Course Analysis [MF2140]

Smart Cyber-Physical Systems (CPS) - understanding and acting in a sociotechnical shift 6.0 credits
Fall 2021

2022-04-12 by Claudia Andruetto, Rafia Inam and Martin Törngren

1 Course information

Data from the Course Syllabus

Course responsible teacher:

Martin Törngren

Other teachers in the course:

Claudia Andruetto, Rafia Inam

Examiner:

Martin Törngren

Learning activities:

The course introduces Smart Cyber-Physical Systems (CPSs), their specific characteristics and implications in terms of a sociotechnical shift, and provides methods and tools for overall CPS design and assessment (see more info here: https://www.kth.se/student/kurser/kurs/MF2140?l=en).

Additional Comments

This was the first time that this new course was given at KTH. The course was developed based on a request from the ITM school, and was intended as suitable for multiple programs at KTH. For being the first time, overall, we felt the course went quite well and that there is a clear path toward continuing to improve it.

With the course taking place during the pandemic, most of the course activities took place on-line, while we tried to have at least one physical meeting per module including for the last examination session (all these were organized as hybrid sessions).

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.

Response rate of LEQ course evaluation survey:

4 respondents out of 12.

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

We here briefly summarize the experiences as expressed by the students from discussions in class, and the LEQ survey.

We divide the experiences into “positive aspects” and “suggestions for improvements”:

Positive aspects:

- Appreciated the socio-technical scope, going beyond technology into impact on the wider system and society
- Case studies, throughout the course, connecting the parts
- 3rd module in particular appreciated with the focused method and tool
- Appreciated collaboration in the project groups, and that the course organizers divided the students into project groups to form multidisciplinary teams (participants with different backgrounds)
- Overall, the course was very well received and provided new perspectives

Suggestions for improvements:

- Clarifying expectations in terms of depth/breadth (the course has a wide scope) – especially the first lecture and guidelines on CANVAS
- Improving project introduction and guidelines on CANVAS referring to how the parts connect and what the goals are
- Making sure peer-review seminars are well structured/prepared (the first one was a bit unorganized)
- Add more concrete examples, practical applications and modeling/analysis techniques etc. for all modules
- Making sure lecture content fits timing
- Considering adapting the flipped classroom approach to include presenting papers they read to each-other
- Would prefer live lectures (one comment)

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.

Changes of the course before this course offering:

No change – this was the first time!

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

- Succeeded in attracting participants from multiple programs across KTH – providing useful collaboration groups
- Succeeded in meeting the overall goals in providing perspectives to future smart (AI-based) cyber-physical systems and socio-technical impact and context

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

- Further strengthening the connections between the course modules
- Including more focused modeling/design/analysis efforts in each of the course modules (especially for module 1, module 2)
- Further minor adjustments according to the participant feedback
- Do more on the promotional side to attract a better gender-balanced participation (together with PAs); this first time we did not actively promote it.

Proposed changes to the next course round:

- Restructuring of the assignments to provide a clearer and more understandable mapping between assignments (examination) and course content/modules
- Hazard and risk analysis as more concrete technique for module 1
- Trustworthiness framework extending the CPS framework
- Module2 to include more focus on Trustworthy aspects of AI and CPS
- Improve module2 lecture 1 content (presenting different AI techniques and incorporating more engaging activities while presenting)
- Improve module2 lecture 2 content (presenting analysis of examples and incorporating more engaging activities)
- Improve content of lectures in module 3, including more example and more engaging activities (for higher interaction between/with students during the lectures)
- Improve the connection between modules, especially module 3 with module 1 and 2, for example by including more system dynamics examples related to cyber-physical systems.

Additional Comments

In addition, the CANVAS content and structure will be reviewed and revised as necessary for the next course instance.