Course analysis – Ht2017

Electromagnetic Compatibility – EI2402 (7.5 Credits)

(For course round **Ht2017** and also valid for the majority of EI3280 (Electromagnetic Compatibility, PhD Course 8.0 credits)).

Staffing

Responsible department: Electromagnetic Engineering (EES/ETK)
Course-responsible, Lecturer: Daniel Månsson
Other teachers/Guest lecturers:
Rajeev Thottappillil (0.75 h),
Mats Bäckström (0.75 h),

Events

Lectures: 9 double-period sessions (i.e., 9*2*0.75 h = 13.5 h) approximately two per week.
Laboratory tasks: 3 (mandatory) laboratory tasks.

Lectures are in general very well attended but this might be due to the fact that it the lecture notes (that also are given at Canvas) along with the course compendium that serves as course literature.

Registered students following the course

Ht-17: ≈ 16.
15 students followed the course.

Results

The grade distribution, for TEN1 in HT2017, is given below. Only one student failed the ordinary exam. This was the second attempt at having an exam with multiple choice questions requiring motivation and using the grading systems as below and I think it works well.

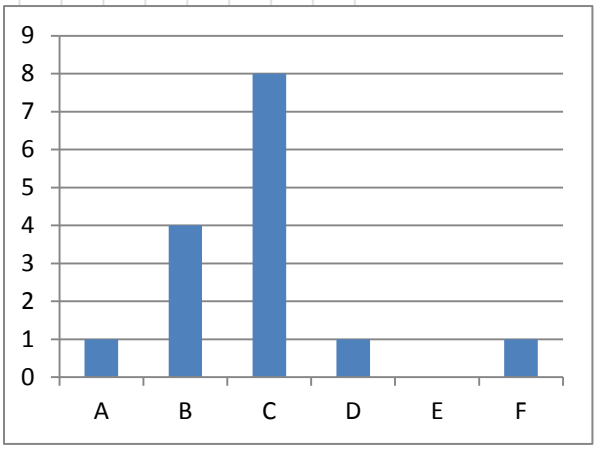
Important, the grading of the questions will be done accordingly (if nothing else is stated) to the following levels:

0 p. "*Rejected*" = no answer **or** coherent motivation given.
1 p. "*Accepted with major revision*" = the motivation/answer is missing much information.
2 p. "*Accepted with minor revision*" = the motivation/answer is missing some information.
3 p. "*Accepted*" = the motivation/answer is correct (or very nearly so).

Observe, each question consists of multiple choices and a motivation for the selected option has to be given! Without this 0 p. will be awarded.

This time the question dealing with Maxwell's equations (i.e., Faradays law) (Q3) was perhaps to hard to understand and I took this into consideration.
Note to self, it is too much work having two questions with 12 points (i.e. four motivations needed in each)!

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8
3	10	2	3	3	12	3	4
0	7	3	2	3	12	3	1
1	10	3	3	3	7	3	4
3	9		3	3	9	3	4
3	12	2	3	3	9	3	3
3	11	2	3	3	8	3	0
0	12	3	3	3	9	3	4
1	7	2	0	3	9	3	2
2	12	2	3	2	8	3	4
3	9	3	0	2	9	3	4
0	10	3	3	3	6	3	3
3	9	3	1	3	7	3	2
0	11	2	3	3	9	3	0
3	9	3	3	2	9	3	4
0	6	1	0	2	0	3	2



The exam went well, as usually does ☺, only one “F” which gives that 93% passed. I think this is so because I am very clear with what the exam will require of them so there is a red thread all through the course.

Course “moments” and points

Extract from Kopps gives the following:

LAB1	3,5 Credits	(P, F)	(mandatory)
TEN1	4,0 Credits	(A, B, C, D, E, FX, F)	(mandatory)

I feel it works well to have the labs mandatory. Even though I require them to write a “logg book” I was lenient in the formation of this. So much that next year I will have as in ei1110 that I only require them to attend AND then discuss the lab results with the lab assistant. As before, the main point is to have them stop, reflect and take note on what they see and what they do in the different exercises in the lab. I think this works well, and I believe (what the students have said to me) that they also share this view.

Course material

The big(!) book (C.R. Paul, Introduction to Electromagnetic Compatibility) is to extensive for this course and is more written as a guide for engineers and scientist. The compendium developed and used (along with my own lecture notes) is enough for the students.

Course Aims

This are extracted from the official course-plan

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:

- The cross-talk lab covers very well points 3 and 4; the shielding lab covers point 5,6 and the filter lab covers point 1 (in part),6 and 7. The point 2 is hard to cover in a lab but this is discussed quite well during the lectures and the "concept cases" I use (see below).
- Also, I trie to very strongly connect the exam questions to the labs. Basically if you did the lab you could quite easily do the exam question I think.
- I have now implement the point raised before and it works well
  "Reduce number of point in exam problems and also to grade after a system similar to the mini-exams in EI1110 (accept, accept with minor corrections, accept with major corrections, reject). This is similar to the ideas of E. Mazuur."
- Also implemented is *"Make multiple-choice questions with demanded motivation part."*

- Finally, as this year I also had ei1100-part 1 for the first time (and this took time!) I felt I could not put my heart into the course as much as I would like but this will be better next time when the EMC (ei2402, i.e. THIS) course is moved to P2.
- The LEQ course evaluation went well I think, many positive feedbacks and comments as also illustrated in the "good grade" gotten in general for the different questions.

Future changes/ideas.

- **Computer lab.** A computer lab will be excellent to illustrate the difference between ideal and non-ideal behaviour of components. There are several online circuit simulation tools that can be run directly in the web browser (e.g., Partsim, CircuitLab etc.). I have to, however, make sure it is well combined with the already existing lab to not have too much overlap.
- **More concept cases**
- **Update/Revise course compendium**, this the students also pointed out.
- **Labs.** I am wondering if I should make the labs demonstrations or shorter to be more efficient but I don't want to diminish the return from them.
- **Lectures.** I am considering make all the lectures more into seminars (with discussions) that the students have to prepare for. Thus, I do not have do the same material over and over again.