



## Course Analysis MF2019

### CAD 3D-modelling and Visualization Autumn 2020

*Date and author: 2021-02-02 by Ellen Bergseth*

#### 1 Course information

This course supports virtual prototyping. Designers and engineers need a common understanding of the performance aspects of the design before physical prototyping. In this course, students create 3D CAD-models that support efficient cooperation between individuals and groups of individuals with different types of competence. The models can be used with different purposes, for example, explaining the function and manufacturability of a product, eliminating interferences between parts as the mechanism moves through the real operating range, or generating operating loads to check the design criteria using Finite Element Analysis.

After completing the course, the student should be able to:

1. Create a CAD part with product manufacturing information (PMI) in a system context.
2. Create a CAD assembly with mixed technological content, e.g. mechanical and electrical parts.
3. Master modeling modules (i.e. applications and environments) in a CAD system for the design of machine components.
4. Make a force- and motion analysis of a mechanism model.
5. Making interference analysis.
6. Create communicative representations of CAD-models to present and describe the design and behaviour of a product.

#### Course responsible teacher:

Ellen Bergseth

#### Other teachers in the course:

Student assistants Johan Ankre and Hampus Andersson

#### Examiner:

Ellen Bergseth

#### Learning activities:

Lectures, computer exercises, one seminar, home assignments (ÖVN1), and a project task (ÖVN2).

#### Additional Comments

The student suggests the individual project task. The project proposal and scope are assessed and have to be accepted before the project start.

## 2 Students' view of the course

*Summary of students' view of the course based on for example LEQ survey and/or interviews or other activities.*

Added the following two questions:

1. Very few attended the computer exercises, what prevented you from joining?

*Summary of answers:*

*Schedule collisions; The teaching and the assignment documents were very clear and easy to interpret. The tutorial video in canvas were also very helpful for me to work independently.; For me, a zoom session during exercises is pointless. Even with the pandemic, a teacher/student should have been in the room to help us physically.; I was able to discuss much with a friend in the course, we could solve many problems by ourselves.*

2. Would you have joined the computer exercises if they were on campus?

Most of the students answered definitely. But one student answer got my attention:

*Yes, its easier to get privacy in the computer halls since in zoom meetings everybody has to listen to your questions.*

### **Response rate of LEQ course evaluation survey:**

We have to consider the response rate was only 23% (14 students out of 62 registered).

### **Brief summary of students' responses from the LEQ survey and/or other types of course evaluation:**

In the survey, the students give it a high rating in meaningfulness (Q1-6) as well as for the comprehensibility (cognitive) level (Q7-11). On the manageable level (Q17-22), students gave a lower rating. This could be linked to the distance education, since we had no face-to-face lectures or exercises. International master students gave higher rates than Swedish students from year 4-5.

### **Additional Comments**

I can never go through the grading of the project part too many times it seems, this course evaluation ended before they got their grades though and I did not get any comments from students after they had received the grades. So I interpret this as they are satisfied with the grading, that it was fair and clear.

I am pleased to read this since this is a lot of effort in, "What was the best aspect of the course?":

- *The teacher and the assignments.*
- *Learning new tools and features I would have never learnt myself.*

## 3 Teacher analysis of the course

*The analysis should present the development of the quality of the course as well as measures that have been taken after previous course analysis. The course's strengths and weaknesses based on the course evaluation and the teacher's reflection.*

This course, as the last course round, was remote due to the pandemic. More students than before joined the lectures. I enjoy answering questions in the chat function when lecturing, its easier to interact with the students. More students seem to feel comfortable asking questions. I have used more

Canvas functions this course round, peer review, discussions, announcements, and more feedback in the comment field for assignments.

I really miss having face to face discussion in small groups. Less students finalized the course than the last course round, Spring 2020, 49 out of 64 registered students completed the course. In this course round, Autumn HT 2020, 35 out of 62 registered students finalized the course.

**Changes of the course before this course offering:**

- I removed one optimization task (Solid Edge Design Optimization tool). I replaced it with the Topology Optimization (Solid Edge Generative Design), useful to help students focus on interfaces and practice another way of thinking when additive manufacturing now is an option to traditional manufacturing. But the challenge of additive manufacturing was reflected in the task.
- I used the Canvas speed grader for the peer review, which worked, but some students did not know if they had uploaded it correctly. However, they had succeeded in uploading it the correct way (many unnecessary emails from students).
- I updated the project assessment protocol.
- I changed back to peer-reviewing a final project, summative feedback, not a draft of the project report as in last course round.
- I am aware that some have felt it was hard to select a product to model. I planned to put some extra time into this. They got more in detail feedback from me when selecting the product, I suggested tools that they had not mentioned to make use of, and I wrote whether they could have a chance for the higher grades or not with the selected products. I got more variation in products modelled in the project task, and the students could use more relevant tools in solid edge.

35 students out of 62 registered finished the project.

**The course's strengths** (based on the students' experiences and the teacher analysis):

The project is individual, and the students can plan their work on their own but can always get guiding. They can select the product to model themselves (this makes students more engaged with the project) and link the product selection to projects in other courses at Machine Design, but this has to be discussed with the examiner.

**Areas for improvement of the course** (based on student experiences and teacher analysis):

Make it more popular to attend the exercises. That few participated in the exercises can be interpreted as if the exercises are too easy. Make a breakout room during exercises so that the students feel that they don't have to ask questions in front of everyone attending the exercise.

Have an open-door session to discuss downstream activities for the project part.

**Proposed changes to the next course round:**

- Go through report writing more in detail, too many students make unnecessary mistakes. Ensure they understand what a technical report is, add this in the last lecture or go through a report and explain in a movie added to Canvas. For example, very few have results described in their abstract.

- Remove parts in A1 to A3 that are not directly linked to the learning goals, that are added for repetitions, and add *an individual challenge* to each exercise related to the tools they should try out.
- Go through more in detail how to make use of relations to constrain sketches.
- Add to the course Canvas page advises from previous students:  
*“GrabCAD, pinterest, instagram, and Youtube are all great places to look for project proposals. Youtube is especially good as if you found something that was interesting but not exactly what you wanted, then the sidebar will show similar content.”*  
*“Start with the project as early as possible.”*  
*“Choose the Final Project topic keeping that they have to balance other courses in that semester.”*  
*“This kind of CAD softwares needs practise in order to get familiar with it. Try to not get frustrated during the transition of an other software to this one if you had a different backround knowledge from a different software.”*

### **Additional Comments**

I handed back the report with my comments in it. In this way, they get summative feedback from me and understand why they get a certain grade on the project work report. But it is much better to spend a lot of time during the time students select the project to get valuable formative feedback from the teacher. I advised against students from some products that are not challenging enough this course round, which the students accepted.