



**CHALMERS**  
UNIVERSITY OF TECHNOLOGY



**Solvina**

**Course duration**  
**5 days**

**2 seats with**  
**scholarships for**  
**Ph.D./M.Sc. students**



**Course 2021 – 4.2/5**



**Course 2022 – 4.5/5**

FOR INDUSTRY  
PROFESSIONALS AND  
Ph.D./M.Sc. STUDENTS

# Power System Stability

Chalmers University,  
Gothenburg.

21<sup>st</sup> – 25<sup>th</sup> August 2023

**UNIQUE OPPORTUNITY**

**MIX THEORY AND PRACTICE**



**SIGN UP  
TODAY!**

This course will provide a unique opportunity for engineers in the power industry to undertake a comprehensive and in-depth study of important areas of power system. The aim is to bridge the gap between theoretical and practical concepts by combining theoretical lectures with lab experiments.

# The Course

The course is a mix of theoretical lectures coupled with laboratory demonstrations. The course covers following major areas,

- **Power System and Control Theory (basics):** Swing equation and power transfer equations, modeling of grid and synchronous machines, Laplace transforms and block diagrams, PID control and tuning, analysis in frequency domain and stability criteria.
- **Stability issues:** Theory on types of stability – Transient, Voltage and Small Signal. *Lab demonstrations of Voltage and Transient stability with different grid conditions.*
- **Active power and frequency control:** Theory on frequency stability, droop control, different prime movers and governors and overall power plant process impact. *Lab demonstrations of frequency stability, governor testing and tuning, impact of droop and different prime movers.*
- **Testing and tuning of AVR:** Theory of voltage control on synchronous machines, different excitation systems and their properties, AVR test methods. *Lab demonstrations of control response of AVR, AVR testing and tuning practices and impact of types of exciters.*
- **Testing and tuning of PSS:** Theory of electromechanical oscillations and damping, PSS (Power System Stabilizer) principles, different types of PSS, PSS tuning and testing. *Lab demonstrations of Small Signal Stability, PSS testing and tuning.*

The lectures are scheduled **8:00–17:00** for all five days. The first day starts with registration between **8:00–8:30**.

## Audience

The course is directed towards grid operators, network & system planners from the transmission industry, as well as engineers and management in power generation industries. Participants attending the course will enhance their understanding of theory and practice of system stability & control, and mitigation of system oscillations after contingencies. The course will provide the participants a good understanding of the fundamentals of the topic.

A holistic approach  
– lasting solutions



**Power**



**Analysis**



**Design**



**Measurement**



**Management**



**Process**

**“More than 25 years of  
experience in the field  
of Power System  
testing and tuning”**

**Solvina** has more than 25 years of experience working with power generating utilities, industrial facilities, wind power, and other power system segments from commissioning small control circuits to complete control strategy redesign to make substantive improvements in existing systems & processes, and provides support for the planning, construction and operation of new installations.

Combining vast experience in the field of Power Systems with practical illustrations, Solvina in co-operation with **Chalmers University** offer this course on ‘Power System Stability’. The course covers theoretical lectures coupled with laboratory demonstrations in the premises of Chalmers University giving the participant a unique opportunity to gain real understanding and knowledge about Power System Stability.





**WHAT IS INCLUDED**

The course fee includes course material for all participants. Lunch and light snacks during morning and afternoon breaks for on-site participants. All on-site participants are invited to a welcome dinner held after the first day of the course.

Last day to register:

# 07<sup>th</sup> July

**REGISTRATION** is done via our website,  
<https://www.solvina.com/courses-power-engineering/>.

Registration can also be made directly to course administrator: Jaidev Oza/Christian Ekstrand at [education@solvina.com](mailto:education@solvina.com), +46 031-709-63-13. The number of participants is limited.

**SIGN UP TODAY TO SECURE YOUR PLACE!**

**THE COURSE FEE** (excluding VAT) for,

- **ONLINE** participation (via MS Teams) is 28,000 SEK
- **ON-SITE** participation (at Chalmers) is 33,000 SEK
- **Ph.D./M.Sc. STUDENTS** participation is free for up to two students. For the rest, fees apply as indicated for both Online and On-site course fees. Register [here](#) to apply for educational scholarship.

**LANGUAGE** the course language will be English.

**THE COURSE LOCATION** is Fredric Lamm Conference Room, Hörsalsvägen 11, Chalmers University of technology in central Gothenburg, 412 96 Gothenburg, [www.chalmers.se](http://www.chalmers.se).

## Other information and conditions

**CONFIRMATION** within one week of registration, a confirmation will be sent to the email address you have entered. The number of participants is limited and if the course is full, you will be queued.

**PAYMENT** The course is invoiced and shall be paid before start of the course.

**CANCELLATION TERMS** If you cannot participate, you are allowed to transfer the registration to another person at the same company free of charge. Registration is binding. Solvina reserves the right to cancel the course until 2 weeks before the start. All the notified will be informed and Solvina shall not be held responsible for any damage.

**ACCOMMODATION** is not included in the course fee. Solvina will be happy to help with your hotel booking if desired.

**FORCE MAJEURE** Solvina AB is not obliged for damages caused by Swedish or foreign law, Swedish or foreign authority, war, strike, blocking or similar circumstances, and shall not be held responsible for damages if all or part of the course time is not carried out due to illness.





**Satisfied participants provided high praise and satisfactory testimonials for previous Power System Stability courses. Here are a few examples:**

*"All topics covered in the course were relevant and essential for myself to perform in my daily work."* – Course 2022 participant, **Lauri Kauppi, Wärtsilä.**

*"The content is rich in practical examples and measurements, which is a big plus for all of us who work in science and education. A special plus is that the material covered is up to date with current trends in development and application."* – Course 2022 participant, **Ružica Kljajić, Faculty of Electrical Engineering, Computer Science and Information Technology Osijek.**

*"The course has discussed the important aspects of power system stability as well as demonstrated it in the lab"* – Course 2022 participant, **Anthony F. Lacastesantos, National Grid Corporation of the Philippines.**

*"Bengt was very clear during his lectures. He is extremely prepared on the topics he presented during the course. It was a pleasure to attend!"* – Course 2021 participant, **Pozzi Fabio, CESI.**

*"A good and helpful course giving a very practical view on the content. Content matches the lecturer's experience well."* Course 2021 participant.

Mr. Bengt Johansson, a power system expert and lecturer for the course, demonstrates damping in power system using the spring-mass theory.

### Power Oscillation Damping

...but the spring can be manipulated  
 • Moving back (lower speed, decreasing  $\delta$ ) – weaker spring

