

EIEN10 – Wind Power Systems

Course program 2021

Overview

The course provides 7.5 credits and includes 14 lectures, 6 exercises, 2 assignments, 1 project, 1 micro-siting exercise, 1 simulation exercise and 1 laboratory exercise. The course information can be found at the course web site www.iea.lth.se/wps/

Minimum requirements to pass

Approved project, assignments, micro-siting exercise, simulation exercise, laboratory exercise and written exam.

Exam

Written exam: Monday 10th January 2022 at 14.00-19.00, room Eden 025 (grade U, 3, 4 or 5).

Literature

James F. Manwell, Jon G. McGowan, Anthony L. Rogers: Wind Energy Explained: Theory, Design and Application, 2009, 2nd International Edition, ISBN: 9780470015001

Course schedule:

W	Monday 15.15-17.00 E:C (V:C week 1)	Wednesday 15.15-17.00 KC:D	Friday 13.15-15.00 KC:E (E:C week 2 & 3)
1	L1 (V:C)	L2	-
2	L3	L4	E1 (E:C)
3	L5	L6	E2 (E:C)
4	L7	L8	E3
5	L9	L10	E4
6	L11	L12	E5
7	L13	L14	E6

L=Lecture, E=Exercise

Lecture program:

	Topic	Book	Responsible
L1	Introduction, Course information Wind turbines - overview	[1,6,8,12]	JS
L2	Wind turbines - historic and modern Wind energy applications, <i>-Project assignment</i>	[6,7,8,10]	JS
L3	Large-scale offshore wind power plants: Rödsand 2 (Overview - Siting, System design, Construction)	[9]	JS
L4	Localisation, Siting Wind characteristics and resources <i>- Assignment1: wind energy and production estimate</i>	[2,9]	JS
L5	Environmental aspects and impacts Micro-siting, system design (optimizing, wake) <i>- Micro-siting exercise (description)</i>	[9,12]	JS
L6	Micro-siting, (construction investment, losses) Wind energy system economics (cost analyses) <i>- Assignment2: project financials</i>	[9,11]	JS
L7	Guest lecture: Enercon Wind Turbines - Grid Integration and Wind Farm Control Aerodynamics of wind turbines (models)	[3,5,8,9]	JS/Extern JS
L8	Mechanics and dynamics (models)	[4,6,7]	JS
L9	Electrical aspects of wind turbines (models) <i>- Simulation and Laboratory exercises (description)</i>	[5]	JS
L10	Grid integration Wind turbine control (models)	[8,9]	JS/Extern
L11	Material and components (wear & tear, availability) Operation & maintenance (availability, efficiency)	[6,8]	JS JS/Extern
L12	System control and wind power integration	[8, 9]	JS
L13	Energy markets and wind power interaction Wind forecasting and impacts	[9]	JS/Extern JS/Extern
L14	Project presentations and oppositions Repetition		JS

Exercise program:

	Problems from the textbook	Responsible
E1	2.1, 2.2, 2.3, 2.4 2.5, 2.6, 2.7, 2.8, 2.10	JS
E2	12.4, 12.5, 12.6, 12.7, 9.1, 9.2, 9.3, (9.9, 9.10) 11.1, 11.3, 11.4, 11.7, 11.8	JS
E3	3.1, 3.2, 4.1, 4.2, 4.3, 4.4, 6.1, 6.2, 6.6, 6.9, 6.11	JS
E4	5.4, 5.5, 5.6, 5.8, 5.9, 5.11, 5.13. 5.16, 9.5, 9.6	JS
E5	8.5, 8.6, 8.10 (+availability)	JS
E6	10.1, 10.2 (+reserve)	JS

Project, assignments, micro-siting, simulation and lab exercises

Information and instructions can be found on the course website www.iea.lth.se/wps/.
The micro-siting, simulation and lab exercises will be scheduled during week 4-7.

Study visit

A study visit is planned to Lillgrund Wind Farm in week 1-4 depending on number of visitors, weather, logistics and COVID-19 recommendations.

Personnel & Student Office

Jörgen Svensson, course coordinator, lectures, exercises and simulation exercise,
jorgen.svensson@iea.lth.se, 046-222 9288

Hannes Bydén, micro-siting and simulation exercises,
hannes.byden@iea.lth.se

Max Collins, laboratory exercises,
max.collins@iea.lth.se

Carina Lindström, Student office.

The IEA student administration is located in M-house, second floor, opening hours 11.00-12.30, studexp@iea.lth.se, 046-222 92 90.