EI2452 Reliability Evaluation of Electrical Power Systems 7.5 credits

Tillförlitlighetsanalys för elkraftsystem

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

Establishment

On 2021-10-14, the Head of the EECS School has decided to establish this official course syllabus to apply from spring semester 2022, registration number J-2021-1915.

Grading scale

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

Education cycle

Second cycle

Main field of study

Electrical Engineering

Specific prerequisites

Completed course SF1920 Mathematical Statistics, or equivalent course on at least 5 higher education credits.

Completed course of at least 6 higher education credits in power engineering, for example EG2100 Power System Analysis, EG2200 Power Generation Operation and Planning, EH2741 Communication and Control in Electric Power Systems, EI2436 Power Grid Tech-

nology and Substation Design and EJ2301 Power Electronics or EJ2201 Electrical Machines and Drives, or equivalent experience.

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 shall be able to

• describe the fundamental definitions and concepts for reliability assessment

• analyze a system and its components using the following techniques for reliability assessment: network modelling for the analysis of systems of independent components (including effect of redundancy), methods for identification of component importance, Markov modelling, lifetime models

• analyze an electrical distribution system with the above described methods with tools such as, e.g., NEPLAN

• describe how reliability is treated in the regulation

• carry out a life cycle cost analysis LCC (Life Cycle Cost)

• integrate sustainability and resilience impact in asset management decisions.

• formulate a reliability centred maintenance plan following so called Reliability Centered Maintenance, RCM, and give an account of the more advanced method Reliability Centered Asset Management, RCAM.

in order to be able to use reliability analysis as a tool for decision support at development, operation and maintenance of electric power systems.

Course contents

The course covers quantitative methods to analyse and prevent risks of failure in electric power systems, and demonstrates practical examples.

The teaching is concentrated to three course components and a final seminar. The different course components have the following focus:

• Models: basic methods and techniques

• Analysis: input data, approximate methods and tools

• Results: cost efficient strategies and instruments for economic incentives. The following activities are part of the course:

• Work with project assignment individually or in pairs. The problem formulation should relate to a real situation and preferably connected to your area of work/studies, written report.

• Lectures where different methods for reliability analysis are presented and examples of application are shown for electric power systems.

• Guest lectures where invited speakers from the industry demonstrate results where reliability analysis have been used.

Examination

- PRO1 - Project work, 4.5 credits, grading scale: P, F
- TEN1 - Exam, 3.0 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.