



## Course Memo

### EG2110 Power System Stability and Control (7.5 credits)

#### VT23

This course deals with advanced methods for analysis of power system dynamic, stability and control. Different power system instabilities will be presented and discussed. Furthermore, different control algorithms for improving power system stability will be presented.

#### Intended Learning Outcomes (ILOs)

In order to successfully complete this course, students should be able to:

- ILO1. create mathematical models for describing power system dynamics,
- ILO2. based on the derived mathematical models, apply different basic methods to
  - a) study and analyze the basic concept of the presented types of power system instabilities,
  - b) improve power system stability based on basic control algorithms,
  - c) describe and analyse effect of integration of renewable energy on power system dynamics and stability,
- ILO3. numerically perform ILO2 by using MATLAB, and present and discuss obtained numerical results.

#### Prerequisites

- Knowledge in analysis of electric power system and load flow calculations, equivalent to course EG2100.
- Knowledge in automatic control, equivalent to course EL1000/EL1110.
- Knowledge in numerical methods and basic programming, equivalent to course SF1519.

#### Course structure

The course includes lectures, project work hours, and examination. During the project work hours, the teaching assistants will be available to assist the students with the assignments. Please note that teaching assistants will only be available during the project work hours.

#### Course staff

<b>Course coordinator</b>	<b>Lecturer and examiner:</b>
Angel Clark ( <a href="mailto:angcla@kth.se">angcla@kth.se</a> )	Mehrdad Ghandhari ( <a href="mailto:mehrdad@kth.se">mehrdad@kth.se</a> )
<b>Teaching assistant:</b>	
Angel Clark ( <a href="mailto:angcla@kth.se">angcla@kth.se</a> )	Anton ter Vehn ( <a href="mailto:antontv@kth.se">antontv@kth.se</a> )

## Code of honor

In this course, the EECS code of honor applies, see:

<http://www.kth.se/en/eecs/utbildning/hederskodex>

## Disability

If you have a disability, you may receive support from Funka, KTH's coordinator for students with disabilities, see <https://www.kth.se/en/student/studentliv/funktionsnedsattning>.

Please inform the course coordinator if you have special needs not related to the written exam, and show your certificate from Funka.

- Support measures under code R (i.e. adjustments related to space, time, and physical circumstances) are generally granted by the examiner.
- Support measures under code P (pedagogical measures) may be granted or rejected by the examiner, after you have applied for this in accordance with KTH rules. Normally, support measures under code P will be granted.

## Course literature

- Stability of Power Systems, An introduction
- Power System Stability and Control, Exercises

The course literature is available in Canvas.

## Canvas

Canvas is an electronic communication platform that we use in the course, where you can find copies of lecture slides, projects, schedule, MATLAB files, etc. Canvas is also the platform where you electronically submit (upload) your reports.

## B-number

A unique identification number, called **B-number**, will be given to each student. This B-number will be used as your identification in this course. In order to get a B-number, you have to be registered for the course. You receive your **B-number** by sending an email to the course coordinator. Write B-number in the "subject" of your email, and your name and your KTH email address in the body of your message.

## Examination

The course examination consists of the following.

- E1.** Four assignments namely, D1, D2, D3 and D4 which will be presented in a written report, respectively. Each report must be submitted by the given deadline.
- E2.** A scheduled oral presentation (**OP**) of one of the passed reports. Only D1, D2 and D4 are considered for the oral presentation. The course staff select the report to be presented.
- E3.** After marking the reports or after the oral presentation (OP), the course staff may ask you for an individual meeting to clarify and explain the solutions of the passed report(s). Therefore, the obtained grades in **E1** must be considered as preliminary since a failed explanation/clarification results in a failing grade (**F**) for the corresponding report(s).

## Grading criteria

The grades used for assessing the criteria are

- **P or F for OP.**
- **1p., 2p. or F for D3.**
- **1p., 2p., 3p. or F for D1, D2 and D4, respectively.**

The following criteria will be applied to the oral presentation (**OP**) and the assignments.

### OP

- Grade **P**:
  - ✓ Presentation shows a good understanding of the topic of the assignment.
  - ✓ The presentation guidelines (see the file OP-guidelines.pptx) are followed.
  - ✓ Presentation is completed within the given time limit.
- Grade **F**:
  - ✓ If the conditions for grade **P** are not met **or** if you do not attend the scheduled OP-session.

### Assignments

The assignments consist of two (D3) or three parts (D1, D2 & D4), namely **Part 1**, **Part 2** and **Part 3**. For each part, the following criteria will be applied,

- Grade **P**:
  - ✓ Solutions show a good understanding of the topic of the **Part**.
  - ✓ All numerical answers are correct, however a very few ***insignificant*** mistakes in the non-numerical answers (such as explanation or derivation) can be accepted.
  - ✓ The requirements for written report are met.
- Grade **F**:
  - ✓ If the conditions for grade **P** are not met **or** if the assignment is not submitted by the given deadline.

Furthermore,

1. For each passed part, **1 p.** is earned.
2. To pass an assignment, a grade **P** (i.e. **1p.**) in **Part 1** is required.
3. **Part 2** and **Part 3** will be marked if **Part 1** has been passed.

## Final grade

In order to successfully complete this course and to earn 7.5 credits, the following necessary requirements (NR) must be fulfilled.

**NR1.** You have passed all assignments, i.e. at least a grade **P (1p.)** in **Part 1** of each assignment.

**NR2.** You have passed **OP**.

**NR3.** The necessary requirements **NR1** and **NR2** are met during the current academic year, i.e. passed **OP** or reports from previous academic years will not be accepted.

The table below shows the course final passing grades providing that **NR1-NR3** have been met. The points are based on the total earned points from the assignments.

Total earned points	Grade
10-11	<b>A</b>
9	<b>B</b>
7-8	<b>C</b>
5-6	<b>D</b>
4	<b>E</b>

#### **Grade FX:**

1. If you receive grade **FX** in **Part 1** of an assignment, you will be offered a new opportunity to revise this part. The course examiner will inform you when and where to submit the revised **Part 1**.

#### **Re-examination**

1. If you receive grade **F** in **OP**, you will be offered a new opportunity to perform your **OP**. The date and time for this extra **OP** will be scheduled by the course examiner.
2. If you receive grade **F** in an assignment, you may resubmit the assignment **but only Part 1, i.e. the other part(s) will not be marked and you will earn max 1 p. if the assignment is passed.** The course examiner will inform you when and where to resubmit the assignment(s).

#### **Improving passing grade**

A passing grade cannot be improved.

#### **Plagiarism**

All the reports will be checked for plagiarism, and if the plagiarism of text, code, or figures is found then strict action will be taken against the corresponding student, based on KTH rules.

For more information regarding plagiarism, please visit [Cheating and plagiarism | KTH](#)