Course analysis – ei2402 "Electromagnetic Compatibility (7.5 Credits)" Ht2021

Staffing
Responsible department / division: EE / EME
Course-responsible, lecturer and examiner: Daniel Månsson
Guest lecturer: Rajeev Thottappillil (1.5 h)

Events
Lectures: nine double-period sessions (i.e., 9*2*0.75 h = 13.5 h) approximately two per week.
Additional tasks: one experimental laboratory group task and one individual home assignment.

Registered students following the course
HT2022: = 25 registered and 24 students followed the course.

Course components and points
Extract from Kopps:

LAB1	3.5 Credits	(P, F) (mandatory)
TEN1	4.0 Credits	(A, B, C, D, E, FX, F) (mandatory)

Results
The grade distribution, for TEN1 in HT2022, is given below.

Grade	#	Sum("P")	Ratio
A	5		
B	3		
C	9		
D	1		
E	0	**18**	***0,75***
F	6	***6***	***0,25***

Course material
Course compendium, lecture notes and the book [C.R Paul, "Introduction to Electromagnetic Compatibility"] (accessed via KTHB).

Intended learning outcomes
The course provides basic understanding of how electromagnetic disturbances appear in, propagate and influence electromagnetic components and systems. Moreover, the participant acquires knowledge about methods and strategies that reduce the influence of disturbances. After completion of the course, the participant shall be able to

1. construct simple models that describe non-ideal properties for electrical components
2. understand and apply the concept of zone-division in electrical systems
3. analyse cross-talk in multiconductor systems
4. identify low frequency (electric and magnetic) coupling mechanisms and calculate simple examples
5. identify high frequency (electromagnetic) coupling mechanisms and calculate simple examples
6. design effective shielding devices and filters
7. describe typical misconceptions in designs

Notes:

- I have previously felt that the labs, although worked well as demonstrations did not fully aid the learning. Thus, I removed two of the three experimental labs and left only one. I added a lab report for this experimental lab, added an individual home assignment that covered one of the removed labs and a report for that. My plan was to have the last third lab as a classroom demonstration but did not find the suitable time or classroom to do this for this course round (but will plan to do this HT22). (A note, before I have not required them to hand in reports only for them discuss the observations with me after the labs. However, I think the addition of the report did not stop them to reflect and take note on what they saw so I think it will be good. (I will also for Ht22 add a peer-review to the lab report and the home assignment to both increase the student time-on-task for the learning activity and ease my burden.)
- The individual cross-talk home assignment covered very well ILO 3, 4 and, in part, also 5. The filter experimental (group) lab covered ILO 1, 6 and 7. The ILO 2 is hard to cover in a lab but this is discussed quite well during the lectures and the "concept cases" I use. Overall, I think that, even though it took me much time to re-write the lab and the new home assignment I think it works much better now.
- The exam was a mix of multiple choice questions and essay questions and I feel this reliably tested the students. For the exam, the ILOs of the course was now clearly and strictly tied to one of the sections of the exam and if a student fell below 50% of an individual section they failed the exam and all of the six "F" was indeed due to this. (There was the Fx case also to consider, "For (Fx) it is required that, in one single group, a maximum of 1 point reduces the result below approved score."). The only drawback to the Ht21 exam was that I made some of the essay questions too long/cumbersome for me to evaluate which made the entire grading process time consuming. For Ht22 I will add a word limitation for these.
- Lectures are, in general, very well attended and liked and I think that the concept cases, that I use to discuss different topics, works very well.

Future items.

- Add **peer-review** to the lab report and the home assignment.
- Add an **additional classroom demonstration** on crosstalk to aid with that home assignment (I have one classroom demonstration on shielding) and this additional demonstration will be based on the old experimental crosstalk lab and that setup.
- Add an **additional individual home assignment** where the student chooses a topic within EMC to study and write a 4 page report to be peer-reviewed (I will copy how I do it for INL1 in my course ei2460).
- Perhaps modify from LAB1 3.5 Cr. (P/F) to LABA 1 Cr. (P/F) + INL1 2.5 Cr. (P/F) to make it fairer for the students to collect points and for me to administrate.
- Perhaps more concept cases.
- I am (still) considering make all the lectures more into discussion seminars that the students have to prepare for. However, that needs some careful planning of the topics and that the students review the material before the class.