

## Calculations of Electrical and Magnetic Fields, 7.5 credits

Beräkning av elektromagnetiska fält, 7.5 hp

Second level

Main field: Energy Engineering AIN

Syllabus is adopted by the Research and Education Board (2015-02-24) and is valid for students admitted for the autumn semester 2014.

### Placement in the Academic System

The course is a part of Master's Programme in Renewable Energy Systems

### Prerequisites and Conditions of Admission

Bachelor's degree in Energy Engineering or equivalent.

### Course Objectives

This course will provide in-depth knowledge and experience of how thermal, electric and electromagnetic fields are calculated in electrical machinery.

The course will also provide training and skills in the application of research and training in critical use of research findings especially when used in practical application.

Following successful completion of the course the student should:

#### *Knowledge and understanding*

- Obtain current and new information about how the calculation is carried out on electrical equipment and be able to understand the mathematical background.
- Understand the importance of electromagnetic phenomena in a biological and energy-technical context.

#### *Skills and Abilities*

- Implement an analysis, and perform electromagnetic calculations in different contexts.
- Document and present findings and results.

#### *Judgement and approach*

- Evaluate the technical development and research in a larger scientific context.
- Critically evaluate own and others' results and relevance for the area.

### Primary Contents

Calculation of electromagnetic fields in electrical machines is a useful course for engineers who intend to work with electrical machinery. The course will be present the mathematical foundations of modern computer-based calculations tools. These computer programs can also be used for calculations of electrical, thermal and engineering problems that require solutions of large coupled differential equations. Parts of the course will be devoted to practical exercises in a project. Different methods to solve stationary and time-dependent problems will be highlighted. Current research will be presented.

### Teaching Formats

The course includes lectures, exercises and laboratory tests as well as study visits.

The course includes a major project to be presented both in a written report and orally at a seminarium. Examples of a project that is relevant is the calculation and design of electromagnets.

### Examination

The overall grades of Fail, 3, 4 or 5 will be awarded for the course.

The examination consist of an written examination.

### Course Evaluation

Course evaluation is part of the course. This evaluation should offer guidance in the future development and planning of the course. Course evaluations should be documented and made available to the students.

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## Course Literature

(Revised 2015-02-19)

Ferrari, L., Silverster,P. //Finite Elements for Electrical Engineers”, Cambridge Books, 1996

Additional exercise papers