



EI2452 Reliability Evaluation of Electrical Power Systems 7.5 credits

Tillförlitlighetsanalys för elkraftsystem

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 EI2452 valid from Spring 2019

Grading scale

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

Education cycle

Second cycle

Main field of study

Electrical Engineering

Language of instruction

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

Intended learning outcomes

After completed course the students should be able to use reliability assessment as a tool for decision support for planning and operation of the electric power system. After the course is completed, the participants have gained knowledge 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
 - Component importance techniques
 - Markov modelling
 - Lifetime models
- Analyze an electrical distribution system with the above described methods tools such as NEPLAN
- Describe how reliability is treated in the regulation.
- Formulate an Life cycle cost model (LCC)
- Formulate a reliability centred maintenance plan following fundamentals of RCM and knowledge in more advanced methods like RCAM.

Course contents

This course is about utilizing quantitative methods to analyze and prevent risks of failure in electrical power systems, and shows on practical examples.

The lectures are concentrated to three parts, and a final seminar. The course parts includes the following areas of attention:

- Models; basic methods and techniques
- Analysis; input data, approximative methods and tools.
- Results; cost efficient strategies and 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 presenting different methods for reliability analysis in electric power engineering.
- Guest lectures with speakers from the industry, showing on results of reliability analysis.
- Computer laborations that exercise the application of methods and tools that are presented in the course.
- Written examination, testing reached knowledge and abilities in the methods taught in the course, one examination in classroom and one home exam.
- Seminar with oral presentation of projects as well as opposition to projects. Participation is mandatory.

Disposition

The course is offered in three main blocks, with each block consisting of a number of consecutive with lectures, online teaching and/or computer laborations. Between the blocks there are breaks for selfstudies. The course ends with a seminar day and final adjustments of reports.

Specific prerequisites

Completed course SF1920 Probability Theory and Statistics, or equivalent course of at least 5 credits.

Completed course of at least 6 credits in electrical engineering, eg EG2100 Power System Analysis, EG2200 Power Generation Operation and Planning, EH2741 Communication and Control in Electric Power Systems, EI2436 Power Grid Technology and Substation Design, EJ2301 Power Electronics or EJ2201 Electrical Machines and Drives, or equivalent experience.

Course literature

C. J. Wallnerström, P. Hilber, Reliability Analysis and Asset Management Applied to Power Distribution, March 2014.

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.

Other requirements for final grade

For passing grade in the course the following is required:

PRO1, 4.5 credits:

- Approved project assignment, written and oral presentations.
- Approved laboratory work, including attending laboratory exercises and written laboration reports.

TEN1, 3 credits:

- Approved examination, divided into two occasions.

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.