

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 curriculum for the master programme of chemical engineering is divided into 3 course modules of 5 ECTS and 1 project module of 15 ECTS. The courses modules serve as introduction to the knowledge field of the project work in the given semester and represent the core disciplines and methods relevant for a given semester. In the curriculum of the master programme of chemical engineering at AAU the learning objectives of the different course modules is described. The learning objectives are divided into knowledge, skills and competences.

I have good experience with teaching at different academic levels which is evident from the listed courses below. This includes teaching of students in small discussions forum consisting of only 5 students to classroom lectures having up to 75 participants. The courses I have taught have included traditional classroom lectures, lab tutoring, tutoring of theoretical exercises, discussion based teaching, and workshops. Depending on the type of course different teaching methods have been selected in order to increase the students learning potential.

Courses lectured

Colloid and interface Science (5 ECTS): 2005- present
Methods for quantitative analysis (5 ECTS) 2010- present
Lab. exercises in Analytical chemistry (2 ECTS) 2010- 2016
Material Science and material selection (5 ECTS) 2014-present
General Chemistry 1 (Adgangskursus) Assistant teacher 2014
AK General Chemistry 2(Adgangskursus) Summercourse 4 week course 2012- 2016)
Water treatment Invited lecturer 2011-present
General Chemistry DT2 (Teknisk manager off-shore, EASV) (3 ECTS) 2011-2013
Physical chemistry (1/3 the course 5 ECTS) 2011
Environmental chemistry and Geochemistry (1/5 the course 5 ECTS, SDU) 2010

During my employment at Aalborg University I have supervised +230 student projects ranging from 1th to 10th semester at the bachelor and master education in chemical engineering and biotechnology. The student semester projects are important tools in research based education. Even though there are some mandatory learning objectives, the projects can be designed/planned so they are part of a larger research activity. The master student projects I have supervised within the last years has been directed towards investigations which potential could result in publications.

Examiner and Censor experience

I have as part of my teaching and student project supervision held numerous exams. This includes both preparation of questions for written exams and the task as examiner for oral exams. Moreover, I am regularly appointed as censor for both written and oral exams.

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.

In addition to teaching and supervision activities I have been involved in different study administrative tasks.

Coordinator tasks

Semester coordinator 3rd semester of the diploma and bachelor education in chemistry and biotechnology, Esbjerg

Internship coordinator for diploma education in chemistry and biotechnology, Esbjerg

Career VIP at Department of chemistry and bioscience: 2022 -

Mission is to help the students become more employable by offering perspectives, reflections and activities that support career management learning

Member of study board for chemistry and bioscience: 2012 -

As a member of the study board for chemistry and biotechnology I am actively involved in the planning and evaluation of the education.

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 pedagogical course 2011-2013 (Assistant professor course)
Ph.D. supervisor course 2015 AAU

Both the assistant professor course and the Ph.D. supervision course have inspired me to continuously develop my teaching and try out new teaching forms.

I have worked with digitalization of teaching through the DEEP project. There has been a particular focus on digitalizing the assignments/problems through quizzes, which makes it possible for the teacher to create an overview of which parts of the teaching material the students have difficulty to grasp.

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

Besides the assistant professor course, I have participated in workshops on teaching in higher education.

University teaching day 2013 AAU
University teaching day 2014 AAU
University teaching day 2017 AAU

Workshop on Moodle structure 2019 AAU
Workshop on Moodle quiz 2019 AAU
Workshop on Flipped approach 2019 AAU

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.

Over the years I have developed/structured course and teaching material for several courses

Methods for quantitative chemical analysis: 3rd semester bachelor education in chemistry and biotechnology

Material science and material selection: 4th semester bachelor education in chemistry and biotechnology

Colloid and interface science: 1st semester master education in chemical engineering

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

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.

An interesting question arises when considering – why do teaching not automatically lead to learning, if teaching is only a matter of transporting knowledge? Even though the students listen to the lecturer their interpretation of the material is crucial to the understanding. During the learning process they have to place the new material into their existing network of knowledge. Teaching is not just a question of transmitting facts, but also about putting the knowledge into the “right” context (shared context).

From my experience one of the central elements for learning is wanting/needing to learn, meaning the student must have a desire to learn. In this way the teacher/supervisor ability to motivate the students to learn is a key for ensuring the learning outcome. Learning is associated by doing, practice and repetition. The students must apply the acquired knowledge for problem solving in order to fully make sense of the material (stimulate self-learning). Another important element in the learning process is fast and useful feedback from the supervisor or lecturer. Slow feedback for instance in writing often results in students have forgotten about the work they have done and thus do not take enough notice of the feedback.

Full comprehension of the material is first achieved when the person is able to explain or teach it to others. Peer learning is highly practiced by the students at AAU in the environment of the group. Many students find it easier to ask the group for help to solve the problem than the lecturer. Peer learning is not only practiced in the semester projects but also in the course modules where the students work on solving problems in the group room.

The acquisition of a particular type of knowledge can be linked to certain learning or teaching situation. This does however not mean that one type of knowledge only can be mediated through one type of teaching. But some forms of teaching may be better suited for mediating a particular form of knowledge than others. In the planning of my courses, I am very aware of this fact. For instance the learning of factual knowledge may be stimulated through classroom lectures; whether as the acquisition of competences may be stimulated through project work.

The courses I have taught have included traditional classroom lectures, lab tutoring, tutoring of theoretical exercises, and workshops. Depending on the type of course and learning goals specified in the curriculum different teaching methods have been selected in order to increase the students learning potential. It is very important to have planned a teaching

strategy with teaching and learning activities that support the learning goals.

I have changed the teaching form in the General chemistry summer course from traditional classroom lectures to discussion based teaching in order to get the students more actively involved during the teaching situations and thus promote active learning through discussion of the material.

Instead of traditional classroom lectures where the course material is presented to the students by help of a PP presentation the alternative teaching method is based on a dialog/discuss of the material with the students. The students are before each lectures handed a list of questions to provide basis for discussion of the material. During the discussion examples were given on the black board and PP was used as a supplement. In addition exercise and experimental work was used to illustrate the different processes discussed.

The initiative with the list of questions for discussion of the material was very well received by the students, who were very engaged in the discussions. The numbers of participants were quite small so instead of a traditional classroom environment the students were arranged in a group around a large table.

I have taught courses with as few as 5 students up to 75 participants. Even though the discussion based teaching approach works very well when the number of participants in the class is relative small it is not suited for large classes. My experience is that it is more difficult to get a discussion going when the number of students increases. Students in a large class do not want to stand out. The course physical chemistry had approx. 75 participants and consisted of traditional classroom lectures using PP presentation to discuss i.e. kinetics of chemical reactions. In order to get the students actively involved in the discussion of the material in the lectures, the students were given small exercises which were to be solved in groups of two. The students were given 5-10 min to solve the exercise which subsequently were discussed in the class. In this way it was possible to overcome the barrier for the students to speak out in front of the class.

Another example on how a course can be structured is the 4th semester Material Science course. This course has been structured so alternating classroom lectures and exercises provide a basic knowledge of different materials and materials properties. These initial lectures are followed by a material selection workshop, where the students in groups shall preform a material selection for an object chosen by the students. The students present their material selection at a presentation seminar at the end of the workshop. A second workshop on material testing where the students carry out material tests in the lab. were arranged.

The introduction of workshops in the course has increased the student activity and engagement in the classes and thus promoted active learning. In this course knowledge about materials and material properties were obtained through lectures and skills and competences are acquired through the workshops.

The courses and projects I have taught have involved not only Danish students but also multicultural classrooms, which sometimes posed new and interesting situations. Especially the course colloid and interface chemistry on the master of Chemical Engineering and Oil and Gas Technology have a high number of international students. The students have different cultural background which often cause defines them as students and different technical level. It is important to have this in mind when teaching as some of these students may not always ask questions even though they may not totally have understood the material.

Students in general have changes over the last 5-10 years. When I started teaching many of the students still took notes using pen and paper, however now most students bring a laptop or tablet. The problem is that you as a teacher cannot always tell whether the students use them for taking notes or look at Facebook updates etc. However, you as a teacher can use electronic devices for i.e. online multiple-choice quizzes etc. and I think we need to face the challenges and opportunities that this presents.

Project organized problem based learning

The project organized problem based learning (POPBL) at Aalborg University uses project work as the main activity for acquisition of knowledge, skills and competences specified in the curriculum. PBL draws from all of the cognitive theories: students compare new information to existing, their learning capabilities may be extended through guidance and collaboration, they learn through progression of experience. The student takes responsibility for their own learning.

The project organized problem based learning is carried out through student semester projects where the students in groups work to solving often complex problems. Many of the projects are carried out in corporation with industrial partners ensuring realistic, interdisciplinary and social relevant projects. The students can shape the project – within the framework of the curriculum - giving the students ownership over the project. This motivates the students to work harder in order to find solutions to the problem thus increasing the learning outcome. The supervisor or facilitator provides inputs, supporting the process of learning, and assesses the product.

What makes a good supervisor/facilitator in project oriented PBL? In my opinion a good facilitator can be characterized as a supervisor that is engaged, able to motivate, ask questions – give examples rather than give solutions, show respect, flexibly, competent.

It is important that we as supervisors do not give solutions, but rather by asking questions makes the students reflect on the problem. From personal experience I know that you learn more by finding the answer you-self rather than getting the answer/solution from the supervisor. Not only will this increase the level of reflection but also grant a feeling of ownership since the idea did not originate from the facilitator but from the students themselves. The role of the facilitator typically change through a project period. At the start of the project the process is central. Later in the project the facilitation changes to be more product oriented.

An important aspect of the group work is the sharing of knowledge which takes place within a functioning group. In this case the individual students work on different parts of the solution and are thus “forced” to explain/teach the rest of the group members about this work. From personal experience I know that students learn a lot from this process. The outcome of a functioning group work is deeper understanding and steeper learning curve (learn more on less time), which also lead to better solutions. However, group work will not always function after the intentions. In this case the shearing of knowledge may not occur or the group members may have different perception of the work discipline etc.. As a consequence focus on communication and interpersonal skills are important, such as communication, Team work, project

management, and responsibilities for the own learning, which are skills that go beyond their area of technical expertise. These competences are highly requested by industry and thus help to prepare the students for future jobs. As a former student at Aalborg University I am very familiar with the concept of problem based learning. The insights into project organized problem based learning and group work I have gained over the years is very helpful during supervision of student projects. In this way I am able to pick up on problems in the project groups in relation to conflicts before they evolve. For instance a group member may not do the work agreed on by the group. Such an issue must immediately be addressed otherwise frustration will build up and most likely influence the success of the project. Such conflicts are time-consuming and uncomfortable, however if the problems are resolved, a functioning group may prevail. In some cases it may however be better to split up a disfunctioning group, group work is used as a tool to increase the learning potential. In my experience from supervision of undergraduate student semester projects the process facilitation is very important as the students have to learn to work independently. Thus the supervisor's role is to ensure the learning process and acquisition of project skills and competences rather than a flawless product. On higher semesters the role of the supervisor is to ensure that the technical/scientific competences are obtained and to guide the students in the direction of a solution as the time of the project period is limited.

Other competences developed by the PBL include learning how to learn, critical reflection on knowledge, transfer of knowledge from one context to another, and self-directed learning.

Further development of teaching competences

If asked to evaluate my own teaching I would say that the form of teaching has improved during the years I have taught at Aalborg University. Through the pedagogical courses, discussions with colleges, and gained teaching experience, I have found that in order to improve the teaching and hence the students learning outcome, it is important to continue to develop the teaching. In essence it means to try out new ideas or ways to conduct the teaching. Hence I will continue to attend pedagogical courses, seek inspiration in books and journals and discuss teaching strategies and experience with colleagues. Try out the new teaching forms, assess the change, share the experience, and finally reflecting over the changes made. In addition I prepare questionnaires I hand out to the students in order to get feedback on the teaching. I would like to describe myself as an engaged teacher, that try to involve the student actively in the learning process and use different means of presentation techniques in order to make the teaching interesting.

Typically I teach after a well-defined study plan, however I am open for changes which may be linked to the students needs, level or special interests as long it can be arranged within the curriculum. Many of the courses in which I have lectured have also included presentations from other lecturer's, this requires good planning and correspondence between the different lecturer's and the students in order to have continuity. Moodle used at Aalborg University is a good tool in this process. Moodle provides a good overview of the course regarding the study plans and provides good possibility of upload of lecture notes and other relevant material and information.

8. Any other information or comments.