ENG-601

Digitalization in electricity systems

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Cursus	Sem.	Type
Energy		Opt.

Language of teaching	English
Credits	2
Session	
Exam	Term paper
Workload	60h
Hours	**40**
Courses	16
TP	24
Number of positions	**20**

Frequency

Every year

Remark

The limited number of 20 places will be filled on a first-come first-served basis. Registration closes September 30th.
December 6 - 8th

Summary

Participants will be equipped with specialized knowledge, grounded on latest academic research and professional practice, on potential applications and risks digitalization tendencies pose to the operation and planning of electricity systems.

Content

The proposed lecture will consist of the following building blocks:

1. Digital transformation, digitalization and digitization:

- Definitions, drivers and patterns.
- A short history of digitalization
- Digitalization theories

2. An overview over digital innovations and technologies

- Internet-of-Things
- Big Data
- Artificial Intelligence
- Distributed Ledger
- and other...

3. Applications of digital innovations across the electricity value chain

- Digital Innovation in the Energy Sector - An international overview
- Forecast techniques for electricity demand and generation
- Peer-to-pper trading or the end of traditional electricity trade?
- Data hubs for to electricity transmission and distribution operators
- Aggreagation models of electricity consumers

4. Emerging risks through digitalization

- Electricity demand of data centers
- The challenge of data valorisation and data privacy

- Cyber attacs and cyber security
- Ethical aspects of Artificial Intelligence

5. Steering digitalization in the â##rightâ## direction:

- Digitalization policies
- Data privacy and protection policies
- Dynamic regulation
- Regulatory experimentation

Content and scope are constantly reviewed and may be slightly updated/adjusted before each edition.

At the end of the lecture block, term papers (6 pages) will be presented to and graded by course partipants.

Note

The lecture will integrate short presentations from external high-level professionals from the electricity industry, public administration and academia, providing excellent opportunity for networking and idea exchange with leaders in the field.

Learning Prerequisites

Important concepts to start the course

A good understanding of the planning and operation of electricity systems is recommended.

Learning Outcomes

By the end of the course, the student must be able to:

- Develop familiarity on the vocabulary of the digital transformation, its main theories, and possess the tools to analyze and mitigate effects of digitalization onto electricity

Expected student activities

half day excursion to a data center or similar

Assessment methods

Term paper

Resources

Bibliography

F. Sioshansi (2020): Behind and Beyond the Meter - Digitalization, Aggregation, Optimization, Monetization
IEA (2017): Digitalisation and Energy - Technical Report
IEA (2020): Data Centres and Data Transmission Networks - Technical report.

Ressources en bibliothèque

- Digitalisation and Energy - Technical Report / IEA (2017)
- Behind and Beyond the Meter - Digitalization, Aggregation, Optimization, Monetization / Sioshansi
- Data Centres and Data Transmission Networks - Technical report - EIA (2020)