EG2121 FACTS and HVDC in Electric Power Systems 7.5 credits

FACTS och HVDC i elkraftsystem

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

Establishment

The official course syllabus is valid from the spring semester 2027 as decided by the director of first and second cycle education. Decision date: 2026-10-14

Grading scale

P, F

Education cycle

Second cycle

Main field of study

Electrical Engineering

Specific prerequisites

Knowledge of power electronics, 6.0 credits, corresponding to the completed course EJ2301.

Knowledge of electric power system stability and dynamics, 7.5 credits, corresponding to the completed course EG2110. Active participation in EG2110 during study period 3 of the same semester is considered equivalent to having completed the course. Students who are registered are expected to participate actively and are considered to be doing so.

Intended learning outcomes

After passing the course, the student shall be able to

1. create basic mathematical models for controllable devices (FACTS and HVDC) and apply different control strategies to these controllable devices

2. regulate voltages and power flow in electric power systems on the basis of these mathematical models and control strategies

3. both orally and in writing present and explain the results of a project in which the impact of controllable devices on power system stability and damping will be analysed.

Course contents

FACTS (Flexible AC Transmission System) and HVDC (High Voltage Direct Current) transmission are power electronics-based devices whose functions are to enhance the capacity, security and flexibility of power transmission systems. Application of these devices to power systems implies an enhancement of transient and voltage stability, increase of power oscillation damping (POD) and improvement of power flow under normal operations or post-fault conditions. The course presents basic mathematical models and control strategies for being able to analyse, how these devices affect power system stability. Most part of the analysis is dedicated to POD which is the main topic of this course. A part of the course shows how one uses the most important functions in the necessary software.

Examination

- PRO1 - Projet work, 7.5 credits, grading scale: P, 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.

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

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.