



Electric Energy Systems University Enterprise Training Partnership (EES-UETP)

<https://www.comillas.edu/ees-uetp/>

HVDC technology and HVDC grids

Stockholm, November 17-19, 2025
Location: KTH, Gradängsalen
Teknikringen 1
SE-100 44 Stockholm Sweden

[Map Link](#)

Nearby rooms available for work and meetings



Important information

- Students have to bring their own laptop for the practical sessions
- For different sessions, Matlab & Simulink v2021a or newer is required
- It will be possible to work in groups for those students without license or without computer
- For practical session 1, Julia is going to be used, see documents attached, questions to Giacomo Bastianel giacomo.bastianel@kuleuven.be. Julia can be freely downloaded from <https://julialang.org/>
- For practical session 2, Matlab & Simulink v2021a or newer is required, see documents attached, questions to adria.junyent-ferre@imperial.ac.uk
- For practical session 3, Matlab & Simulink v2021a or newer is required, see documents attached, questions to ilka@kth.se
- A 30-day trial license of Matlab and Simulink can be freely downloaded from: <https://se.mathworks.com/campaigns/products/trials.html>

Dinner

Monday, 17th November, 19:00 in the KTH Reactor Hall (dress warm).

Organizers

- KTH Royal Institute of Technology, Sweden
- CITCEA-UPC, Technical University of Catalonia, Spain
- Technical University of Denmark, Denmark
- KU Leuven, Belgium

Coordinators

Dr. Staffan Norrga (KTH Royal Institute of Technology)
Dr. Ilka Jahn (KTH Royal Institute of Technology)
Prof. Oriol Gomis-Bellmunt (Technical University of Catalonia)
Prof. Nicolaos A. Cutululis (DTU)
Prof. Dirk Van Hertem (KU Leuven)

Description of the course

HVDC transmission is being considered as key driver to enhance the energy transition worldwide. The rapid development of offshore wind power, especially in North Sea, is favoring –and is also favored by – development of DC transmission. Based on the development of modern conversion technology (voltage source converter) the plans for the interconnection of multiple renewable power sources, loads and AC grids through DC technologies are leading to an exciting transmission concept: HVDC grids.

HVDC grids and Supergrids have sparked so much interest that researchers and engineers across the globe are talking about them, studying them, supporting or questioning them. The main motivation of this course is to present a complete picture of HVDC grid technologies and offshore wind power by collecting and summarizing recent technological advances, academic research development and engineering applications.

The course is conducted in three days covering various aspects of HVDC technology, HVDC grids applications including offshore wind, HVDC systems operations and control, and protections. The course consists of lectures, hands-on exercises and live Q&A sessions with the lecturers. All lecturers are internationally recognized experts in the area and they come from both academic and industry.

The course covers the overall spectrum regarding HVDC technologies, including:

- (1) the advantages of HVDC compared to AC technologies for power transmission;
- (2) the key technologies and challenges for developing an HVDC grid;
- (3) design, operation, control and protection of HVDC grids;
- (4) offshore wind power technology, offshore energy islands and synergy with DC technology.

The course is partly based on the books: "HVDC Grids: For Offshore and Supergrid of the Future", edited by Dirk Van Hertem, Oriol Gomis-Bellmunt and Jun Liang, and "Design, Control and Application of Modular Multilevel Converters for HVDC Transmission Systems" by Kamran Sharifabadi, Lennart Harnefors, Hans-Peter Nee, Staffan Norrga, and Remus Teodorescu

Course program

DAY 1 - November 17th 2025						
Registration		8:30	-	9:00		
Intro to the course and HVDC systems (fundamentals, applications)		9:00	-	9:40	Staffan Norrga	KTH
Intro HVDC (basics, monopole, bipole, ac compared to dc, ...)		9:40	-	10:20	Dirk van Hertem	KUL
Grid-forming and grid codes		10:20	-	11:00	Xiongfei Wang	KTH/Tsinghua
Break		11:00	-	11:15		
HVDC power engineering - Manufacturer perspective		11:15	-	12:00	Jürgen Häfner	Hitachi
Operator perspective		12:00	-	12:30	Perry Hofbauer	SSEN
Offshore transmission developer perspective		12:30	-	13:00	Ervin Spahic	Elia Windgrid
Lunch		13:00	-	14:30		
Offshore wind technology		14:30	-	15:00	Oscar Saborío-Romano	DTU
Practise module 1 - Design of offshore wind transmission systems (DTU) and HVDC Grid Planning (KUL)		15:00	-	18:00	Oscar Saborío-Romano and Giacomo Bastianel	DTU & KUL

DAY 2 - November 18th 2025						
MMC 1 – Looking detailed at the MMC inside (<i>from semiconductor to cell to arm, PWM, arm balancing, low-level control & protection</i>)		9:00	-	10:00	Staffan Norrga	KTH
VSC & MMC 2 – (<i>from simple PE converter to MMC</i>)		10:00	-	11:00	Adrià Junyent-Ferré	Imperial College
Break		11:00	-	11:30		
MMC 3 - principles of operation (<i>higher level MMC control</i>)		11:30	-	12:15	Eduardo Prieto-Araujo	UPC
Practise module 2 -VSC and MMC modeling		12:15	-	13:00	Adrià Junyent-Ferré	Imperial College
Lunch		13:00	-	14:00		
Practise module 2 -VSC and MMC modeling		14:00	-	15:00	Adrià Junyent-Ferré	Imperial College
Break		15:00	-	15:30		
HVDC circuit breakers		15:30	-	16:15	Staffan Norrga	KTH/ Scibreak
Insulation coordination and high voltage equipment for HVDC		16:15	-	17:00	Willem Leterme	RWTH
HVDC Cables		17:00	-	17:45	Markus Saltzer	NKT
DAY 3 - November 19th 2025						
Operation and control principles for HVDC grids		9:00	-	9:45	Jef Beerten	KUL
Impedance Analysis and Stability Assessment of MMCs		9:45	-	10:30	Mehrdad Nahalparvari	Hitachi Energy
Break		10:30	-	11:00		
HVDC fault analysis & RMS/EMT modeling of systems with HVDC		11:00	-	11:45	Vinícius Albernaz-Lacerda	UPC
Ancillary services from offshore wind power and HVDC grids		11:45	-	12:30	Oscar Saborío - Romano	DTU
Lunch		12:30	-	13:30		
HVDC grid protection		13:30	-	14:15	Ilka Jahn	KTH
Standardization of HVDC and HVDC grids		14:15	-	15:00	Frank Schettler	Siemens Energy
Break		15:00	-	15:30		
Practise module 3 – Protection of HVDC systems		15:30	-	17:00	Ilka Jahn	KTH

Intended Audience

The course would suit anyone who works in HVDC and/or offshore wind power integration related topics, especially would suit graduate power systems engineers, postgraduate students, power systems researchers who are starting to work in HVDC and/or offshore wind and junior engineers who want to extend their knowledge. This course is also a great opportunity to meet and communicate with the experts and colleagues who work in the HVDC field.