Course Analysis MF2019

CAD 3D-modelling and visualization
HT22

2023-03-06 by Bulat Munavirov

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. Students create 3D CAD models that support efficient collaboration between individuals and groups of individuals with different competence types in this course. The models are useful for various purposes, such as eliminating interferences between parts, studying the operating range of a mechanism, or generating operating loads to check the design criteria using Finite Element Analysis.

The course main content covers the feature-based parametric modeling technique, which consists of two elements: a feature tree and fully parameterized wireframes employed for protruding solid features.

Structurally course is based on two parts.

The first part consists of three assignments and is intended to help students practice various tools in different modelling environments. All assignments are introduced by means of communicative images and/or movies.

The second part of the course is an individual project assignment. The participant has to make a detailed CAD model of a product that he/she chooses. The modeled product must contain both electronic components and moving mechanisms. Each participant will also assess another students model in a peer review.

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

- *Create a CAD model with product and manufacturing information (PMI) from a system perspective.*
- *Create a CAD model with mixed technical contents, e.g. mechanical and electric components.*
- *Be familiar with modeling modules/tools (i.e., different applications and environments) in a CAD system for design of machine elements.*
- *Make force and motion analysis of a mechanism model.*
- *Carry out interference analyses.*
- *Create communicative representations of CAD models to present and describe the design and behaviour of a product.*

Course responsible teacher:

Bulat Munavirov

Other teachers in the course:

Student assistants Joakim Hultgren and Mathis Jonathan Hörmann

Examiner:

Kjell Andersson, Ellen Bergseth

Learning activities:

Lectures, Computer Exercises, Mandatory seminar, 3 individual assignments, 1 individual project work

Additional Comments

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2 Students' view of the course

I have performed two interactive surveys (multiple choice questions managed using DirectPoll.Com) during the lectures. One in the beginning of the course, to get an acquaintance with the background knowledge in CAD of course participants. The second one in the middle of the course, to get an immediate reflection on the course activities. I have as well run a standard LEQ6 - Course Evaluation Survey after completion of the course.

Response rate of LEQ course evaluation survey:

38 participated the first survey
5 participated the evaluation
(out of the 60 registered student)

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

Once again students appreciate the amount of freedom in the choice of the final project and are happy with the pace and the content of the course.

Students suggest to increase the amount of the help sessions in the final stage of the course.

Students suggest that future participants plan more time to work with the project, starting as early as possible.

Additional Comments

There is a comment admitting it was challenging to hear the lecturer. Most probably this is addressed to lecture 1 that was given in an M3 lecture hall (otherwise usually it is M33). I have noted this to my self and will be using the microphone from this time on when giving lectures in large lecture halls.

3 Teacher analysis of the course

Inspired by the feedback received during previous course rounds I increased the amount of discussions on the possible project ideas. This course round I've started introducing project already at the first lecture. It resulted with a very efficient seminar, and very well-structured project proposals.

Incorporating modules section with thorough introduction to each modules (in Canvas) was beneficial. As a result I received almost no emails regarding course organization from the students during this round.

Almost in all of the course rounds there is a final feedback addressed to the future participants saying: "start earlier with the project". While it is not a surprise that students finalizing the course

suggest newcomers to work harder, this is especially important for the MF2019, since a big portion of the course is based on the self-studies. I tried to stimulate this with constant reminders of the course calendar, shown from different prospective. So that students always know where to put more efforts and where they can expect a faster feedback. I think there is always a room for improvement here.

Changes of the course before this course offering:
- Both assistants' presence during all of the scheduled help sessions was requested

- I have created Modules section in the Canvas, efficiently dividing the whole course into two modules (Assignments and Project) and adding a description page to each module. I have as well incorporated the time plan for each module to ease the planning of the workload

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

Course is well organized, students with a very diverse background and starting knowledge of CAD efficiently adapt to the course pace through well instructed assignments and then apply this skills in the project.

Students appreciate the freedom in the project ideas selection and I try to support this as much as possible, advocating towards selection based on the applicability, curiosity etc. (i.e. ideas based on their hobby, other course and projects related interests) Since it stimulates critical thinking: students start seeing skills being achieved as tools they can benefit from.

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

Restructure the help tutorials in the second half of the course. At the moment the computer classes are uniformly distributed throughout the course. A possible change would be to increase the frequency towards the end of the course.

Proposed changes to the next course round:

Run zoom tutored sessions in addition to the on campus activities. There are many students preferring to work from home, adding possibility of zoom participation could ease their participation. This however shouldn't be a substitution of on campus activities.

Additional Comments

I have noticed a low participation in the final survey. My approach is to start the survey only after the students get their final grades published, to get the ultimate "final picture" in the survey. Possible improvement would be to release the survey earlier, for example, after the last lecture or last tutored help session.

Another possible change would be to create a list of project to choose from, as it is for instance done in the MF2072 Research Methodology in Machine Design course. I would however leave the possibility of freedom in idea choice to students, making the list as an option for those who struggle coming up with an idea.