. Kollegiasupervision, redaktørarbejde, erfaring som mentor og anden kompetenceudvikling.**

So far, I have been acting collegial supervisor for four assistant professors (Aviaja Hansen, Peter Fojan, Jens Laurids Sørensen and Klaus Westphal) during their pedagogical training course. I attend some of their lectures and laboratory supervision and give them feedback on how they could try to improve their teaching. I also help them compiling their portfolio.

Besides, I am taking part in various courses and webinars offered by Aalborg University on different selected topics in teaching:

2.06.2021 Blended Learning 101 Center of Digitally Supported Learning – Aalborg University

## **5. Pædagogisk udvikling og forskning: Udvikling af nye kurser, undervisningsmateriale, undervisnings- og eksamensformer eller andet udviklingsarbejde. Didaktisk og pædagogisk forskning. Samarbejde med eksterne samarbejdspartnere.**

I am constantly developing my teaching and teaching materials. The biggest leap was to flip the classroom in my course teaching. I made all teaching material available to the students online and use the confrontation time with the students for problem solving and to answer questions on the online content.

## **6. Udtalelser om undervisningskompetencer fra foresatte og kolleger. Undervisningsevalueringer og eventuelle udmærkelser for undervisningsvaretagelse.**

In 2007 and again in 2019, I was elected Teacher of the Year the Studyboard for Chemistry, Biotechnology and Environmental Engineering.

## **7. Evt. personlige refleksioner og initiativer: Personlige overvejelser knyttet til undervisning og vejledning, ønsker til og planer for pædagogisk videreudvikling, planer for opfølgning på undervisningsevalueringer m.v. Refleksioner over eget pædagogiske arbejde, dets målsætninger, metoder og gennemførelse. I refleksionen analyseres og motiveres dine pædagogiske aktiviteter i forhold til din pædagogiske forståelse og de studerendes læring. Tanker om undervisningsformen på Aalborg Universitet, der har et stort indhold af gruppeorganiseret projektarbejde og problembaseret læring (PBL).**

I have spent considerable thought on how to present complicated theories (e.g. NMR) to students. I have come to the conclusion that PowerPoint slide shows are the best way to drown students in a flood of information and to lose their attention. For this sort of teaching, I have reverted to the use of a blackboard and found the use of colored chalk incredibly pedagogical. The students have several times expressed their approval of this approach (again in their motivation to elect me Teacher of the Year 2019). At first, they think that this approach of teaching is old-fashioned (and maybe, they have a point), but as time goes by, they more and more appreciate the old-fashioned way of teaching. Also, in my attempts at providing digital teaching material, I tried to keep the blackboard-teaching style to combine the benefits of digital teaching with the pedagogical bonus of blackboard teaching.

## **8. Andet.**

Skriv dit svar her...