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**
Lecture	16
Practical work	24
Number of positions	**15**

Frequency

Every year

Remark

The limited number of 15 places will be filled on a first-come first-served basis. Registration closes September 30th. The course runs from 28th - 30th November 2022.

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
- Peer-to-peer trading
- Artificial Intelligence
- Distributed Ledger
- and other...

3. Selected applications across the electricity value chain

- Digital innovation in the electricity sector - An international overvie
- Forecasting techniques for electricity demand and generation
- Peer-to-peer trading
- Data hubs for to electricity transmission and distribution operators
- Aggregation of electricity consumers and flexibility
- Scarcity event analysis in resource adequacy studies

4. Emerging risks through digitalization
- Electricity demand of data centers and infrastructure
- Data privacy
- Cyber attacs and cyber security
- Ethical aspects of artificial intelligence

5. Steering digitalizationin the electricity sector
- Policy making â## an introduction
- Digitalization policies & strategies
- Data privacy and protection policies
- Dynamic regulation and sandboxes
- Regulating AI, cyber security and digital platforms

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

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 with the vocabulary of the digital transformation, its main theories, and possess the tools to analyze and mitigate effects of digitalization on electricity systems.

Expected student activities

Presentation and participation in a 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 Centers and Data Transmission Networks - Technical report.

Ressources en bibliothèque

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