EG2340 Wind Power Systems 7.5 credits

Vindkraftsystem

This is a translation of the Swedish, legally binding, course syllabus.

Establishment

Course syllabus for EG2340 valid from Autumn 2015

Grading scale

A, B, C, D, E, FX, F

Education cycle

Second cycle

Main field of study

Electrical Engineering

Specific prerequisites

• In total 60 HEC within mechanics, physics, electrical engineering or mathematics

• MJ1520 Statistics and risk assessment or SF1901 Probability theory and statistics (or equivalent)

• English B/English 6 (or equivalent)

Language of instruction

The language of instruction is specified in the course offering information in the course catalogue.

Intended learning outcomes

The course aims at providing knowledge about the wide area of technology that is needed for persons working in the wind energy industry or related industry, like generation or network companies. The course also provides a general knowledge in this wide area.

To pass the course, the students should show that they are able to

- give some basic definitions (power curve, overall efficiency, Betz limit, stall and pitch regulation, etc.),
- describe basic concepts, such as power in the wind, vertical distribution of wind speeds, power production and efficiency of a wind turbine, energy yield of a wind turbine from a site,
- calculate energy yield of a wind turbine using actual wind speed measurements or approximate data,
- describe the main wind turbine design concepts, main differences, advantages, disadvantages,
- describe basic concepts from grid integration of wind turbines (voltage at the connection point, active, reactive power, strength of the grid, power quality of a wind turbine),
- describe effects that wind power has on power system operation and grid investments,
- describe operation of hybrid systems (wind/diesel, wind/battery/diesel),
- describe effects that wind power has on environment,
- describe different economical support schemes for wind power.

In order to receive a higher grade (A-D), you will also need to show that you are able to

- derive the important formulas studied during the course (power in the wind, Betz limit, etc.),
- analyse and compare characteristics of different wind turbines,
- present some control possibilities of wind turbines,
- analyse wind conditions, and wind farm layout possibilities of the particular site,
- perform basic calculations and analysis for grid connection of a wind turbine,
- describe main aspects treated in the Grid Codes for connection of wind turbines and explain why those aspects are important.

Course contents

Wind energy technology covers many technological aspects, like aerodynamics, mechanics, physics and electrical engineering. Hence, the course intends to provide a wide overview of, for example, the physical power in the wind, the historical development, the wind energy industry, market regulations, wind turbine design concepts, environmental impact of wind turbines, economics, network integration, stand-alone systems and offshore wind power systems.

An important part of the course is a team assignment. In this assignment, the team will perform a feasibility study for a wind energy project.

Disposition

Lectures, exercise sessions, project work.

Examination

- PRO1 - Project Work 1, 1.5 credits, grading scale: P, F
- TEN1 - Examination, 6.0 credits, grading scale: A, B, C, D, E, FX, F

Based on recommendation from KTH's coordinator for disabilities, the examiner will decide how to adapt an examination for students with documented disability.

The examiner may apply another examination format when re-examining individual students.

If the course is discontinued, students may request to be examined during the following two academic years.

The final grade is equal to the grade of the exam.

Other requirements for final grade

Each part of the examination must be passed.

Ethical approach

- All members of a group are responsible for the group's work.
- In any assessment, every student shall honestly disclose any help received and sources used.
- In an oral assessment, every student shall be able to present and answer questions about the entire assignment and solution.