Course analysis IE1206 Embedded Electronics

The course analysis is based on the LEQ, interview with 3 student and discussions with the examiner Carl-Mikael Zetterling.

Summary from 2019

From the course analysis 2019 I identified:

- Find a way to allow students to discuss more with the teacher.
- Raise the requirement to pass the Arduino project and guide students more to the taught subject.

2020 edition

Two days before the first lecture on a Monday, KTH closed for students due to COVID-19 and the course had to be online. None of the suggested improvements from 2019 was implemented, they were postponed to 2021 edition.

The LEQ was answered by 31 students (24 %). The student spent 10-25 hours/week studying and most commented that the study pace was good. The LEQ answers were above 5.0 for all questions except “I felt togetherness with others on the course” which had a low 4.3. Interestingly “I had the opportunities to influence the course activities” increased from 4.0 to 4.9 this year. Questions on subject matter and constructive alignment was all above 6.0 which is encouraging.

Online implementation:

Lectures were chosen to be pre-recorded videos in 15-30 min length. I made this choice in order to have be able to have them in the 2021 edition to make blended learning for that edition. Students were overall pleased with the video lectures as judge from the LEQ. Two of the interviewed students emphasized how good it was to be able to see the lectures several times.

Student recitations had to be replaced. I converted them into with home assignments. To encourage student to do the home assignment I implemented a rule that they had to at least send in 20 problems out of 36 to be allowed on the exam. Due to time I never corrected the home assignments, the student got a problem checked as long as they sent in something that looked like a solution. Student didn’t receive feedback on the home assignments. Students said the regular distribution of the home assignments made them understand the pace of the course and how they were aligned to the intended pace.

Labs had to be replaced. I let them simulate (using the open software we use for preparation for the normal labs) one circuit from each of the 4 modules of the course. Then they wrote a lab report that I corrected. I think student accepted this way because it is hard to come up with a more hands on way, at least with the short preparation time that was available. This year students missed out on some learning outcome because no practical hands on work was conducted. Some students expressed that this was pitty. I think the practice to write a lab report that I provided feedback on was valuable to the student, although very teacher time consuming activity. I identified that since all modules was covered

in the simulation lab more students performed well on the later modules 3 and 4 in the exam. Due to scheduling labs normally only covers module 1 and 2.

Problems solving sessions

During the course students felt they needed to see how to analyze circuits. I did that in some of the lectures but I can understand their frustration. Normally students work and are encourage to work together to prepare for the student recitations. This year they sat home alone trying to grasp how to analyze circuit. I had several discussions with students and we tried a few ways before settling on an activity we called problem solving sessions.

We scheduled the sessions a few days before each home assignment should be handed in. The session dealt with similar problem has on the home assignment. The session was live on zoom. I had a powerpoint slide onto I could annotate using a wacom tablet. All students could participate if they wanted to. Typically 20-60 students particpated in each session. In the beginning of the session I asked if someone had a problem. It only happened once that we did a problem that a student had. In all other cases I post the problem for them and then asked how to proceed. I randomly picked a student and ask what the next step in the problem solving should be. If student didn't want to particpate orally they could be silent and I continue to pick students until someone was willing to talk. Then I wrote down what the student said, asked if it was clear to everyone, asked the student why we do has he/she suggested and so on. Students could interupt at anytime for clarifications.

I believe this method was very successful, we did real problem solving, without everything laid out nice and clear by the teacher. The students that participated was very positive and I learned quite a bit of what students found difficult. At the same time, it was very teacher time efficient. Basically, one teachers connects with all students in the class at the same time and there is unrestricted time to discuss with the teacher.

The written exam was converted to online exam in CANVAS and monitored over zoom. Correction of the exam only took a day since the exam was automatically corrected and I reviewed all wrong answers. I only saw their answer and not have the student did the circuit analysis, which clearly was a drawback. I spent a lot of time designing the online exam to make it appropriate for the learning outcomes and still fair.

The throughput was 65 % after the re-exam in August, which is almost identical to the throughput in 2019. This year, it might be considered ok due to the online teaching, but I should continue to find ways of improving it.

Suggested changes for 2021 edition

- Implement blended (in some sort of flipped-classroom) teaching using the video lectures recorded
- Find a way so that labs (hands – on or through simulation) cover all modules in the course
- Find a way to raise the requirement for pass in the Arduino project and possibly guide students more to the content in the course.

- Implement the online problem solving sessions while using on campus student recitations

- Schedule one session per week where I am available to discuss whatever the students wants to discuss in the course.