

COURSE ANALYSIS

An asterix (*) denotes non-compulsory data.

Course data

Course name	Design of Electrical Machines
Course ID	EJ2222
Credits	7.5
Time period for course	Study period 1, autumn 2019
Teachers	Oskar Wallmark
Classroom hours	32 hours (major part of work carried out outside the classroom hours)
Nr of registered students	18 (=number of students following the course)
Examination rate, in %	TBD (deadline for hand-in assignments has not yet passed)

Goals

Global course goals	After completion of the course the student shall be able to: <ul style="list-style-type: none">• Apply the theory of MMF-waves to estimate air-gap flux densities, magnetic flux, inductances, and to derive the steady-state equivalent circuit of the induction machine (IM)• Apply the theory of MMF-waves to analyze and understand limits of permanent-magnet synchronous machines (PMSMs)• Implement a finite-element (FEM) based solver in a Matlab environment to solve static and quasi static, two-dimensional magnetic problems• Use FEM-based computations to estimate different performance parameters of IMs and PMSMs• Estimate stator and rotor resistances, magnetizing inductances and leakage-inductance components for IMs and corresponding parameters for PMSMs using analytical and numerical methods• Carry out a preliminary electromagnetic sizing of an IM given a defined torque request and thermal limitations• Carry out FEM-based computations on PMSMs to extract data to implement transient PMSM models including magnetic saturation, magnetic cross saturation and the impact of harmonics• Carry out FEM-based computations to estimate the resulting temperature distribution in an electric machine of IM or PMSM type
How the course design helps fulfill these goals	The concepts are presented during the lectures and are worked with by the students in the project work.

Pedagogical development - I

Changes made since previous time course was given	The course compendium used last year was revised somewhat.
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Course evaluation; comments from students

Based on the questionnaire used at the Division.
If the course has less than 10 students, the questionnaire can be replaced by informal discussions.

Evaluation response rate*

15/18 students.

Overall student view*

- 3 students (20% of the respondents) gave the course an overall grade of 3/5, 4 students (30% of the respondents) gave the course an overall grade of 4/5. The remaining 8 students gave the course an overall grade of 5/5

- Final comments regarding the course:
 - Oscar is very kind and helpful
 - This was a good course that was needed for me, it also increased my interest in machines.
 - This course help me a lot you shouldn't miss it, especially the homeassignments.
 - According to me, this course is one of the best I ever took.
 - The slides need to have page numbers! And it would also be nice, if the equations in the slides haed the same numbers as in the book. But this is rather a detail. I find the page numbers on the slides are really necessary, to compare my notes with the slides being presented, and to see on what page we currently are. Further, it would be nice to have the book and the slides as digital version (PDF).
 - Good course

Positive comments

- What was best with the course?:
 - The projects were the best part of the course. We did the projects together. It was really nice that we discussed with our peers and progressed in the projects.
 - The encouraged work between students
 - It was practical which stimulates ne more to study the subject.
 - The homeassignments are perfect
 - Using FEMM
 - The projects were practical and very challenging which made the course more interesting.
 - That we had to measure the machines oursevels, all the simulations in FEMM and Comsol, the book
 - Getting a clearer picture of how an electrical machine functions
 - The projects were reallly interesting and the book helps a lot
 - Stimulating thinking
 - Going into details about analytical estimation of formulas

Negative comments

- What was worst with the course?:
 - The simulation time for project 3
 - The long simulation times.
 - It will be better if it includes more examples

Pre-knowledge, comments*
Course design, comments*
Literature, comments
Examination, comments
Particularly interesting* comments

- That the professor was not available during the last week of the period, because we had many questions. Alternatively or even additionally, there could have been some presence hours in the week after Period 1, because most of us were still working then, and had many questions. And also, that we had to wait one week for the results in the second hand-in. I was very nervous and thought, that the feedback would come right on Monday, as it was the case in the first handin.
 - Basically being dependent of solving the assignments in a large group, incompatibility with used computer programs
 - The lecture can be more dynamic
 - Very harsh in evaluating
 - Not many lectures
- Additional comments regarding background knowledge:
 - I feel somewhat I lack knowledged of Finite State modeling. Knowing basics about FEM would have made the course more interesting.
 - I didn't read electrical machines and drives, which is very much needed.
 - It would have been nice to recapitulate some basic equations and realations about Machines (not only theory, but what a change in current/voltage will provoke in general)
- Additional comments regarding the course book
 - The book does not have much unecessary content, which is good
 - I read the section that was relevant for the projects, some questions also directly asked about mehtod written in the book which was good.
 - The content was good but some of the relations where to deep to follow some times
 - It is very, very helpgul, especially the list of parameters in the beginning.
 - Adding an index would be helpful and save much time
- Additional comments regarding the examination
 - No comments handed in regarding the examination.
- Some interesting comments are highlighted above.

Course teacher's impressions from the evaluation

Comments

I am happy with the constructive feedback I have received.

Course teacher's summary

Overall view

Positive comments

Negative comments

View on pre-knowledge*

View on course design*

View on course material

View on examination

- I am relatively happy with the course outcome
- See above
- See above
- See above
- This course design enables participants both from PhD students from other universities (following the course EJ3222) and nearby industry which both are very important types of participants for the EES school.
- This type of examination works generally well with PhD and late year students.

Pedagogical development - II

Outcome of course changes made since last time course was given

Changes to be made before next time course is given

- Hard to determine what impact the revisions in the course literature and additional project added to the course's overall quality.
- Revising the projects to fit with the new electrical machines to be installed in the laboratory.
- Fixing smaller errors in course literature.

Other

Comments*