

## 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.

I have experience within a wide range of teaching tasks at various educational programs, including biomedical engineering and informatics, Sport Science, Clinical Science and Technology, Medicine and Medicine with industrial specialisation. See list below, for a chronological list of teaching experience. I have been supervising students in semester projects and teaching courses. In addition, I have been examiner and internal censor at both written and oral exams, and involved in curriculum development and course planning.

Collegial knowledge sharing has been another priority during my time at AAU. I have initiated Faglig Fredag, which was a medical informatics knowledge sharing initiative, and recently I have been involved in knowledge sharing in the Medical informatics group. In my voluntary work 2008-2010, teaching has also been an important part.

#### 2016

Course: Methods and models in clinical information systems. 2nd semester, master program in biomedical engineering and informatics, AAU. Taken over course coordination. In addition, I have added new teaching about distributed systems and service oriented architectures. In accordance with good experiences from the Semantics course, we have handed out a complete written version of the workshop assignment in the beginning of the course.

Course: Kliniske informationssystemer (Clinical information systems). 6th semester, bachelor program in biomedical engineering and informatics, AAU. Only minor changes.

Supervision of 6th semester project about improved flow of pregnancy related information. Bachelor program in biomedical engineering and informatics, AAU

Co-supervision of 8th (2nd) semester project (Main supervisor) about HL7 FHIR infrastructure for telemedicine. Master program in biomedical engineering and informatics, AAU.

Co-supervision of 10th (4th) semester project about the overlap between FMK and FSIII in home care information systems. Master program in biomedical engineering and informatics, AAU

#### 2015

Course: Videnskabsteori og etik (theories of science). 3rd semester, bachelor program in Medicine and Medicine with industrial specialization. Module coordinator and teacher. Changes from last year: Strengthened the first lecture with more clear points and stronger visual aids. Development of e-learning material to support learning about study design, so that the students could take it based on needs – for some the repetition have been very demotivating earlier years. Strengthened exercises to be better aligned with exam and provided written online feedback.

Course: Semantics of clinical information systems. 1st semester, master program in biomedical engineering and informatics. Only minor changes from last time I taught the course. We improved the workshop assignment, so that each student had a complete written version of the assignment in the beginning of the course.

Censor: exams in health informatics pilot projects. 1st year in part-time master program of health informatics, AAU.

Course: Methods and models in clinical information systems. 2nd semester, master program in biomedical engineering and informatics, AAU. I have taken over more responsibility for this course. The course have been re-designed to strengthen the focus on student's modelling competences, requirement engineering and system evaluation.

Course: Kliniske informationssystemer (Clinical information systems). 6th semester, bachelor program in biomedical engineering and informatics, AAU. Only minor changes.

Supervision of 6th semester project about design of intensive care unit information systems. Bachelor program in biomedical engineering and informatics, AAU

Co-supervision of 8th (2nd) semester project about FHIR implementation in Denmark. Master program in bio-medical engineering and informatics, AAU

#### 2014

Course: Videnskabelig metode (scientific method). 5th semester, bachelor program in Sport Science. Module coordinator and teacher. After discussions with former teacher and stakeholders at the sport science education, I did a few changes to the course. I have re-designed to support a more equal focus on qualitative and quantitative methods and chosen a book that supported this. In addition, I have strengthened the focus on the exercise work and follow-up on exercise work.

Course: Videnskabsteori og etik (theories of science). 3rd semester, bachelor program in Medicine and Medicine with industrial specialization. Module coordinator and teacher. I coordinate the whole course and teach the theories of science part of the course. After discussions with semester coordinator and former teacher, I only made small changes to the course e.g. the students have to read a scientific paper in addition to the study protocol which was already part of the course.

Course: Semantics of clinical information systems. 1st semester, master program in biomedical engineering and informatics. Only minor changes from last time I taught the course. We improved the focus on use of standardized models in the designs on clinical information systems, and I updated course material and gave a lecture covering this area.

Course: Methods and models in clinical information systems. 2nd semester, master program in biomedical engineering and informatics, AAU. I have been involved in updating the course plan after basic database modelling was moved to another semester. My main responsibility has been to teach advanced modelling of clinical databases. I have been using transfusion adverse reactions as a clinical case. Moreover, I have updated material from 2012 and given lectures regarding the scientific IT-design, requirement engineering in health and special databases and architectures.

Course: Kliniske informationssystemer (Clinical information systems). 6th semester, bachelor program in biomedical engineering and informatics, AAU. I have been responsible for teaching database modelling using ER-diagrams. I have been using different clinical cases to illustrate this including documentation of vital signs and nutrition screening in routine care and a blood bank database.

Censor: re-exam in videnskabelig metode (scientific method). 5th semester, bachelor program in Sport Science.

## 2013

Censor: exams in health informatics pilot projects. 1st year in part-time master program of health informatics, AAU.

## 2012

Course: Semantics of clinical information systems. 1st semester, master program in biomedical engineering and informatics, AAU. My main responsibility was to develop and support the students in solving a workshop-assignment concerning clinical content modelling i.e. user interface design, information structure, terminologies and classifications exemplified using vascular surgery as a clinical case. Moreover, I gave lectures concerning health informatics standards and their use and implementation in clinical content models and different methodologies and theories of science underpinnings used when studying clinical information systems.

Co-supervision of 9th (3rd) semester project about a data warehouse for laboratory and patient administrative data. Master program in biomedical engineering and informatics, AAU. External partner: EnVersion.

Co-supervision of 4th semester project about automatic discharge summaries. Master program in Clinical Science and Technology, AAU. External partner: SAS Institute.

Censor: exams in health informatics pilot projects. 1st year in part-time master program of health informatics, AAU.

Course: Methods and models in clinical information systems. 2nd semester, master program in biomedical engineering and informatics, AAU. Developing course plan together with the other teacher of the course, because this was the first time the course was held. My main responsibility in terms of teaching was using transfusion adverse reactions as a clinical case in basic database modelling, implementation and querying. Moreover, I developed teaching material and gave lectures regarding the scientific IT-design, requirement engineering in health and special databases and architectures. Together with the other teacher of the course I developed and evaluated the written exam.

Course: Idrættsinformatik (Sport Informatics). 6th semester, bachelor program in Sport Science. My main responsibility was motivating the use of databases for sports science applications plus teaching data-base implementation and querying. I updated teaching material from earlier years to strengthen the motivation-part. Together with the other teacher of the course I developed and evaluated the written exam. In connection with my responsibilities at this course, I helped develop a new curriculum for the course that is expected to be effective from spring 2015.

Course. Almen patologi (General Pathology). 4th semester, bachelor programme in Medicine and Medicine with industrial specialisation. Gave lecture regarding patient records. Updated teaching material from earlier.

Supervision of 6th semester project about an information system for managing COPD patient at follow-up in hospitals. Bachelor program in biomedical engineering and informatics, AAU. Collaboration with: Region Northern Jutland and department of respiratory medicine at Aalborg Sygehus.

## 2011

Course: Almen patologi (General Pathology). 4th semester, bachelor programme in Medicine and Medicine with industrial specialisation. Gave lecture regarding patient records. Developed teaching material based on my investigation of different

EHR systems in use in Denmark and knowledge of the history of the patient journal.

Course: Semantics of clinical information systems. 1st semester, master program in biomedical engineering and informatics, AAU. My main responsibility was to develop a course plan together with the other teacher of the course. Moreover, I gave lectures concerning health informatics standards and their use and implementation in clinical content models and different methodologies and theories of science underpinnings used when studying clinical information systems.

Course: Clinical registries, database systems and data networks. 2nd semester, master program in biomedical engineering and informatics, AAU. Gave a modelling workshop using nutrition screening as the clinical case, updated teaching material from earlier. Gave a lecture on requirement engineering in health. Based on my involvement in this course, I helped develop the curriculum for the new courses: Semantics of clinical information systems and Methods and models in clinical information systems.

Co-Supervision of 2nd semester master project about an information system for bridging clinical content and clinical terminology. Master program in biomedical engineering and informatics, AAU. Collaboration with. Region Northern Jutland.

## 2010

Course: Kliniske Informationssystemer (Clinical information systems). 2nd semester, master program in biomedical engineering and informatics, AAU. Developed and gave a modelling workshop using nutrition screening as the clinical case.

Co-Supervision of fourth semester master project about the overlap between clinical content in electronic health records and the content of clinical guidelines. Master program in biomedical engineering and informatics, AAU. Collaboration with. Region Northern Jutland. External Partner: CSC Scandihealth.

Censor: exams in health informatics pilot projects. 1st year in part-time master program of health informatics, AAU.

## Other teaching experience

2014. Organised an inspiration seminar in the medical informatics group in co-operation with other staff concerning the statistical method bootstrapping and its applications in medical informatics.

2009-2010. I developed the concept "faglig fredag" [fagligfredag.blogspot.dk](http://fagligfredag.blogspot.dk) where interested participants from AAU students and staff could come and discuss medical informatics topics based on different lectures by internal and external speakers. I maintained the home page, planned lectures (in co-operation with other staff) and held a couple of lectures myself. Some of my lectures were about mapping the domain of medical informatics and reviewing scientific literature.

2010 I planned a number of strategy workshops for my research group, TaMiCS including an introduction to systematic creative thinking.

2008-2010: Various teaching during my time as board member at the Danish youth organisation "Ventilen". Examples of what I taught our volunteers are "Communication and active listening", "project management" and "creative thinking".

## 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.

### Module coordinator:

Course: Methods and models in clinical information systems. 2nd semester, master program in biomedical engineering and informatics, AAU. (2015-now, earlier years in collaboration with senior staff)

Course: Videnskabsteori og etik (theories of science). 3rd semester, bachelor program in Medicine and Medicine with industrial specialization. Module coordinator and teacher. (2014-now)

Course: Videnskabelig metode (scientific method). 5th semester, bachelor program in Sport Science. Module coordinator and teacher. (2014)

### Course responsible in collaboration with senior staff:

Course: Semantics of clinical information systems. 1st semester, master program in biomedical engineering and informatics. (2011-now)

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

#### **Workshops in connection with university pedagogy education for assistant professors:**

Flipped courses in Higher Education: In flipped classroom, my main outcome was about making my approach to e-learning more research based i.e knowing the theories and evidence behind flipped classroom. In addition, different methods were explained and different motivations for making e-learning material was presented. This improved my insight into the situations in which e-learning material might be helpful, which were much more broad than anticipated. In a classic situation, e-learning will be generated to substitute a lecture, but we can also use it to explain the motivation of a course, explain additional material or show how to answer an exam question. I have developed e-learning material about clinical study design for the course "Videnskabsteori og etik (theories of science). 3rd semester, bachelor program in Medicine and Medicine with industrial specialization".

Assessment of – and for learning in a PBL context: In the assessment course, I used the presented material and theory about alignment and fairness of assessment to reflect upon the coordination of the course "Methods and models in clinical information systems". I have detected that follow-up sessions could be strengthened to improve alignment with intended learning outcomes and exam.

#### **Earlier**

Early in my career at AAU, I attended the Basic course in university pedagogy. This course had a great influence on my understanding of learning outcomes. I have used the acquired knowledge actively ever since.

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

#### **Conferences**

ETALEE (Exploring Teaching for Active Learning in Engineering Education):

*Detective work: Supporting engineering students' learning when reading scientific texts.* Gøeg, Kirstine Rosenbeck; Krogh, Lone. Exploring Teaching for Active Learning in Engineering and Education, ETALEE, 11-12 November 2015, Copenhagen, Denmark: Book of Abstracts. IngeniørUddannelsernes Pædagogiske Netværk, IUPN, 2015. s. 89-95.

*Learning how to apply complex abstract models in the biomedical domain by stepwise reflection.* Højen, Anne Randorff; Gøeg, Kirstine Rosenbeck; Krogh, Lone. Exploring Teaching for Active Learning in Engineering and Education, ETALEE, 11-12 November 2015, Copenhagen, Denmark: Book of Abstracts. IngeniørUddannelsernes Pædagogiske Netværk, IUPN, 2015. s. 85.

At the conference, Anne Højen and I also organised an "Explore" session, where we together with the audience reflected upon what characterized active learning activities happening in the beginning or in the end of a course. We anticipated that activities such as "Detective work" designed as a mean to teaching students new material, would be better suited for the beginning of a course, whereas activities such as our "stepwise reflection method" would be better suited for reflections about how to integrate the competences learned as part of a course. Thus, it would be more suited for the end of a course. The main feedback from the audience was that reflective methods could also be a way of detecting students point of departure in the beginning of a course – raising awareness of what the course could be used for and what competences could be achieved by attendance. In the following semester (spring 2016), we actually tried this with good results in the "methods and models" course, making the students reflect about the complexity of the health domain, and the weaknesses that their preliminary method and design choices possessed. We achieved a positive dialog at the same time as highlighting the importance of the intended learning outcomes of the course.

### **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.**

*E-learning material about clinical study design* for the course "Videnskabsteori og etik (theories of science). 3rd semester, bachelor program in Medicine and Medicine with industrial specialization".

*Course curriculum and course plan development in collaboration with senior staff: Semantics of clinical information systems, 2011.* My main responsibility was to find selected exemplary research papers to support up-to-date research based teaching.

*Course curriculum and course plan development: Methods and models of clinical information systems, 2011.* My main responsibility was to find selected exemplary research papers to support up-to-date research based teaching.

*Kliniske informationssystemer.* Gøeg, Kirstine Rosenbeck; Pape-Haugaard, Louise B.; Elberg, Pia Britt. Bidrag til bog: *Sundhedsinformatik i klinisk praksis.* red. Lone Withen Erdmann. Gad, 2011. s. 21-39.

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

None

## 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.

### **Problem-based learning and student competences**

I am a teacher who is enthusiastic about students acquiring competences that are important in the multidisciplinary domain of health and technology as well as skills that are relevant for employers in the global community. Problem based learning and team work is an appropriate method to facilitate this. In student projects, I have usually initiated or supported collaboration with external partners in industry, hospitals or a region.

The focus on relevance and problem orientation has also characterized the methods I have used and developed in courses in co-operation with more experienced colleagues. One example is from the course Methods and models in clinical information systems. My experience is that modelling competences are best obtained by actually doing a lot of modelling in a close-to-real-world setting. Consequently, the students are primarily learning through workshop-assignments where concrete clinical cases play an important role. The work is structured so that each time there is reading material or/and a lecture regarding a relevant topic, this introduction allows the students to do the next step in the workshop-assignment. This work is followed up by written assignments and/or a presentation in class, as well as feedback from course teachers.

In courses, I know that students have a natural focus on passing exams. I work actively with making motivating learning outcomes and aligning with the exams. Consequently, students have the basis for passing exams, but they are also made aware of the competences that will make them better professionals. Below, I elaborate on how I work with learning outcomes.

### **Learning outcomes and student progression tracking**

I find it most important to state intended learning outcome, track student learning and tailor teaching accordingly. This often means that even though the same teaching tasks are repeated yearly, the content of my teaching is adjusted to take into account that it is a new group of students attending the course. To track student progression, I encourage written status documents (report or pre-report text) before supervising students as well as minutes afterwards. In the courses, student learning progression is monitored using a combination of student presentation of material, written assignments and directly asking the students about their learning experience. Whenever asking for student material (written or oral), the essential feedback should allow students to track their own learning outcome, which is an important part of encouraging students to take responsibility of their own education. When asked directly, students seem to prefer workshop assignments with a relevant clinical case that runs through the whole/large parts of the course, because it allows them to build upon existing material instead of having to understand a new assignment-context every time. Student feedback has encouraged my continuous improvement of the workshop-assignment method. In addition, I have tried to spread the method to multiple of the courses I teach.

### **Methodology and research based teaching**

When teaching about clinical technology related topics from a research perspective there is a special challenge in terms of methodology and theory of science underpinnings because engineering and medicine have different traditions. An important part of delivering research based teaching within a School where both technology and health are important priorities is to take this challenge seriously and help students navigate in a complex domain. I have been working with making methodology and theory of science an integral part of courses e.g. there is a lecture about the scientific IT-design in Methods and models of clinical information systems and a lecture about different methodologies and theories of science underpinnings used when studying clinical information systems in Semantics of clinical information systems. My engagement in methods and theories of science has been strengthened by my new teaching assignments in scientific methods in the sport science bachelor and theories of science in the medicine bachelor. It is imperative that the abstractions are made concrete and useful for each of the disciplines.

In continuation of a methodological focus, my research based teaching at the master level is supported by making contributions from myself and other researchers an integral part of learning. In courses, we read selected scientific papers where the results support the relevant lecture topics, but we also discuss the methodological approach, alternative approaches and scientific quality. In supervision, I encourage my students to review the scientific literature systematically, so that they become aware of the knowledge contribution of their own project.

## 8. Any other information or comments.

None