EI2455 Smart Electrical Networks and Systems 7.5 credits

Smarta elektriska kraftnät och system

This is a translation of the Swedish, legally binding, course syllabus.

If the course is discontinued, students may request to be examined during the following two academic years

Establishment

Course syllabus for EI2455 valid from Spring 2019

Grading scale

A, B, C, D, E, FX, F

Education cycle

Second cycle

Main field of study

Electrical Engineering

Specific prerequisites

Basic courses within electrical engineering

EJ1200 Electric Power Systems
EG2020 Power systems, basic course
EJ2301 Power Electronics
or corresponding knowledge.

Language of instruction

The language of instruction is specified in the course offering information in the course catalogue.

Intended learning outcomes

After being approved for all parts of this course the student should be able to

- describe the benefits and business opportunities that a smart grid will address
- develop models for the impact of local generation on the voltage variations in a system
- describe the innovation process of a product development project
- analyze the influence of fast measurements and data acquisition on control and automation properties of the electric power network
- present the recent findings about smart electrical networks
- judge the needs and business opportunities from a system perspective that future's electrical networks must have
- understand the different methods with which local generation can be installed in the power system
- be aware on where and how information control systems and monitoring/diagnostic systems can be implemented in the power grids;

Course contents

In the course Smart Electrical Networks and Systems you will apply your electrical engineering competence on projects that are of high relevance in the field that is called 'smart grids'. You will also get the basic concepts on evaluating the business potential of different technical innovations.

Module 1 and project 1: Smart Grids as a concept.

Module 2 and project 2: Integration of renewable energy into the electric power grid. Analysis of the influence of the design of the electric power system on all voltage and and power levels. The impact of an increased amount of fluctuating energy sources, such as wind- and wave-power. Different principles of Energy Storage.

Module 3 and project 3: The smart electric power grind on consumption level.The impact of ICT solutions on the smart electric power grid. Influence of own electricity generation, electricity generation etc.

Module 4 and project 4: HVDC super grids. Power transmission and distribution with HVDC.

Disposition

The course is organized into four different modules that will run at different times over the year. In relation to each course module you need to perform a project that will illuminate different concepts.

Course literature

J. Ekanayake, et al, SMART GRID, Technology and Applications, Wiley, 2012. (E-book)

Stuart Borlase (ed), Smart Grids, Infrastructure, Technology, and Solutions, CRC Press 2012 (E-book)

Distributed articles etc

Examination

- ASS1 - Homework Assignments, 3.0 credits, grading scale: P, F
- PRO1 - Project, 4.5 credits, grading scale: A, B, C, D, E, FX, F

Based on recommendation from KTH's coordinator for disabilities, the examiner will decide how to adapt an examination for students with documented disability.

The examiner may apply another examination format when re-examining individual students.

Other requirements for final grade

Project 1 (4 projects), PRO1, 4,5p

Assignments(4 home assignments), ASS1, 3p

Ethical approach

- All members of a group are responsible for the group's work.
- In any assessment, every student shall honestly disclose any help received and sources used.
- In an oral assessment, every student shall be able to present and answer questions about the entire assignment and solution.