DALARNA UNIVERSITY

Course Syllabus

Energy Systems 7.5 Credits*, First Cycle Level 2

Learning Outcomes

Upon completion of the course, the student will be able to:

- analyze energy systems from a holistic perspective by identifying and analyzing the functions of the major components and the way they are connected to a functioning system
- choose a model for analysis of energy systems and evaluate the results on the basis of reliability in the used computational models
- show an understanding of the energy system´s role and its development from a socio-technical and techno-economic perspective
- work in groups and interact with companies or other external parties when executing a projects
- present and discuss, both orally and in writing, project results

Course Content

This course deals with complex energy systems, meaning systems that include both the supply and use of energy. This can, for example, be municipal energy systems that include district heating and its use in the built environment as well as, industrial energy systems that include primary resources for electricity and heat in processes and support systems or an overview of regional energy systems from primary energy resources for use in various sectors of society.

The concept of energy systems will also be widened to include a socio-technical system approach, which means that social components are included in order to explain how systems are designed and how they change over time depending on how professional actors act and how business investments, institutional regulations and policy instruments affect their decisions.

A number of lectures are given initially in order to provide examples of various types of provincial, municipal and industrial energy systems with regards to current legislation and policy instruments at the national and EU level, commercial grounds for investment and user issues related to energy use. The course includes exercises and home assignments in modeling and simulation of energy systems with several types of models.

* 1 Credit = 1 ECTS

Throughout the course a project, in the form of a case study, will be carried out. The formulation of the problem originates in a real project in a company. The task can be compared to a consultant assignment and can, for instance, be to examine the changes in a system where you want to achieve lower energy use or power peak levelling. The project is carried out in a group and in close cooperation with one (or more) companies. During the project, feedback is provided to the group in seminars. Presentation at the company is also included. It should be possible to use the same case study to make resource and environmental assessments in the parallel course Resource and Environmental Impact of Energy systems.
The course prepares students for independent work (the thesis).

Assessment
Project (including written report and oral presentation) (5 credits)

Individual assignments (2.5 credits)

Forms of Study
Lectures, excercises , home assignments, seminars, project

Grades
The Swedish grades U, 3, 4, 5.

Individual assignments: U, G

Prerequisites
Electrical Power systems, 7.5 credits, first cycle
Building services technology 7,5 credits first cycle level
District Heating Technology 7,5 credits first cycle level 2 or equivalent knowledge

Subject:
Energy Technology

Group of Subjects:
Energy Technology

Disciplinary Domain:
Technology, 100%

This course can be included in the following main field(s) of study:
1. No main field of study

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Progression Indicator within (each) main field of study:
1. G2F

Approved:
Approved 8 October 2015
Valid from 1 December 2015