



EG2140 Computer Applications and Machine Learning in Electric Power Systems 7.5 credits

Datortillämpningar och maskininlärning 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-2022-2175. 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 communication and control in electric power system, 6 higher education credits, equivalent completed course EG2130.

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

- develop and implement algorithms for physical modelling, static analysis of electric power system and state estimation in electric power system
- describe preconditions and advantages and disadvantages of physical and data-based methods for static analysis of electric power system
- develop and implement data-based algorithms for identification of static states in electric power system
- develop and implement data-based algorithms for time series analysis of measured values in electric power system

in order to optimise operation and planning of electric power system with high penetration of renewable power production with maintained high reliability.

Course contents

The course gives a good basis in development of algorithms to solve different types of problems in electric power system based on both physical modelling and data-based methods. The course is divided into three modules, and the use of the programming language Python and a set of code libraries for the analysis of electric power system is common to all modules. The first module is based on a physical modelling perspective and the assignment is to analyse the topology of an electric power system and develop a state estimator. Module two extends the challenge, but here the method is instead data-based, and methods in machine learning such as decision trees, k-means and kNN be introduced. The third and final module includes analysis of time series with measured values for the analysis of production and consumption data in electric power system where the methods from module two are supplemented by additional contents adapted for the analysis of time series.

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.