Course analysis – Ht2018

Electromagnetic Compatibility – EI2402 (7.5 Credits)

(For course round **Ht2018** and also valid for the majority of EI3280 (Electromagnetic Compatibility, PhD Course 8.0 credits)).

Staffing
Responsible department: Electromagnetic Engineering (EECS/EME)
Course-responsible, Lecturer: Daniel Månsson
Other teachers/Guest lecturers: ***not available this course round.***
~~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.

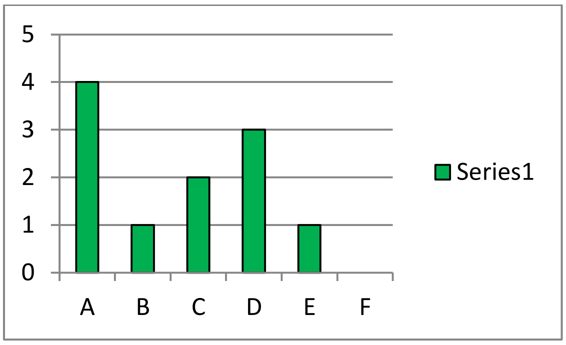
Lectures are in general very well attended but this might be due to the fact that it the lecture notes (that also are given at Canvas) along with the course compendium that serves as course literature.

Registered students following the course
Ht-18: = 17.
13 students followed the course.

Results
The grade distribution, for TEN1 in HT2018, is given below. Out of the 13 students, one did not follow the course to the end but only followed the lectures for interest and one followed ei3280 and is scheduled to take the exam at a later time. No student failed the ordinary exam. I continue to use an exam with multiple choice questions requiring motivation and using the grading systems as below and I think it still works well.

> **<u>Important</u>**, 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.

As last time it was too much work having two questions with 12 points (i.e. four motivations needed in each) so changed this.



The exam went well, as usually does, no “F” which gives that 100% passed. I still 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. **But** I will think it over if the exam is too easy.

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)

There is a problem in the future that there is no PhD student or TA to help with the course and specifically the labs.

I feel it works well to have the labs mandatory and this year I followed 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 tried 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.
- It worked better this course round when ei2402 was in P2 and did not collide with my other teaching.
- The LEQ course evaluation was a catastrophe with a low number of respondents. Next year I will hand out notes during last lecture/meeting or do it in some other documentable way. With only 3 respondents it is difficult to draw conclusions and/or make any changes in the course. But usually, the course is very well liked, which is also the impression I got from the students at the lectures.

Future changes/ideas.

- As all the content is now cowered in the video recorded for a MOOC course run by NPTEL, this will be used and lectures decreased and adapted to only feature concept cases.
- **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.). However, I have to make sure it is well combined with the already existing lab to not have too much overlap.
- **More concept cases**
- **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.