



FEG3231 Wind Power Systems, Graduate Course 10.0 credits

Vindkraftsystem, doktorandkurs

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

Establishment

Course syllabus for FEG3231 valid from Autumn 2011

Grading scale

G

Education cycle

Third cycle

Specific prerequisites

The course is intended for Ph.D. students in electric power systems, but can also be interesting for students from other fields of electrical engineering.

Language of instruction

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

Intended learning outcomes

After the course, the student should be able to

- give some basic definitions (power curve, overall efficiency, Betz limit, stall and pitch regulation, etc.),
- understand basic concepts 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 certain site,
- describe four main wind turbine design concepts, main differences, advantages, disadvantages,
- understands 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 some 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,
- 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,
- calculate energy yield of a wind turbine from a certain site using actual measurements or approximate data,
- 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,
- work in a group,
- make presentations,
- reflect on the role of wind power in power systems.

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, home assignments, 5 h exam, team assignment, individual project assignments.

Course literature

Examination

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 project assignments are chosen by students in agreement with their supervisors and the examiner of the course.

Other requirements for final grade

- Approved home assignments.
- Passed the exam.
- Approved team assignment.
- Approved project assignments.

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.