MJ2503 Small Scale Polygeneration 6.0 credits

Polygenerering - småskaliga system

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

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

Establishment

Course syllabus for MJ2503 valid from Autumn 2017

Grading scale

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

Education cycle

Second cycle

Main field of study

Mechanical Engineering

Specific prerequisites

- 2nd year TMESM(SELECT Master) students

Language of instruction

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

Intended learning outcomes

After completing the course, students should be able to:

- In detail describe the technical concept of cogeneration of multiple energy services with flexible fuel input, specifically with regards to
- Characteristis of various energy converters, and their suitability for different system configurations.
- Efficiency as compared to stand-alone production.
- Environmental as well as economical performance.
- consideration of the distribution in time of energy supply and demand of energy services.
- Describe and carry out engineering design of smart buffers (batteries, hot and cold thermal energy storage, pure water reservoirs, etc)
- Describe and carry out engineering design of functional control strategies for integrated Polygeneration systems.
- Describe how small-scale Polygeneration systems can be operated if connected to a grid vs. being stand-alone, where the grid can be a classic national grid or a grid with distributed power generation.
- Carry out advanced thermoeconomic optimizations for design of technically robust, and environmentally and economically sound polygeneration of energy services, as applied to practial need in various situations (e.g. industrial processes, the built environment and transportation)

Course contents

In the Polygeneration course, cogeneration of multiple energy services (heat, power, cold, pure water…) using flexible fuel input to allow for a sustainable energy mix will be in focus. The following sub-topics will be covered:

- Cogeneration;

- Control principles and strategies;

- The integration of smart buffers: batteries, thermal energy storage, pure water reservoirs, etc; and

- Thermoeconomic optimization of polygeneration systems.

Thus, the course aims at integrating those engineering skills previously aquired as applied to energy efficient energy conversion pathways -- Polygeneration.

Course literature

- Utdelat och inspelat material
- Vetenskapliga artiklar genom KTHB

- CompEDU www.compedu.net
- Lecture Handout and recordings
- Scientific articles available through KTH library
- CompEdu www.compedu.net

Examination

- INLA - Assignments, 1.0 credits, grading scale: P, F
- PROA - Project work, 3.0 credits, grading scale: A, B, C, D, E, FX, F
- TENA - Written exam, 2.0 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.

Other requirements for final grade

- TENA -- Written Exam 2hp, Grading A-F
- INLA -- Assignment 1 hp, Grading P/F
- PROA -- Project, 3hp, Grading A-F

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.