



T-867-STAB STABILITY AND CONTROL IN ELECTRIC POWER SYSTEMS

8 ECTS

Year of study: First year.
Semester: Spring.
Level of course: 5. Second cycle, intermediate.
Type of course: Core in MSc Electric Power Engineering, elective in other programmes.
Prerequisites: T-867-POSY Power System Operation
Schedule: 6 teaching hours a week for 12 weeks.
Supervisor: Ragnar Kristjánsson.
Lecturer: Hjörtur Jóhannsson.

Learning outcome: A student who has met the objectives of the course will be able to:

Knowledge:

- Explain the principal causes of power system stability problems (frequency, transient rotor angle, small-signal rotor angle and voltage stability problems);
- Reflect on how the power system stability problems are affected by grid related limitation for the transfer of active power and the machine related limitation for the injection of active and reactive power;

Skills:

- Apply the mathematical model of the synchronous machine to analyze it under stationary and transient conditions;
- Explain the key concepts for primary frequency control in power systems and reflect on how inertia, loads' frequency dependency and regulation constant influence the system's frequency response ;

Competances:

- Analyze rotor angle small-signal stability problems by applying small-signal analysis;
- Analyze transient stability problems and describe means to protect the system against transient stability problems;

Content: To obtain knowledge about conditions in electric power systems that can lead to stability problems, to understand which physical mechanisms are the cause of power system instability, and to give the student insight in the theoretical background for analysis methods used for assessment of system stability. Hands-on experience will be obtained by carrying out numerical simulations and analysis in Matlab/Python, where students analyse different stability problems implementing and applying appropriate models and methods for analysis.

Reading material: *Power System Stability and Control*, Prahba Kundur, 1994.

Teaching and learning activities: Lectures and practical sessions.

Assessment methods: The students will work on four hand-in assignments throughout the semester. The hand-in reports form the basis for the evaluation of their performance during the semester.

Language of instruction: English.

All course descriptions may be subject to change. Revised information on the course schedule, reading material, teaching and learning activities, and assessment methods will be introduced in the learning management system Canvas at the beginning of the semester.