

Course analysis – ei2402 “Electromagnetic Compatibility (7.5 Credits)” Ht2023

Staffing

Responsible department / division: EE / EMF

Course-responsible, lecturer and examiner: Daniel Månsson

Events

Lectures: nine double-period sessions (i.e., 9*2h = 18 h) approximately two per week.

Additional tasks: one experimental laboratory group task including one numerical simulations, two individual home assignment.

Registered students following the course

HT2023: = 17 registered and I would say that 16 students “followed” the course in an active way.

Course evaluation:

This course round I skipped the LEQ, as it never receives enough answers to be statistically significant. I used my own “Ris&Ros” paper that I distributed during the final lecture and I got almost all students responses (some might not have been present at the last lecture).

I will not publish these in full here but have them available for myself.

Course components and points

- LAB1 3.5 Credits (P, F). To pass LAB1 a students has to finish:
 - Experimental lab with numerical simulations as well as handed in a satisfying report.
 - Hand in a satisfying report for individual home assignment 1 (ha1).
 - Hand in a satisfying report for individual home assignment 2 (ha2), peer-review two other students reports and present their selected topic for the class during the specially session.
- TEN1 4.0 Credits (A, B, C, D, E, FX, F).

If LAB1 has a “P” then the final grade of the course is set by the grade from TEN1.

Results

The grade distribution, for TEN1 and the re-exam of TEN1 in HT2023, is given together below. For LABA all newly registered students passed.

Grade	#	
A	4	
B	2	
C	2+2	
D	1+1	
E	0	12 (70%)
F (final)	5	5 (30%)

I felt that this year there were some students with significant gaps in the prerequisite knowledge (however it isn't clearly seen in the results above). I noticed this both during the discussions and in the different reports. If this persist for the next course round I have to discuss this in-depth with the PA(s) to see if the admittance to the program(s) have changed.

Course material

Course compendium, lecture notes and the book [C.R Paul, "Introduction to Electromagnetic Compatibility"] (accessed via KTHB). Many students like the availability of the book 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 passing the course, the student should be able to

- analyse electrical systems by means of models that describe non-ideal properties of electrical components,
- apply the zoning concept on electrical systems,
- analyse crosstalk in multi-conductor systems,
- design efficient surge protection and filters,
- design efficient shielding,
- explain typical construction errors within the scope of the course.

Comments and notes:

- For this course round I had improved the ILOs which made the examination clearer and easier for me to do.
- This year I again had a study visit to Ericsson and their EMC labs in Kista. The students liked this very much.
 - Some wanted more guest lectures but this is not always easy to find.
- Lectures are, in general, very well attended and liked. As well as are the concept cases, that I use to discuss different topics are, as always, very well liked as they link the different ILOs and discussions together. Almost all student commented that they liked the mix of theory and practicality during the lectures!
- The classroom demonstration went well and was, as always, very well liked. I understood from the discussions that they really connected the experimental phenomenon to the theoretical material.
 - However, I fear that the equipment needs soon to be replaced due to old age (but as these are commercial consumer items it should be ok). I have mention this to the responsible teacher; perhaps new setup will be constructed.
- This new lab, together with the two individual home assignments now covers, more or less, the removed labs fully. I like this especially as now the students can do numerical analyses of these phenomena that I believe is more useful than experiments as the tools to do such experiments are often harder to acquire. Should be more beneficial for their future careers. :-)
 - I might extend the experimental part of the lab, as there is time for this and I felt some students wanted this (two students made a comment on this also.)
 - I added peer-review to the larger individual home assignment, along with peer-review instructions. This worked well and the students did not have so many questions on the format and I think that the quality, in the end, was improved.
- 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 and the new numerical part aided to this very well. 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, even though I, again, had to put some time to construct a new individual home assignment that it works really well now.

- As before, 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 (but still only two “F” were awarded). There was one Fx case also to consider, “For (Fx) it is required that, in a group, a maximum of 1 point reduces the result below approved score.”. One student got the Fx mark and the increased this to a “C”. From experience from last year’s exam, I added a word limitation for some of the essay questions and this went well.
- One student added that they want more on regulations/standards as this is not done in any other course! This is interesting as I had it before but removed it due to time constraint but I might add it again.
- Many students felt the individual projects were good but one said they were too hard to pick. I will make more suggestions (as I do in ei2460) for next year so it is easier to select topic.
 - One student made a comment that they wanted some “assignment help session” but there actually where in the schedule!
- I will improve some slides that I feel have become outdated and/or has bad quality (e.g. picture etc.).

Future items.

- I am (still) considering to perhaps modify from today “LAB1 3.5 Cr. (P/F)” to “LABA 1 Cr. (P/F) + INL1 1 Cr. (P/F) + INL2 1.5 Cr. (P/F)” to make it easier for the students to collect points and for me to administrate the grades but I am not sure yet.
- I am (still, since many years) considering to make all the lectures more into discussion seminars that the students have to prepare for. However, I am not sure, as the lectures are well liked and it would need some careful planning of the topics and that the students review the material before the class.
 - This might be more important now if I need to save money on the course as well as attract industry participants (that I sometimes get questions from if they can attend the course).