

Design of Wind Energy Plants, 7.5 credits

Vindkraftprojektering, 7.5 hp

Second level

Main field: Energy Engineering AIN

Syllabus is adopted by the Research and Education Board (2015-02-24) and is valid for students admitted for the autumn semester 2014.

Placement in the Academic System

The course is included in Master's Programme in Renewable Energy Systems

Prerequisites and Conditions of Admission

90 credits Energy Engineering.

Course Objectives

This course will provide knowledge and insight within design of wind power plants in terms of both energy and environmental impact. The course will also provide training and skills in application of research and training in the critical evaluation of research results especially when considering different practical application.

Following successful completion of the course the student should:

Knowledge and Understanding

- Obtain current and new information on electricity generation from wind energy and use it.
- Understand the importance of electricity production in a broader energy technical context.

Skills and Ability

- Thorough understand all aspects of a wind power project; from initial wind measurements to the permit process and independently with supervision be able to manage projects.
- Design wind projects and energy and able to calculate the environmental impact and evaluate projects from both a financial and environmental perspective.
- Document the consideration, calculation and measurements.
- Introduce wind energy projects for clients, agencies and mass media, as well as local opinion.

Judgement and Approach

- Evaluate the technical development and research findings in a larger scientific context.
- Critically evaluate own and others' results and relevance for the area.
- Manage and respond to the authorities and opinioners attitude to wind power projects. To be able to evaluate external opinions and arguments in the process.

Primary Contents

In this course previous knowledge in wind power technology will be deepened. The course will thoroughly examine the issues that has earlier only been superficially treated in basic courses; such as noise, reflexes, shadows and powerline interference. Methods to calculating and to practically investigate these interference with measurements will be used.

The course aims to give aspiring designers advanced knowledge so that future projects can be implemented with minimal interference. The course is linked to the following courses; Production of Energy from Renewable Energy Sources and Environmental Impact of new Energy Production Plants

Detailed parts of the course are: Designing, Calculation of production, Wind measurements. Methods for wind measurements, anemometers, SODAR, Weibull distribution and statistical accuracy, Investment decisions taken on the mapping and measurements, Placement, Planning issues, permits, Environmental impact descriptions, Environmental assessments, Foundations and road connection. Electrical connection. Calculations on the grid, Interference (such as Flicker, Flimmer, transients, reactive power balance, etc.) and how they can be reduced, Electrical protection and operation monitoring, Contacts with authorities, landowners and other stakeholders, pitfalls in the project and the permitting process, Profit calculations, Legal questions, Wind Power Market, Operational and Maintenance, Service Procedures, Longevity and settlement, Research in the area and finally Study Visits.

Teaching Formats

The course includes lectures, exercises and laboratory tests as well as field trips.

The course literature is in English.

The course includes an compulsory series of seminars and a project. At the seminars the students are expected to present and discuss a subject in the course. The teachers decide which areas that are relevant for the course. The project addresses the calculation of energy production at a wind farm. Acoustic emission calculations will be done. The result from the project should be presented in a report which also must be orally presented.

Examination

The overall grades of Fail, 3, 4 or 5 will be awarded for the course.

The examination consist of a written examination

Course Evaluation

Course evaluation is part of the course. This evaluation should offer guidance in the future development and planning of the course. Course evaluations should be documented and made available to the students.

Course Literature

(Revised 2015-02-19)

Tore Wizelius; Wind energy projects, Studentlitteratur

Webb pages e.g Danish Wind Industry Association

When the course starts additional current articles and research reports within the field will be presented