47202 - Introduction to Future Energy - E2023

Version 28-08-2023

Tuesday afternoon 13.00-17:00
Lectures: building 303A, auditorium 42, 13:00 to 15:00
Activities: building 303A area OEST and area VEST 15-17, 13:00-15:00

Lecture	Title	Content	Teacher	*
Introduction				
1 (29/8)	Introduction	Background for the future energy system The challenges (Climate, ressources, security) Supply vs. demand. Energy sources and energy carriers. Quantification of sources	Peter C. K. Vesborg + Jens Oluf Jensen	P
Energy sources I				
2 (5/9)	Wind	Wind turbines, implementation	Asger Bech Abrahamsen	W
3 (12/9)	Water	Wave, geothermal, tidal, salinity and OTEC	Ming Chen	E
4 (19/9)	Nuclear	Fission, fusion, implementation	Bent Lauritzen	P
5 (26/9)	Solar	Photovoltaics, CSP, incl. direct solar-to-fuel, implementation	Peter C.K. Vesborg	P
6 (3/10)	Biomass	Biomass and biofuels, implementation, role in the energy system	Lasse R. Clausen	C
Energy conversion and storage I				
7 (10/10)	Thermodynamics, electrochemistry	The need to know for energy technologies from thermodynamics and electrochemistry	Jens Oluf Jensen	E
8 (24/10)	Energy storage	The basics and the integration of renewables. Hydropower for storage.	Ming Chen	E
9 (31/10)	Fuel cells and hydrogen	Fuel cell technology and hydrogen as an energy carrier	Jens Oluf Jensen	E
10 (7/11)	Power-to-X	From electrical energy to fuels. Hydrogen production, synthetic fuels, CCU and CCS.	Jens Oluf Jensen	E
11 (14/11)	Batteries	Batteries and flow batteries, role in the energy system, applications, implementation	Tejs Vegge	E
Wrapping up				
12 (21/11)	Infrastructure and cost	Grid, energy infrastructure, smart-grid, scalability, CAPEX/OPEX.	Peter C. K. Vesborg	P
13 (28/11)	Wrap-up	Wrap-up and course evaluation. Outro talk on future energy /the big picture	Jens Oluf Jensen	E

** C: DTU Construct, E: DTU Energy, P: DTU Physics, W: DTU Wind.*

14/12	Exam	Multiple choice, 2 hours, no aid (*time of the day pending*) (E4A)