

# Power System Analysis

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Assistants	<a href="#">Hubert Abgottspon</a> <a href="#">Theodor Borsche</a>
Date	Wed 13-17, ETZ E 6
Hours/Credit points	6 credits
Type	Core subject
Course number	227-0526-00

## Subject

Stationary processes of electrical power transmission, deduction of stationary models of components of power networks, formation of the system of equations and its special characteristics and solution methods.

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## Contents

The electrical power transmission system, the network control system, requirements for power transmission systems (supply, operation, economics), network planning and operation management, models of N-port components (transmission line, cable, shunt, transformer), data specification per unit (p.u.), Linear Modelling of networks, Linear and non-linear calculation (NewtonRaphson), non-linear load flow (specification and solution methods), threephase and generalized short circuit current calculation, further applications of load flow calculation. Introduction to dynamics and stability in power systems. Rotor angle and voltage stability. Equal area criterion. Control of power systems.

- Precondition: [Electric power systems](#) (recommended)

Download of [PowerWorld Simulator](#) demo version.

Run [swingdemo.m](#)

**Lecture Notes:** [pdf](#). Available also at [SPOD](#)

**Lecture Plan:** [pdf](#).

## Reference books

Bergen, A. R., and V. Vittal, Power System Analysis

Prabha Kundur, Power System Stability and Control

## Useful Material

[The anatomy of a power grid blackout - Root causes and dynamics of recent major blackouts](#), Pourbeik, P., Kundur, P.S., Taylor, C.W.

[Keeping the lights on and the information flowing](#), Kirschen, D., Bouffard, F.

## Exercise schedule

Exercise	Topic	Available	Exercise session	Deadline, Fri 17:00
<a href="#">Set 1</a>	Power flow computation	28.9.2011	5.10.2011	7.10.2011
Set 2	Power flow computation	12.10.2011	12.10.2011	14.10.2011
Set 3	Short circuit currents I	19.10.2011	26.10.2011	28.10.2011
Set 4	Short circuit currents II	26.10.2011	2.11.2011	4.11.2011
Set 5	Synchronous machine	2.11.2011	9.11.2011	11.11.2011
Set 6	Stability I	9.11.2011	16.11.2011	18.11.2011
Set 7	Stability II	16.11.2011	23.11.2011	25.11.2011
Set 8	Voltage stability	23.11.2011	30.11.2011	2.12.2011

### Lecture Slides

21.09.2011 Chap. 1 - 4

28.09.2011 Chap. 5 -6

05.10.2011: Numerical Methods for Loadflow calculation

19.10.2011: Short Circuit Current Calculations

19.10., 26.10. and 02.11.2011: Dynamics, part I

16.11., 23.11. and 30.11.2011: Dynamics, part II

21.12.2011: Repetition

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### Exercises Task




Set 1

Set 2

Set 3

Set 4



- Set 5 
- Set 6 
- Set 7 
- Set 8 