



Course Analysis MF2011

Systems Engineering Spring 2022

Date and author: 2022-09-05 by Ellen Bergseth

1 Course information

This course is based on an analysis and redesign scenario for an existing technical system combined with lectures, computer exercises, and seminars to support the project and to understand the discipline and practice of systems engineering.

Course responsible teacher:

Ellen Bergseth

Other teachers in the course:

No other teachers

Examiner:

Ellen Bergseth

Learning activities:

Lectures, computer exercises, seminars, project meetings, pulse meetings, final presentations, project work (non-scheduled), and individual logbook writing (non-scheduled).

Additional Comments

About a third of the lectures are held by guest lecturers relevant to the course and the project task.

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.

I mixed the LEQ questions with interviews and asked them voluntarily to add input on course activities in their logbook. To the anonymous LEQ questionnaire (22% response rate), I added these questions:

1. Tror du att du kommer att ha någon praktisk användning av det du har lärt dig i den här kursen?
Do you think you will have any practical use of what you have learned in this course?
2. Vill du arbeta med komplexa system i din framtida karriär?
Would you like to work on complex systems tasks in your future career?

Response rate of LEQ course evaluation survey:

We have to consider that the response rate was 22%. I got a better response in students' logbooks/other types of course evaluations.

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 over the neutral rating (high satisfaction that they got support if needed)

Other types of course evaluation: Written in their logbook and from interviews. Here are some comments from students:

Activity-related comments:

- Clearer instructions on the computer exercise.
- CE1: Typo: Write "file size" rather than just "size" to make it easier on students who first may think it is referring to CAD dimensions.
- CE2 had the same topic as another course; however, after all, very different from last year's modularisation course. We had to use many new concepts.
- Please invite this year's lecture on modularisation again and more than once in the course. His presentation could be put ahead before our exercise on system architecture. He's a great engineer, and his presentation impressed me the most.
- Guest lecturer for the last seminar on Cyber-Physical System/Industry 4.0 was a fantastic speaker and had me thinking about the future and how the world is changing. I try not to think about these things so much. I find it quite stressful. It is slightly upsetting that even once I have my degree, I will still have to re-educate myself once I'm out in the "real world.". I had also never heard of the age of industry 5.0. I think it's admirable that she spoke about doing good change, meaning thinking about what you are doing. For example, if I'm creating a product, consider if it's needed and what good it will do.
- I would have loved to hear more about Ellen's work at Scania.
- Best lectures were the ones about Dependability & Reliability given by Ellen.
- I was a bit confused about what a Component of Interest (CI) was, but now I understand it as an essential part of a system. For example, the guest lecturers from Saab mentioned that there is a bolt that holds the engine in place. This is, therefore, essential to check up on as if it breaks, it's a big issue. That's why it is marked as a CI.

Project-related:

- I think those open communication rounds were missing.
- We need better help to define how detailed the components in DSM (Design Structure Matrix) should be.
- Clearer instructions on each project phase, the deliverable and outputs.
- If I could suggest one improvement for next time this course is to be held is that the information that each group has a responsibility of handling communication and that the course structure is somewhat unique could have been brought up a bit sooner. But overall, this has not had a huge effect on the project but would clear some confusion in the early stages.
- I feel we lack much knowledge on how to go about the project. Some more straightforward and in-depth instructions would be more helpful. There was the intro lecture about the project, but

it did not clear up nearly enough. More information about the FMT and DSM would also have been helpful.

Additional Comments

The course evaluation ended before they got their grades, and I only had to add additional comments to three students (3/55) after they received the grades. 55 students out of 67 registered finished the project. So I interpret this as the grading was fair and clear.

This comment says a lot about the course: "What was the best aspect of the course?":

- "This course has been pretty weird! But in a good way!"

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.

Overall, this experience was great, considering that this was the first time I ran it. I had formative course evaluations when running the course, which helped. When I took over the course, I decided to run it as the former teacher in this first course round to see how it went and then make my changes. I have a lot of changes listed at the end of this document based on my experience and the student's input. In some of the activities, I see clear trends and will directly remove or change to the next course round.

This course was run as a hybrid since the pandemic was still making us care about the risk of spread. But the students want it to be on campus full time for better learning experiences, as I interpret it. Also, using hybrid teaching means that I, as a teacher am neither fully committed to the students online nor fully committed to the ones in the lecture room. So, I will not use hybrid anymore. See student comment below:

- "No online course! No hybrid, please!!! If we couldn't meet, the passion and efficiency of work decreased greatly. Please if possible, next time make it to campus."

Changes of the course before this course offering:

I took over the course from Ulf Sellgren. I decided not to make any changes before having the experience with the existing course design.

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

That the course project gives insight into real-world industry problems. See the following student comments:

- This project has been a roller coaster. I never knew what to expect. Some weeks I felt like everything was going as planned, and others, I felt like we had no idea what we were doing. But I also feel like this is somewhat representative of the real world.
- This is really what an interactive learning process in studying should look like. Compared to my experiences studying in Germany, this was very refreshing.

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

More clear information regarding the project process and topic (I will push more for the literature search) and more teacher assistance for computer exercises and seminars. Make grading more efficient.

Proposed changes to the next course round:

- Remove and select new more relevant journal papers for the students to read.
- Create CE4 (Computer Exercise) with the industry about MBSE instead of having the wire design exercise.
- Generally, in the logbook, I lack that most don't reflect on how they integrate new learnings from the activities into the project and the challenges of applying methods to your sub-group project tasks. I have to be more clear on this early on in the next course round.
- Information that each group has responsibility for handling communication and that the course structure is somewhat unique could have been brought up a bit sooner.
- System Integration Group need more help and has to understand their responsibility in informing the rest of their subgroup.
- Lecture on Configuration Management earlier and introduce active safety in a lecture. Also, V&V should be earlier in the course schedule.
- Introduce a start-up meeting with each sub-group about state-of-the-art for their subtopic.
- The integration group needs a better structure of how we should deal with collisions and information regarding this project.
- Shorten the time between periods P3 and P4.
- Be clear on Proof of concept and how to prove the project's technical feasibility, i.e., more information about the FMT and DSM.
- All activities on campus since much of the last course round misunderstandings and lack of communication are probably due to not meeting face to face on campus as much as usual.
- Get inspired by the researcher in the ECO2 research centre on modularisation.
- Add creating future scenarios in the project.
- Introduce CE:s better, for example, algorithm i CE3.
- Add oral examination for A or B grades.

Re-write the course learning goals and add/remove course content (ongoing) for the next course round 2023.