



EI2451 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 EI2451 valid from Autumn 2007

Grading scale

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

Education cycle

Second cycle

Main field of study

Electrical Engineering

Specific prerequisites

Language of instruction

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

Intended learning outcomes

The course is aimed to you that want to perform reliability assessment for electrical power systems. The goal for the course is to give the participants knowledge on how to use reliability analysis as a tool for decision support during design, operation and maintenance of electric power systems. The application studies are focused on electrical distribution systems.

The course shall give knowledge in using reliability assessment as a tool for decision support for planning and operation of the electric power system. After completed course the participants shall achieved knowledge to:

- Describe the fundamental definitions end concepts for reliability assessment
- Analyze a system 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 using the RADPOW and NEPLAN tools
- Knowledge on how reliability is treated by the network performance assessment model (NPAM).
- 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.

Formulate an optimization problem for maintenance planning and propose solution approach.

Course contents

The education is concentrated into three parts, of each three full days, and one day with final presentations. The three course parts have the following different

focuses;

Part 1 Models problem formulation and basic methods and techniques.

Part 2 Analysis: input data, approximate methods and tools.

Part 3 Result: cost efficient strategies and economic means of control and maintenance management

The following activities are included in the course:

- Work with the project task. The problem formulation for the project task shall be related to practical examples.
 - Lectures where methods for reliability analysis are presented with examples for electrical power system applications.
 - Guest lectures with speakers from the electrical power industry which shows on reliability assessment used in practice.
 - Home assignments which gives exercises on the introduced methods in Part 1.
 - Computer labs which give practice on methods and tools introduced in the course.
 - Written exam which tests knowledge in the different the goals for the course.
- Seminar with oral presentation of the own project, and being opponent on other project.

Course literature

- Course compendium with lecture notes, reports, papers, exercises, material from mathematics statistics etc.
- Hoyland A., Rausand M., System reliability theory - models and statistical methods, Wiley Series, 2004
- Roy Billinton and Ron Allan, Reliability Evaluation of Power Systems, Plenum press, 1996.

Examination

- PRO1 - Project, 4.5 credits, grading scale: P, F
- SEM1 - Seminar, - credits, grading scale: P, F
- TEN1 - Examination, 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.

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.