ELEC-E8423 Smart Grid - Course topics 2023

1. **Wind power generation variation and its modeling. Rehan Muhammad, Williams Immanuel (25.4.)**
2. **Solar power generation variation and its modeling. Hänninen Juho, Huotari Ilari (25.4.)**
3. **Role of DR, storages and hydrogen in future energy systems. Ranjan Prabhat and Sarkkinen Veikka (7.3.)**
4. **Battery energy storage systems. Asikainen Ella and Björkstam Maximilian (25.4)**
5. **Compressed air energy storages. Keino Eetu and Nguyen Phong (7.3)**
6. **Pumped hydro energy storages. Moilanen Klaus and Kettunen Oskari (7.3.)**
7. ***Power to gas applications. Moghimy Fam amin, other place vacant (2.5.).***
8. **Thermal heat storages for daily and seasonal use. Härmä Helmi and Lappalainen Siiri (14.3.)**
9. **Fuel cells as a part of power system. Seppälä Simeon and Tikkanen Onni (7.3.)**
10. **Electric vehicles and their charging systems. Md Tausif Alam and Khadka Suman(28.3.)**
11. **Modelling of Electric Vehicle charging load. Efaz Tanjim and Geekiyanage Viduruwan(28.3.)**
12. **Demand response of EV loads. Lehtinen Antti, Laitinen Antti (4.4.)**
13. Demand response of HVAC loads.
14. **Electrical energy use in residential buildings. Flex./DR pot. of energy uses. Abbasi Mohammad (14.3.)**
15. DR limitations set by human comfort requirements. Heat gains, heating and cooling, and demand flexibility.
16. ***Demand response of industrial loads. Kukkonen Joona, the other place vacant(21.3.)***
17. Demand response of commercial loads.
18. Self-healing networks; automatic switching applications (FLIR).
19. Methods for fault location and detection in SG.
20. Distribution system state estimation in SG
21. Dynamic thermal rating of SG components
22. Monitoring and control of secondary substations
23. Communication solutions for SG.
24. AMR – systems in SG (Automatic Meter Reading).
25. **Power markets in Nordic Countries: Day ahead market and intra-day balancing. Kauppi Janne and Tattari Juuso(28.3)**
26. ***Power markets in Nordic Countries: Freq. containment and freq. restoration reserves. Melanen Peetu, 2. place free (25.4.)***
27. Prosumer / Consumers. Local energy resources and local energy matching.
28. **Different market mechanisms for SG: bidding, real-time pricing, block chains. Erno Huotari(14.3.)**
29. Technical solutions in Micro Grids.
30. **Power and Energy Balance management in Micro Grids. Ishaq Danish and Akrami Freshteh (14.3.)**
31. Interconnection of Micro Grids with each other / power system.
32. **Demand response in power system energy balance management. Nurmiainen Sonja and Kuula Emma(21.3.)**
33. Demand response in distribution grid congestion management.
34. PV hosting capacity of low voltage and medium voltage grids.
35. Active voltage control in SG.
36. **Monitoring and control in SG. SCADA and NIS systems. Koveshnikov Semen and Aura Matias.(4.4.)**
37. **Network impacts of distributed generation. Voltages and relay protection. Vaara Pyry, Leppänen Pinja (28.3.)**
38. Power Quality issues in SG.
39. **Wind farms, their local grids and connection to the power system. Rantala Tanja and Eloranta Alissa(18.4.)**
40. ***Solar farms, their local grids and connection to the power system. Aren Conny, other place vacant (4.4.)***
41. **Supergrids. Canal Antonin and Bratzke Julian.(18.4.)**
42. **Future street lights. Laaksonen Anna, Rönkkö Jaan (28.3.)**
43. **Smart Meters and their Security Issues. Helin Aleksi (2.5.)**
44. Smart Grids and electrical safety.
45. **Concentrating solar power and its comparison to photovoltaics. Virtanen Eljas and Manninen Markus (4.4)**
46. **Sector coupling of power and heat. Bäck Jimi and Krumtünger Linn (18.4.)**
47. **Deep heat energy wells for ground source heat pump systems. Laine-Ylijoki Juho and Kanerva Markus(21.3.)**
48. ***Electrical buses and their charging solutions. Männistö Miku, the other place vacant(25.4.)***
49. ***Electrical trucks and their charging solutions. Geust Alexander, the other place vacant (2.5.)***
50. **Energy communities. Edo Rodriguez Xavi, Selonen Eira (18.4.)**