EG2130 Communication and Control in Electric Power Systems 7.5 credits

Kommunikation och styrning i elkraftssystem

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

Establishment

The official course syllabus is valid from the spring semester 2024 in accordance with head of school decision: J-2022-2176.Date of decision: 09/10/2022

Grading scale

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

Education cycle

Second cycle

Main field of study

Electrical Engineering

Specific prerequisites

Knowledge in analysis of electric power system, 6 higher education credits, equivalent to completed course EG2100. Knowledge in automatic control, 6 higher education credits, equivalent completed course EL1000/EL1110.

Language of instruction

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

Intended learning outcomes

After passing the course, the student should be able to

- describe operational states in an electric power system
- analyse the need of system and ancillary services for voltage and frequency control in electric power system
- analyse the need of automation and supervision functions to ensure operational reliability in electric power system
- analyse the need of information exchange and communication for automation and supervision in electric power system
- design local systems for automation and protection in stations in an electric power system so-called substation automation systems
- design systems for system wide supervision and control of electric power system so-called SCADA/EMS systems
- describe risks with cybersecurity in communication and control in electric power system

in order to ensure optimal and safe operation of electric power system with high penetration of renewable power production.

Course contents

Modern electric power system with a large amount of power generation that comes from varying renewable sources such as wind and solar set new requirements on control and supervision to maintain operational reliability. The course is based on the different operation states in an electric power system and how frequency -, and voltage control are used to ensure the operational reliability. Here, particularly emphasis is on how electric power systems with large amount of renewable generation puts demands on ancillary services for maintained operational reliability and how such support services can be implemented. This constitutes the first module of the course.

Thereafter, based on these fundamental control functions, functions in local control systems such as protection, voltage adjustment and automation discussed both regarding the function of the control systems and their communication and information exchange. Finally, in the third course module, the central control systems for operation supervision and central control that is used system wide over the whole electric power system is treated. Here, a shorter item on cybersecurity is also included.

Examination

- DAT1 - Computer assignment, 2.5 credits, grading scale: P, F

- INL1 - Hand-in assignment, 2.5 credits, grading scale: P, F
- INL2 - Hand-in assignment, 2.5 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.

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.