Roana de Oliveira Hansen
Mads Clausen Institute (MCI)
SDU NanoSyd
SDU Climate Cluster
Email: roana@mci.sdu.dk
Phone: +4565501649

Roana Melina de Oliveira Hansen is an associate professor at the Mads Clausen Institute in Sønderborg, and she have been teaching courses related to electronics, actuators, physics and reliability. In this portfolio, an overview of her teaching activities, her teaching philosophy and challenges will be presented along with a description of a pedagogical development project and an e-learning project. Teaching is an art which is mastered by some and can be further improved and developed by others. Many tools for an improved teaching are offered by the Lecturer Training Program offered by SDU, and some of the applications of these tools will be described in the following pages.

Teaching CV

Roana´s overall teaching experience can be found in the table below. It includes external lecturers to schools, teaching courses related to research, teaching laboratory techniques, supervising student projects, teaching traditional courses and supervising (or co-supervising) bachelor, master and Ph.D. projects. The regular courses cover a wide range, from general courses in the bachelor level attended by a large number of students to specialized advanced courses in the master level with few students. There are great pedagogical opportunities in both types of courses, and different teaching tools can be applied to it. Courses with high attendance can become more interactive by using e-learning tools for instant student feedback, as described in the e-learning project section. Courses with few students give a great possibility to apply techniques as the one called “flipped classroom”, where the general introduction to a subject is given by the students, followed by a lecture given by the teacher.
Designing new courses such as “Scientific Methods” and “Physics of Electronic Devices” at the master level has also been one of Roana´s tasks, among assisting to design the new mechatronics curriculum for the bachelor programme and for the master programme profile in power electronics.

Teaching

Medical Devices and Imaging (Summer school)

Jacek Fiutowski, Casper Kunstmann & Roana de Oliveira Hansen
07/08/2023 → 18/08/2023

Computer Aided Engineering

Roana de Oliveira Hansen
01/02/2024 → 30/06/2024

EKA: T350041402 -Advanced sensors

Roana de Oliveira Hansen & Lawrence Nsubuga
03/10/2022 → 10/10/2022

Reliability of Electronic Systems

Roana de Oliveira Hansen
01/09/2023 → 26/01/2024

Experts in Teams

Roana de Oliveira Hansen, William Greenbank & Shouvik Chaudhuri
01/09/2023 → 28/01/2024

MIME 2023

Roana de Oliveira Hansen
12/04/2023 → 12/04/2023

Computer Aided Engineering

Roana de Oliveira Hansen
01/02/2023 → 23/06/2023

Experts in Teams

Roana de Oliveira Hansen, & Benaoumeur Senouci
01/09/2022 → 31/12/2022

Reliability of Electronic Systems

Roana de Oliveira Hansen
01/09/2022 → 01/01/2023

Advanced sensors

Roana de Oliveira Hansen
01/09/2022 → 01/01/2023

Summer school "Medical devices and imaging"

Roana de Oliveira Hansen & Jacek Fiutowski
08/08/2022 → 12/08/2022

EKA: T350041402 -Advanced sensors

Roana de Oliveira Hansen & Lawrence Nsubuga
24/09/2021 → 17/12/2021

Computer Aided Engineering

Roana de Oliveira Hansen
01/02/2022 → 24/06/2022

Reliability of Electronic Systems

Roana de Oliveira Hansen
01/09/2021 → 31/01/2022

Advanced Sensing Technologies

Roana de Oliveira Hansen
01/09/2021 → 31/01/2022

Experts in Teams

Roana de Oliveira Hansen, & Jerome Jouffroy
01/09/2021 → 31/01/2022

Computer Aided Engineering

Roana de Oliveira Hansen
01/02/2021 → 30/06/2021

Reliability of Electronic Systems

Roana de Oliveira Hansen
01/09/2020 → 22/01/2021

Experts in Teams

Roana de Oliveira Hansen, &
01/09/2020 → 22/01/2021

Computer Aided Engineering

Roana de Oliveira Hansen
03/02/2020 → 17/06/2020

Physics of Electronic Devices and Failures and Reliability

Roana de Oliveira Hansen
02/09/2019 → 15/01/2020

Reliability of Electronic Systems

Roana de Oliveira Hansen
02/09/2019 → 14/01/2020

Semester Project 4 - Mechatronics

Oliver Niebuhr, Roana de Oliveira Hansen & Jesper Puggaard de Oliveira Hansen
04/02/2019 → 31/05/2019

Scientific Methods for Engineers (Mechatronics)

Oliver Niebuhr & Roana de Oliveira Hansen
05/02/2018 → 31/05/2018

Scientific Methods for Engineers (Mechatronics)

Oliver Niebuhr & Roana de Oliveira Hansen
01/02/2017 → 31/05/2017

Mekanik og Termodynamik

Roana de Oliveira Hansen
01/09/2019 → 31/01/2020

Reliability of Electronic Systems

Roana de Oliveira Hansen
01/09/2019 → 31/01/2020

Physics of Electronic Devices and Failures

Roana de Oliveira Hansen
01/09/2019 → 31/01/2020

Mechanics semester project

Roana de Oliveira Hansen
01/02/2019 → 30/06/2019

Scientific Methods

Roana de Oliveira Hansen
01/02/2018 → 30/06/2018

Reliability of Electronic Systems

Roana de Oliveira Hansen
01/09/2017 → 31/01/2018

Experts in Teams

Roana de Oliveira Hansen
01/09/2017 → 31/01/2018

Physics of Electronic Devices and Failures

Roana de Oliveira Hansen
01/09/2017 → 31/01/2018

Scientific Methods

Roana de Oliveira Hansen
01/02/2017 → 30/06/2017

Physics of Electronic Devices and Failures

Roana de Oliveira Hansen
01/09/2016 → 31/01/2017

Scientific Methods

Roana de Oliveira Hansen
01/02/2016 → 30/06/2016

Actuators

Roana de Oliveira Hansen
01/02/2015 → 30/06/2015

Semester project: Construct Mechatronics

Roana de Oliveira Hansen
01/02/2014 → 30/06/2014

Power Electronics

Roana de Oliveira Hansen
01/02/2014 → 30/06/2014

Scientific methods

Roana de Oliveira Hansen
01/02/2014 → 30/06/2014

Experts in teams

Roana de Oliveira Hansen
01/09/2013 → 31/12/2013

Supervision of thesis

Bachelor - Jonna Mejenborg

Casper Kunstmann, Jacek Fiutowski & Roana de Oliveira Hansen
01/02/2024 → 30/06/2024

Bachelor - Peter Csanad Kiss

Roana de Oliveira Hansen & Lawrence Nsubuga
01/02/2024 → 30/06/2024

Bachelor - David Eszes

Roana de Oliveira Hansen & Lawrence Nsubuga
01/02/2024 → 30/06/2024

Bachelor - Philip Oliver Mejer Jørgensen

Roana de Oliveira Hansen
01/09/2023 → 01/02/2024

Bachelor -Christina Joy Moses

Roana de Oliveira Hansen & Bente Olsen
01/09/2023 → 31/01/2024

Master - Albert Ashong

Roana de Oliveira Hansen & Casper Kunstmann
01/05/2023 → 01/09/2023

Internship - Ekow Dadzie

Roana de Oliveira Hansen
01/02/2023 → 31/08/2023

Master - Turjja Datta

Roana de Oliveira Hansen
01/02/2023 → 21/06/2023

Bachelor - Oliver Vedby Jørgensen

Jacek Fiutowski & Roana de Oliveira Hansen
01/02/2023 → 21/06/2023

Bachelor - Frederik Leonard Floyd Zemlin

Roana de Oliveira Hansen
01/02/2023 → 30/06/2023

Bachelor - Anders Franker Holm

Roana de Oliveira Hansen
01/09/2022 → 31/12/2022

Bachelor - Tobias Weile

Roana de Oliveira Hansen
01/09/2022 → 31/12/2022

EKA: T340059402 Experts in Teams

Roana de Oliveira Hansen & Lawrence Nsubuga
01/09/2021 → 08/12/2021

Student Assistant - Oliver Vedby Jørgensen

Roana de Oliveira Hansen
01/04/2022 → 30/06/2023

Student Assistant - Daniel Szanka

Roana de Oliveira Hansen
01/04/2022 → 31/12/2022

Internship - Rytis Mikutavicius

Roana de Oliveira Hansen
01/02/2022 → 24/06/2022

Master - Ahmmed Iftekher

Roana de Oliveira Hansen
01/02/2022 → 24/06/2022

Master - Jens Holm Hansen

Roana de Oliveira Hansen &
01/02/2022 → 24/06/2022

Student assistant - Eduardo Tannhauser

Roana de Oliveira Hansen
15/08/2021 → 30/11/2021

Bachelor - Mary Dannia Raju

Roana de Oliveira Hansen, Lawrence Nsubuga & Simon Overgaard Høgh
01/09/2021 → 01/12/2021

Bachelor - Xabier Aítor Adin Vallespir

Roana de Oliveira Hansen
01/09/2021 → 01/01/2022

Bachelor - Jesus Sanmartin Gonzalez-Haba

Roana de Oliveira Hansen
01/09/2021 → 01/01/2022

Bachelor - Zoltan-Mihály Török

Roana de Oliveira Hansen
01/09/2021 → 24/06/2022

Master - Sabita Acharya

Roana de Oliveira Hansen & Jacek Fiutowski
01/09/2021 → 31/01/2023

Raisa Sadat Sharmin

Yogendra Kumar Mishra & Roana de Oliveira Hansen
01/09/2021 → 01/06/2022

Guest researcher - Simon Overgaard Høegh

Roana de Oliveira Hansen
01/02/2021 → 31/03/2026

Kiana Kavianynejad

Roana de Oliveira Hansen & Yogendra Kumar Mishra
01/02/2021 → 31/12/2021

Amit Barua

Yogendra Kumar Mishra & Roana de Oliveira Hansen
01/02/2021 → 31/12/2021

Raisa Sadat Sharmin

Yogendra Kumar Mishra & Roana de Oliveira Hansen
01/02/2021 → 31/12/2021

Student assistant - Jamal Salvi

Roana de Oliveira Hansen, Simon Overgaard Høgh & Lawrence Nsubuga
22/03/2021 → 01/09/2022

Student Assistant - Mary Dannia Raju

Roana de Oliveira Hansen, Lawrence Nsubuga & Arkadiusz Goszczak
01/07/2020 → 30/06/2021

Guest researcher - Celestina Rai

Roana de Oliveira Hansen
01/03/2021 → 31/07/2021

Bachelor - Fernando Donaire

Roana de Oliveira Hansen &
01/03/2021 → 31/08/2021

Master - Daniel Mammou

Roana de Oliveira Hansen, Tatiana Lisboa Marcondes & Lawrence Nsubuga
01/03/2021 → 31/08/2021

Research assistant - Deborah Curtis

Roana de Oliveira Hansen & Jacek Fiutowski
01/04/2021 → 01/02/2022

Postdoc - Tatiana Lisboa Marcondes

Roana de Oliveira Hansen
01/09/2020 → 31/03/2026

PhD - Lawrence Nsubuga

Roana de Oliveira Hansen
01/03/2021 → 29/02/2024

Master - Ginevra Alberio

& Roana de Oliveira Hansen
03/02/2020 → 16/06/2020

Master - Lucas Gazola Mugnol

Wai Keung Mo & Roana de Oliveira Hansen
03/02/2020 → 23/06/2020

Master - Pulkit Saluja

Roana de Oliveira Hansen
02/09/2019 → 16/06/2020

Master - Josep Maria Carmona Domingo

Roana de Oliveira Hansen
02/09/2019 → 17/06/2020

PhD - Juliana Schons Gularte

Roana de Oliveira Hansen
01/11/2018 → 30/04/2019

Master - Carlos André Bravo Costa

Roana de Oliveira Hansen
01/09/2017 → 01/06/2018

Bachelor - Dionis Grazdan

Roana de Oliveira Hansen
01/09/2017 → 01/02/2018

PhD - Lucas de Carvalho Ribeiro

Roana de Oliveira Hansen
01/11/2015 → 31/10/2022

Bachelor - Victor Tolstrup

Roana de Oliveira Hansen
01/09/2016 → 01/02/2017

Master - Romans Safonovs

Roana de Oliveira Hansen
01/09/2016 → 01/06/2017

Bachelor - Carlos André Bravo Costa

Roana de Oliveira Hansen
01/02/2016 → 01/06/2016

Master - Ying Wang

Roana de Oliveira Hansen
01/02/2015 → 01/06/2015

Master - Nicole Klindworth

Roana de Oliveira Hansen
01/09/2012 → 31/07/2013

Master - Yinghui Liu

Roana de Oliveira Hansen
01/09/2011 → 01/06/2012

Bachelor - Mathias Hausladen

Roana de Oliveira Hansen
01/02/2012 → 01/06/2012

Teaching philosophy

Roana has always been found of teaching and being a teacher was always her favourite role-play game when growing up. Practical teaching and pedagogical methods have helped her to learn new tools and to perform a more objective teaching. One learns when new knowledge is facilitated to the person and he/she can relate it somehow to common sense and to previous knowledge. The learning process can in that sense be like a stairway and one cannot reach the top without

passing through each learning step.
Another important observation coming from teaching practice has been the reflective practice. It refers to different forms of immediate application of the gained knowledge to a practical problem. The students should have time to apply the knowledge by solving a practical problem, in order to enhance their learning outcome. These observations are consistent with the reflective practice models from Gibbs (1988) and Kolb (1984) and I have applied it to my teaching by activating students with practical activities in class and by practical problem solving through laboratory exercises. According to Loughran (2006)´s assumptions, experience alone does not lead to learning – reflection on experience is essential.
The role of the teacher is to be a facilitator to the students learning process. This can be achieved by applying different tools for reflective practice. It is the teacher´s responsibility to get to learn the type of students that forms the teacher´s audience and adapt the tools and the student activation to that audience, which is related to the “reflection on action” concept (Schön-1983).

Reflections in practice

The residential courses

The Lecture Training Program offered residential courses, where relevant topics were taken into account and which were very useful and with good applications to the practical lectures.
It is very interesting to reflect on the links between teaching and learning in a different perspective. Reflections leaded to the conclusion that the learning process is more effective if somehow the new concepts being taught are related to the learner´s background knowledge. Making relations between the new concepts to common sense values or previous well-learned knowledge will always make the assimilation of new knowledge easier.
Assessments are also a good tool while teaching, in order to get a feedback on your teaching being learned by the students. There are different types of assessment that could be used as tools for this feedback. Examples include peer review assessment, class entry questions, multiple choice questions, asking the students to find examples related to the new concepts or a short traditional test. Examples of applications in the teaching include using the multiple choice questions through Shakespeak, where instant feedback can evaluate the learning outcome.
E-learning tools can be very helpful when the group of students is shy and quiet, and only willing to answer questions without identifying themselves, or for a large audience. By using Shakespeak and Padlet Walls, they start a good interaction and a great outcome can be measured. More details are described on the e-learning project section.
Roana has previously been given the task of writing the course description of two courses. One of them was a Scientific Methods course and the other one was a new course to be included in a new programme, called Physics of Electronic Devices. The courses´ designs followed instructions from a course design lecture from the Lecture Training Program, taking learning objectives into consideration.
In addition to all these techniques, in the first residential, individual teaching supervision sections were realized. Each member of the colleague supervision group gave a lecture and given the opportunity of observing and commenting on each other teaching. Aspects as the logic and structure of the lesson, the main points and tools, the basic methods, the personal behaviour and the methods of activity were some of the points to observe.

The open courses

Attending relevant open courses was also a part of the Lecture Training Program, and the following courses were attended:
-Teaching and learning with social media: social media can also be a useful tool for teaching, instead of a distraction for the students. Both Twitter and Facebook have some features that can enhance group work and discussion.
-Oral examination: a very common practice in Denmark. Learning about how to handle it and how to make a fair evaluation has been particularly interesting and useful for future exams.
-Student supervision on the distance: great remote lectures can be performed using the features of Adobe Connect.
-Prezi: Interactive presentations.
-de Bono´s thinking hats: understanding how different students react to the same teaching, and the dynamics of interaction of different people.

Teaching practice and supervision

Supervision and useful feedback from internal and external supervisors were also a part of the Lecturer Training Programme. One of the main discussed topics regards student participation and engagement on the lectures.
While some of the students seemed to be very participative and engaged, some of them were doing something else behind their computer screens during the lecture. The question was how we can engage and activate the passive students.
Many useful suggestions came along, including using an instant response system as Shakespeak, asking the students to write a minute paper or make a lecture summary by the end of the class, peer-review, asking them to come to the blackboard to solve a problem, ask them to give the lecture instead of me, making practical experiments/measurements on class, among many other methods.
Many of these methods were applied to the teaching, and some of them resulted in a very positive outcome. Among them is the summary approach method. By the end of the lecture, the students are asked to point out some of the main points, and write it on the blackboard. A summary of the lecture is built and then these points can be compared to the lecture´s learning objectives. If they are matching, the learning objectives have been fulfilled, but if not, some of the important points can be repeated and the learning objectives reached. It is also important to challenge the students with exciting topics and questions, and always allow some time for the new knowledge to "digest".
Overall, the teaching supervision sections were very helpful for the pedagogical development, and the feedback given was useful helping organizing the teaching in a logical way.

E-learning project

Shakespeak and Padlet walls

In many of the taught courses, students were very quiet and shy, and were not asking questions or answering questions when asked. As a solution for avoiding one way communication in the classroom, a small Shakespeak test was applied after the Power Electronics lectures. It was surprising to see that basic concepts which have just been thought were actually not well understood by the students. With the help of the feedback results from Shakespeak, their weaknesses could be identified and important concepts could be reviewed. Shakespeak is an instant feedback tool, meaning that questions can be added to the lecture slides and the students can immediately answer the questions online. The results are shown on the slides and can be promptly discussed.

The results from the first Shakespeak section gave an alert about teaching methods and the process of teaching and learning, which could be adapted to the next lectures. After consulting the students about the use of Shakespeak, they were very positive to use it in every class, since they could also get a feedback on their learning by testing themselves.

Padlet Walls have also been used as a tool for idea generation in the Scientific Methods course. Padlet Walls are interactive online walls where all students can access it and post ideas and questions directly on the wall. Here again, when the students were asked to give input to the idea generation phase, they were all very quiet. However, when they could anonymously write on the wall, great ideas started flowing, and we reached some interesting topics for future scientific projects.

In conclusion, these tools have been a great help for student activation into a two way communication, resulting in better teaching and learning outcomes.

E-learning project: Using Shakespeak for the Power Electronics course

Learning objectives: According to the course description, the students should demonstrate their understanding of electronic components for power circuits and to design and simulate power circuits. They demonstrate their understanding by applying the theory to a concrete semester project and by delivering assignments throughout the semester.

Learning theory: Instant feedback from the students helps the lecturer to have an overview on the assimilated concepts and review the necessary content for a more effective learning.

Teaching and learning activities: The e-learning project was initiated in February 2014 and used though the spring semester. The course consisted of theoretical lectures about power electronics, followed by practical assignments where the students were able to apply the learned theory. The new knowledge was applied to a large semester project, where the students were asked to build an energy harvester and all power electronics involved for the correct energy conversion.

E-learning tool: Shakespeak was used as an e-learning tool in order to get instant feedback from the students during theory lectures. Theory of power electronics is a dry subject, involving advanced concepts within physics and engineering. It can be though for the students to follow new concepts if they have not assimilated the previous ones, hindering the learning process.

Therefore, it was very useful to check out the understanding of individual important concepts by using Shakespeak, which gave me the opportunity to review concepts that might have been misunderstood by the students and to bring more practical examples and analogies that could help improving learning.

By the end of each lecture, a Shakespeak quiz section was applied, where about 80% of the students were actively participating. For the first lecture, the answer accuracy was not very high (what was also observed on the outcome of their practical assignments that day), and based in that result, more practical analogies to the theoretical concepts involved were performed in the next lecture. A review of the misunderstood concepts was performed and the teaching made in a more dynamic form. At the end of the lecture, the Shakespeak quiz had revealed a significant increase on answer accuracy, and the few misunderstood concepts were immediately reviewed. The improvement of the learning outcome was again reflected on the students' practical assignments after that lecture.

Over the semester, the students enjoyed the Shakespeak section and their answers were getting more and more accurate.

Their final semester projects were also good and some of them had impressive outcomes. This could be partly attributed to their good understanding of the theoretical concepts.

Reflections

Instant feedback from the students learning of power electronics concepts can greatly help on teaching this subject, since it is impossible to learn new concepts without understanding the previous ones. If the lecturer gets a feedback showing that the students have misunderstood some concepts, there is still time to review it and re-explain it using different methods and examples.

The activity can be evaluated in a very positive way, and this e-learning tool can be used in future teaching. It was good to see the students' improvement through the semester and their final outcome.

The students really appreciated the use of Shakespeak, since it helped them to run a self-evaluation of the concepts and they got the feeling that they have learned it. In the few lectures where Shakespeak was not used, they have asked why so, as they liked it.

Development project

Learning statistics: Is it boring?

Statistics is a very important tool for handling of data for a wide range of disciplines. Therefore, statistics courses are present in the most various specializations.However, teaching statistics requires the introduction of many definitions and equations which can by instance seem boring for the students, especially by using one-way teaching, where students are listeners and teachers are speakers.One of the taught courses (Scientific Methods) includes the challenge of teaching, and different methods were applied in order to engage the students to the lecture. The background for the project comes

from the theory of reflective practice, based on the work of Gibbs (1988), Kolb (1984) and Loughran (2006), based on the fact that the students should apply the new knowledge immediately by solving a problem, for example, which gives them time to reflect upon the application experience.Keeping this in mind, different tools and methods were used in class, allowing the students to apply the knowledge and reflect upon it. The applied methods, outcomes and the student's engagement improvement are presented in this section.

Methods

One-minute paper: This method allows the students to reflect upon the lecture, in the sense that they are asked to write down all the learned concepts within one-minute. The different written topics are discussed and a reflection on how important they are on the lecture structure is performed.

Summary of class made by students: In a similar manner of the one-minute paper, the students are asked one by one to mention one topic that was learned on that lecture. The teacher writes it down on the blackboard, and a general reflection and discussion is followed.

Instant feedback: During the lecture, the students are requested to answer a quiz via an instant response system such as Shakespeak, as described on the e-learning project. The teacher gets instant feedback on the understanding of different concepts, which can be reviewed if needed, and the students get the opportunity to reflect upon the learned concepts.

Student peer-review: In this technique, the assignments are reviewed by fellow students, which also have the opportunity to reflect on what the others have done, increasing the learning process.

Students' activation: Here, the students are asked to take action and measure, answer and count determined samples and analyse it. In this way, they are able to apply their knowledge, solve a problem and reflect to it. Some examples of activities are described below:

Learning objective: To understand concepts regarding uncertainties and measurements.

Activity 1: In order to demonstrate the uncertainty of measurements and data collection, the students were provided with nuts, almonds and a measuring tape. They were then asked to measure the circumference of both nuts and almonds and compare their results. A clear discrepancy was found, coming from small differences from the samples and also from different measurements using a measuring tape. The students could then reflect on that and conclude that uncertainties are present in all measurements.

Learning objective: To be able to prove a hypothesis using statistical t-test.

Activity 2: Data analysis. The students were asked to answer how many hours they sleep per day. The hypothesis that students sleep less than the average population was assumed. Through statistical analysis of their data, the hypothesis was disproved, showing that they also get a good amount of sleep.

Learning objective: To be able to prove a hypothesis using statistical t-test.

Activity 3: M&Ms. The students were provided with an amount of M&Ms and were asked to count how many pieces of each colour they had. Through statistical analysis, they were able to disprove the hypothesis that there are more orange M&Ms than the other colours.

Outcome

The students were much more active than in previous lectures, where they learned the concepts without immediate application. Here, they have been introduced to the concept and immediately applied it to analyse their own data. Together, an investigation of the hypothesis was performed by simply collecting data and analysing it.

Through this process, the students learned how to conduct scientific research through hypothesis formulation, data collection and data analysis - all in a very interactive way. "Learning by doing" helps the students to transfer the new knowledge to permanent knowledge rather than temporary knowledge.

After the lecture, the students had to submit a report with some statistics exercises. A huge difference in quality between the reports made by the students present in class and the absent ones could be observed, showing that activating the students can significantly help their learning process also for a topic as "boring" as statistics.

The project was presented in a poster section in the Lecture Training Program at SDU, and was chosen as the best poster/project in that term (June 2015).

In summary, pedagogical development is a continuous process, and one should be always open for the use of new tools and methods, as the learning process evolves.