



## Course Analysis MF2019

### CAD 3D-modelling and visualization HT21-1

2022-03-15 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 Alexander Ozaeta Arce and Aydar Gaynullin

**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:**

21 participated the first survey

4 participated the evaluation

(out of the 51 student)

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

Students find assignments as a useful tool to prepare to the project activity. All students were able to get support when needed, they get chance to discuss their ideas with each other. At the same time, students note that they found it challengeable to choose a right idea for the project. They suggest to start earlier with the work on the project.

**Additional Comments**

Some students as well were not satisfied with the CAD program choice (Solid Edge). They motivate it by worse productivity of the program and less relevance for the industry (compared to other solutions).

### 3 Teacher analysis of the course

*This course was given on Campus, first time after two digital runs. The consequences were immediately observable comparing the attendance to lectures with attendance to the compulsory seminar event: a big half of the students chose to study lecture materials on their own. It has to be admitted that course is rich in self-study materials: video tutorials, step-by-step assignment descriptions and lecture slides. The drawback though is that choosing self-study, they missed a lot of communication both with teacher and each other. This e.g. could be one of the reasons giving rise to difficulties with choosing a right idea for a project.*

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

- I have corrected the model draft in the description to the 1<sup>st</sup> assignment, based on the feedback from the previous course responsible
- I have updated the instructions to the assignments, according to the relevant SolidEdge version. I as well updated the respective pages in the DDM designer tutorial document that is being distributed through the Canvas
- I have removed the article review task from the 3<sup>d</sup> assignment based on the discussion with the course examiner

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

The course has a nicely fitted relevant content: highly instructed assignments make it possible to learn the required CAD tools from scratch. At the same time, the project concept supports the individual approach towards CAD modelling, which is relevant, since it is an art in itself.

I have noticed that many students selected projects based on their background experiences, side projects or an old-time dream "to have a virtual model of that particular mechanism" that they acquainted with at some point in the past. I have tried to stimulate and support such choices, and, in most cases (probably all cases) they ended up to be A or B grade reports.

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

To help student even more with formulating project ideas.

To additionally stimulate students towards using more diverse modelling environments. Based on the project submissions a big majority of the participants limit themselves towards using at the best 3 modelling environments.

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

Go in detail through several project ideas from previous course rounds; discuss pros and cons.

Explain in a more detail the grading table for the project, to stimulate the choice of more sophisticated mechanisms and parts, usage of more diverse modelling environments.

#### **Additional Comments**

It would be worth to investigate the possible consequences of perhaps not migration but maybe allowing using different CAD software as well.